




# **K•STATE**

**UNDERGRADUATE  
CATALOG  
1994-1996**



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# K-State Undergraduate Catalog 1994–1996

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## Information

You may call toll-free for information about  
admission to Kansas State University.

### Undergraduate students

Dial 1-800-432-8270 from any place in  
Kansas 24 hours a day. Outside of Kansas dial  
(913) 532-6250.

Prospective students should contact the Office  
of Admissions, 119 Anderson Hall, Kansas  
State University, Manhattan, KS 66506-0102.

### Graduate students

Dial 1-800-232-0133, ext. 6194, 24 hours a  
day. Outside the United States dial (913)  
532-6191.

Prospective students should contact the  
Graduate School, 102 Fairchild Hall, Kansas  
State University, Manhattan, KS 66506-1103.

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# About the Catalog

The K-State *Undergraduate Catalog* is a reference for those interested in academic policies, procedures, and programs of the university. Refer to the table of contents or the index for specific topics of interest.

Degree requirements and programs are organized by colleges and departments. Course descriptions are provided to help you and your academic advisor plan your academic choices.

## Course Descriptions

The following course description key explains the system used for courses listed throughout the catalog.

### Sample course description

**ENGL 425. Women in Literature.** (3) I, II, S. Literary works, by or about women. Treats individual writers, writers considered within various traditions, themes, or formal issues. Pr.: ENGL 120 or 125.

The letters **ENGL** denote the department in which the course is offered (in this case, English).

The three digits of the course number **425** represent the level of the course.

#### Level numbers:

- 000–099 Not applicable toward degree requirements.
- 100–299 Lower division undergraduate. Designed as freshman or sophomore course.
- 300–499 Upper division undergraduate. Designed as junior or senior course.
- 500–699 Upper division undergraduate. Primarily for a junior or senior, but also may be taken for graduate credit. A course numbered 500 may be taken for graduate credit only in a minor field. A course numbered 600 may be taken for credit in a graduate student's major.
- 700–799 Graduate and upper division, primarily for graduate level.
- 800–899 Graduate level for master's course or professional course beyond the undergraduate level.
- 900–999 Graduate level, primarily for doctoral candidate.

The number in parentheses (**3**) following the course title indicates the units of credit given for the course.

The **I, II, S**, and/or **intersession** following the course title indicate the semester, or semesters, each course is usually offered; **I** stands for fall semester, **II** for spring, **S** for summer term, and **intersession** for the term between semesters.

The abbreviation **Pr.** indicates prerequisites for the course. In the sample course, students would be required to have completed either ENGL 120 or ENGL 125 before enrolling for ENGL 525. Some courses may allow or require concurrent enrollment in other courses. This is indicated by the abbreviation **Conc.**

## Faculty Lists Key

In the departmental sections, faculty members are listed by their last names. Those on the graduate faculty have an asterisk following their names.

An all-inclusive faculty and administration section precedes the index. This section lists each faculty member's full name, academic degrees, and year of first appointment at K-State (in parentheses). Those on the graduate faculty have an asterisk following their names.

## Contacts

All phone numbers are (913) area code, except where noted. All addresses are Manhattan, Kansas, 66506, except where noted.

## Other Publications

Other K-State publications are available on request from the offices listed below.

### Office of Admissions

119 Anderson Hall, 532-6250

*K-State Admissions Guide*: an introduction to Kansas State University, including photographs and undergraduate application information and forms.

### Division of Continuing Education

College Court Building, 532-5687

*Summer School Bulletin*: course descriptions and admission information. Available in early spring.

*After Hours*: information and course descriptions for classes starting after 4 p.m. on campus during fall and spring semesters. Available in December and July.

### Graduate School

101 Fairchild Hall, 532-6191

*The Graduate School*: an introduction to K-State's graduate programs that includes photos and admission information.

*K-State Graduate Catalog*: descriptions of graduate programs, courses, and policies.

### K-State Union Bookstore

K-State Union, First Floor, 532-6583

*Class Schedule*: a description of the courses offered during an academic semester/term.

# About the University

## Kansas State University

The university was founded February 16, 1863, 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 664-acre campus is in northern Manhattan, convenient to both business and residential districts. Under an enactment of the 1991 Kansas Legislature, the Salina campus was established through a merger of the former Kansas College of Technology with the university.

Additional university sites include 18,000 acres in the four branch locations of the Agricultural Experiment Station—Hays, Garden City, Colby, and Parsons—and 8,600 acres in the Konza Research Prairie jointly operated by the AES and the Division of Biology.

One of the six universities governed by the Kansas Board of Regents, Kansas State University continues to fulfill its historic educational mission in teaching, research, and public service.

## Objective of the educational program

The objective of the educational program at Kansas State University is to develop individuals capable of applying 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 at the university. Specifically, this means to:

**A.** Learn and make known to students all that is possible and useful about their interests, aptitudes, and abilities.

**B.** Apply that knowledge to the students' choice of courses and curricula as fully as possible without encroaching harmfully on their initiative and feeling of self-responsibility.

**C.** Provide continuing guidance for students according to their needs.

**II.** To prepare students for an occupation or a profession which includes an organized body of information and theory so they may realize their creative potential. More specifically this means that students should acquire:

**A.** The ability to recognize and master fundamental principles in their fields of specialization.

**B.** The knowledge basic to their special fields of study.

**C.** The ability to reason critically from facts and recognized assumptions to useful technical conclusions.

**D.** The basic skills associated with their fields of study.

**E.** A professional attitude in their chosen work.

**III.** To provide all students with an opportunity to gain the knowledge and abilities members of a democratic society need, whatever occupation or profession they expect to enter. Specifically, this means that through its program the university undertakes to help the student:

**A.** Develop communication skills.

**B.** Develop the ability to apply critical and creative thinking to the solution of theoretical and practical problems.

**C.** Understand the basic concepts of the natural sciences, the interrelations of the natural and social sciences, and the impact of science on society.

**D.** Comprehend and evaluate the processes and institutions in society at home and abroad, and develop a dynamic sense of personal responsibility as effective citizens in a democratic society.

**E.** Develop habits of self-evaluation, responsibility, and enterprise that will increase the effectiveness of the educative process in college, and provide the basis for continued self-improvement.

**F.** Develop a well-adjusted personality, good character traits, and a sound philosophy of life.

**G.** Prepare for effective participation in family life.

**H.** 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 that the institution serves.

## Accreditation

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.

## Faculty

The faculty at Kansas State University are dedicated to excellence in teaching, student advising, research, extension education, scholarly achievement, and creative endeavor.

K-State recognizes superior teaching with annual faculty awards. Citations for the Outstanding Teachers of the Year and for Distinguished Graduate Faculty Members are presented at Commencement. The university also honors faculty members who contribute to the expansion of knowledge in their respective fields.

The faculty assume a major responsibility to participate in outreach activities that serve the citizens of the state, and many hold leadership positions in their disciplines and in professional organizations.

# Calendar

## Summer Term 1994

**June 6, Monday**  
Summer term enrollment.

**June 7, Tuesday**  
Term begins.

**July 4, Monday**  
University holiday. No classes.

**July 29, Friday**  
End of summer term examinations.

## Fall Semester 1994

**August 17–19, Wednesday–Friday**  
Registration.

**August 22, Monday**  
Semester begins.

**September 5, Monday**  
University holiday. No classes.

**November 23–25, Wednesday–Friday**  
Student holiday. No classes.

**November 24–25, Thursday–Friday**  
University holiday.

**December 9, Friday**  
End of semester.

**December 10, Saturday**  
Commencement.

**December 12–16, Monday–Friday**  
Semester examinations.

## Winter Intercession 1995

**December 27, 1994–January 10, 1995, Monday–Friday**  
Intercession.

## Spring Semester 1995

**January 9–10, Monday–Tuesday**  
Registration.

**January 11, Wednesday**  
Semester begins.

**January 16, Monday**  
University holiday.

**March 20–24, Monday–Friday**  
Student holiday. No classes.

**May 3, Wednesday**  
End of semester.

**May 4–6, 8–10, Thursday–Saturday, Monday–Wednesday**  
Semester examinations.

**May 12–13, Friday–Saturday**  
Commencement.

## Spring Intercession 1995

**May 15–June 2, Monday–Friday**  
Intercession.

## Summer Term 1995

**June 5, Monday**  
Registration.

**June 6, Tuesday**  
Term begins.

**July 4, Tuesday**  
University holiday. No classes.

**July 28, Friday**  
End of summer term examinations.

## Fall Semester 1995

**August 16–18, Wednesday–Friday**  
Registration.

**August 21, Monday**  
Semester begins.

**September 4, Monday**  
University holiday. No classes.

**November 22–24, Wednesday–Friday**  
Student holiday. No classes.

**November 23–24, Thursday–Friday**  
University holiday.

**December 8, Friday**  
End of semester.

**December 9, Saturday**  
Commencement.

**December 11–15, Monday–Friday**  
Semester examinations.

## Winter Intercession 1996

**January 2–16, 1996, Monday–Friday**  
Intercession.

## Spring Semester 1996

**January 15, Monday**  
University holiday.

**January 17–19, Wednesday–Friday**  
Registration.

**January 22, Monday**  
Semester begins.

**March 25–29, Monday–Friday**  
Student holiday. No classes.

**May 10, Friday**  
End of semester.

**May 13–17, Monday–Friday**  
Semester examinations.

**May 17–18, Friday–Saturday**  
Commencement.

## Spring Intercession 1996

**May 20–31, 1996**  
Intercession.

## Summer Term 1996

**June 3, Monday**  
Registration.

**June 4, Tuesday**  
Term begins.

**July 4, Thursday**  
University holiday. No classes.

**July 26, Friday**  
End of summer term examinations.

# Glossary and Abbreviations

**A/Pass/F:** A grading option in which a student earning a grade of A in a course will have an A recorded for that course; a grade of B, C, or D will be recorded as a Pass; and a grade of F will be recorded as an F.

**Academic load:** The total number of credit hours enrolled in during one semester.

**Academic warning:** An indication that a student is in academic difficulty which could lead to dismissal from the university.

**Advanced standing:** Having credit awarded for previous work or testing.

**Advisor:** A department- or college-based faculty member who helps students achieve their educational goals by providing guidance on courses, program requirements, prerequisites, programs of study, policies and procedures, and resources.

**Audit:** To attend a course regularly without participating in course work and without receiving credit.

**B.A.:** Bachelor of arts degree. Courses selected from a variety of disciplines with concentrations in one or two areas. A modern language is required for a B.A. degree.

**B.S.:** Bachelor of science degree. A specified program of required courses with fewer electives than the B.A. A modern language is not required.

**Baccalaureate:** Refers to the bachelor's degree.

**Classification:** Level of progress toward a degree with classifications of freshman, sophomore, junior, or senior, depending on the number of semester hours completed.

**College:** An academic unit of the university. Kansas State University has nine colleges.

**Cooperative education (co-op):** The integration of academic experience with planned employment experiences that relate to a student's academic major or career goals. The work experience supplements and complements the curriculum.

**Concurrent enrollment:** Taking a course during the same semester as another. Abbreviation: Conc.

**Course:** A unit of study a student enrolls in during a semester.

**Credit by examination:** Credit received when a student takes an oral or written examination without registering for a course.

**Credit hour:** A unit of measurement used in determining the quantity of work taken. Each credit hour is roughly equivalent to one hour of class time per week. For example, a class meeting three hours a week would be a three-credit-hour class. Abbreviation: Cr.

**Credit/No Credit:** A grading option with successful completion of a course recorded as Credit and failure as No Credit. No other grades are given for such courses and they are not figured into the grade point average.

**Curriculum:** A program of courses that meets the requirements for a degree in a particular field of study.

**Degree program:** Courses required for completion of a particular degree.

**Department:** A unit within a college representing a discipline.

**Discipline:** An area of study representing a branch of knowledge, such as mathematics.

**Dismissal:** A student who neglects his or her academic responsibilities may be dismissed on recommendation of an academic dean.

**Double major:** Having two programs of academic study.

**Drop/Add:** Changing the student's course schedule by adding and/or dropping a course.

**Dual degrees:** A student may elect to pursue two degrees at one time.

**Electives:** Courses chosen by a student that are not required for the major or minor. The number of hours of electives required varies according to student's major.

**Enrollment:** The process of selecting courses and having courses reserved.

**Equiv.:** Equivalent.

**Extracurricular:** Activities such as band or debate for which a student may earn credit toward graduation. Extracurricular activities are counted as electives.

**Financial aid:** Help for a student who lacks funds to pay for college. Aid is available from grants, loans, scholarships, and work/study employment.

**Grade point average (GPA):** A measure of scholastic performance. A GPA is obtained by dividing the number of grade points by the hours of work attempted, where an A = 4 points, a B = 3 points, a C = 2 points, a D = 1 point, and an F = 0 points.

**Hour:** The unit by which course work is measured. The number of semester hours assigned to a course is usually determined by the number of hours a course meets per week.

**Intersession:** Courses offered between fall and spring semesters and after spring semester.

**Lec.:** Lecture. A class wherein the teaching is done primarily through oration.

**Major:** The subject or subject areas upon which a student chooses to place principal academic emphasis.

**Minor:** A systematic program of study in an area of emphasis outside a student's major.

**Option:** An approved group of courses creating a specialty within a major field of study.

**Orientation:** Activities designed to help the new student become acquainted with the university.

**Prerequisite:** A requirement, usually credit in another course, which must be met before a particular course can be taken. Abbreviation: Pr.

**Rec.:** Recitation. A small section usually taken in conjunction with a lecture.

**Scholastic honors:** An award an undergraduate receives based on the excellence of K-State academic work.

**Secondary major:** Interdisciplinary major which must be completed along with a first major course of study.

**Special student:** An undergraduate student taking courses at K-State but not regularly enrolled in work toward a degree.

**Transcript:** An official copy of a student's permanent academic record.

**Transfer student:** A student who terminates enrollment in another college or university and subsequently enrolls at K-State.

**Undergraduate student:** A university student who has not received a bachelor's degree.

**V/Var.:** Variable. The credits earned in some courses may vary.

# Admission

Richard N. Elkins, Director  
119 Anderson Hall, Manhattan  
913-532-6250  
1-800-432-6240 (Kansas only)

## General Admission Information

Undergraduate students interested in attending Kansas State University on the main campus in Manhattan, or the College of Technology campus in Salina, may request information and assistance by writing or calling the Admissions Office.

The Admissions Office is located on the Manhattan campus and is open weekdays from 8 a.m. to noon and 1 p.m. to 5 p.m. All campus offices are closed on weekends.

All academically qualified students are admitted to the university. No qualified student will be denied admission to the university on the basis of race, sex, national origin, handicap, age, sexual orientation, or other nonmerit reasons.

## Campus Visitation

Students and parents are welcome and encouraged to visit the campuses. For a visit to the Manhattan (main) campus please write or call the Admissions Office (see address and phone information above). For maximum benefit from your visit it is wise to plan your visit two weeks in advance so that appropriate appointments can be made and admission representatives can be available for consultation concerning your educational plans.

Students and parents wishing to visit the College of Technology campus in Salina are encouraged to contact the Office of College Advancement, 100 Technology Center, Salina campus. The phone number is 913-826-2639. The office is open during the same standard business hours, and admissions representatives are available to schedule campus visits and to provide information regarding College of Technology programs.

## Glossary of Terms

**Enrollment:** The process of selecting courses and arranging a schedule of classes for the semester.

**International students:** Individuals who are not citizens or permanent residents of the United States.

**New freshmen:** High school graduates with no earned college credits after high school graduation. Students taking college-level work while in high school are considered new freshmen.

**Non-degree students:** Students not pursuing a degree who have been admitted for special purposes or at the discretion of a director. Generally, these students are limited to 15 hours of credit from K-State. Other restrictions may apply. Non-degree students will not qualify for financial assistance.

**Official test scores:** ACT, SAT, and TOEFL results that are received directly from the testing service via magnetic tape reports or formal mail service. Scores noted on high school transcripts, personal reports, etc., are not official results.

**Official transcript:** A transcript that is sent directly by mail from the registrar of a credit-granting institution to the K-State Admissions Office. Hand-carried documents, sealed envelopes, fax documents, personal grade reports, etc., are not official records.

**Readmitted students:** Any student who has previously been admitted and attended K-State courses on the Manhattan campus at any time since high school graduation. Any student who was admitted to and attended classes on the College of Technology campus since fall of 1991.

**Registration:** The process of paying fees.

**Special students:** Students not pursuing a degree but meeting all standard admission requirements. Special students will not qualify for financial assistance.

**To apply for admission:** The process of submitting written application and supporting credentials so that an official determination of eligibility to attend the university can be made.

**Transfer students:** Students who have earned college-level credit since high school graduation.

## Freshman Admission

### Kansas high school graduates

Admission to Kansas State University is granted to any individual who has graduated from an accredited Kansas high school. Students are encouraged to initiate the application process early in the senior year by submitting a completed application and the non-refundable \$15 application fee. To complete student records each student must submit official scores from the American College Test

Battery, and an official eight-semester transcript showing the date of high school graduation.

### Out-of-state high school graduates

Students graduating from non-Kansas accredited high schools are required to show strong academic class rank and grades and good scores on the American College Test Battery. Students must submit a completed application form, the nonrefundable \$15 application fee, official scores from ACT, and a six- or seven-semester transcript early in the senior year. To complete student records, each student must have a final transcript sent showing date of high school graduation.

### GED applicants

Adults who have completed the GED rather than the traditional high school diploma are considered for admission if the high school work they completed was of good quality and if they show promise of collegiate success through results on the American College Test Battery. Such students should submit a completed application form, the nonrefundable \$15 application fee, official scores from ACT, a copy of the high school transcript showing work completed prior to withdrawal, and official results of the GED. All standard admission procedures and requirements apply.

### High school prerequisites

Each entering freshman student should have completed the high school mathematics courses necessary for his or her K-State curriculum. A listing of the mathematics prerequisites for each university curriculum appears in the Degrees section of this catalog.

The Kansas Board of Regents recommends that a Kansas Regents university preparatory curriculum include the following 15 units:

- Four units of English, including one unit of literature and one unit of oral expression.
- Three units of mathematics, including Algebra I and II, one-half unit of geometry, and one-half unit of trigonometry. (See the Degrees section of this catalog for specific curricular requirements.)
- Three units of social studies, including American history, government, and economics.
- Three units of natural sciences, preferably biology, chemistry, and physics.
- Two units of foreign languages. (These may be in one foreign language or a combination of two foreign languages.)

## American College Test (ACT)

All new freshmen applicants, regardless of age and non-traditional status, are required to take the ACT and have official test results forwarded to the university. The test should be taken on one of the national test dates throughout the year. If the applicant anticipates applying for scholarships, the October test is preferable. Test centers are available nationally. Information about the ACT is available from the Admissions Office and from your local high school counseling office.

## Scholastic Aptitude Test (SAT)

In some situations, students are unable to participate in the ACT program but do have access to the SAT program offered through the College Board Services. K-State will substitute SAT results for purposes of making admission decisions, but students should take the ACT so that all data made available through that service can become part of the student's advising portfolio. Specific questions concerning standardized testing should be referred to the director of admissions.

## Transfer Admission

### Transfer qualifications

Students who have earned college or university credit after high school graduation must have a minimum cumulative GPA of 2.0 on a 4.0 scale to qualify for admission to the university. The following programs of study require higher grade point averages.

- All College of Architecture and Design programs
- All College of Engineering programs except construction science, computer science and information systems
- All College of Business majors (does not apply to pre-business)
- Mass communication (journalism)
- Psychology
- All health-related professions
- All teacher education programs (does not apply to pre-professional education)

For information regarding specific program requirements contact the college's dean's office or refer to the college's academic section of this catalog.

### Transfer application

Application procedures require a completed application form, the \$15 nonrefundable application fee, and complete official transcripts from all previous colleges or universities.

Transfer applicants who have earned less than 12 hours of transfer credit must also submit an official final high school transcript showing their graduation date. Information about insti-

tutions previously attended must be furnished upon application and transcripts must be furnished regardless of the applicant's wishes concerning use of previously earned credit.

All documentation should be sent to the Office of Admissions in Manhattan. Hand-carried or personally delivered transcripts are unofficial even though they carry the college seal and/or signatures that are placed on official records. All documents submitted become the property of the university and cannot be returned or copied.

### Transcript evaluations

Most academic credits from accredited junior colleges and universities are transferable to K-State. One-half of the hours required for a K-State baccalaureate degree can be taken at a two-year college.

Official evaluation of transfer credit is part of the admission procedure. Application of transfer credit toward degree requirements is determined by each college and major department.

Students with more than 45 hours of transfer credit may not choose the undeclared program of study in the College of Arts and Sciences. Advice and assistance is available in the College of Arts and Sciences to help students define their appropriate programs of study.

### Community college articulation

K-State subscribes to the transfer articulation agreement with the 19 Kansas community colleges. Students who have received an associate of arts degree from a Kansas community college are guaranteed junior classification and are not required to fulfill the K-State physical education concepts course requirement.

All credits of an associate degree are not necessarily applicable toward a baccalaureate degree; additional freshman, sophomore, and general education courses may be required to meet degree requirements.

### Military evaluation for credit

The evaluation of military training and experience is conducted in the Office of Admissions for a fee of \$25. An evaluation of military experience is optional and has no bearing on admission status to K-State. This evaluation does not include evaluation of transfer work from other educational institutions.

The fee covers evaluation of documents to include DD-214, DD-295, certificates of completion, Defense Language Institute transcripts, Academy of Health Sciences at Fort Sam Houston transcripts, and AARTS transcripts. Active military personnel may have their current, primary MOS evaluated, provided it has been validated by a performance evaluation within the last 12 months.

*Credit awarded through military credential evaluation will be recorded on the K-State transcript at the time the student is admitted to a degree seeking program at K-State and enrolls in K-State courses.*

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 as these recommendations apply to a student's K-State degree program. *Kansas State University does not award physical education credit for basic training.* Credit in military science is granted based on length of time in service and rank upon discharge. Military correspondence courses and courses which last less than two weeks are not recognized for college-level credit. Credits resulting from military evaluations granted by other institutions are not transferable to K-State.

## Special and Non-Degree Student Admission

Several categories of special and non-degree students exist at K-State. All students are subject to stated requirements and are responsible for payment of all fees, regular attendance at classes, and maintenance of satisfactory standing. Special and non-degree options are not available for international students on student visas.

### Special student applicants

Students who do not intend to become candidates for a degree may apply for admission as special students. Such students must submit the traditional application, application fee, test scores, and appropriate transcripts. Special student applicants must meet standard admission requirements. Special and nondegree-seeking students are not eligible for financial assistance.

### Nondegree-seeking student applicants

Some students may be admitted as nondegree-seeking students at the discretion of the director of admissions. Nondegree-seeking students must submit the standard application, application fee, test scores, and appropriate transcripts. These students will be allowed to complete a maximum of 15 semester hours in non-degree status. In order to pursue work beyond the 15 hour limit, students must apply for regular admission and meet all requirements. Nondegree-seeking students on the Salina campus are required to sign an agreement specifying the terms of their admission.

## High school students

Outstanding high school students may be admitted as special students to take courses while completing their high school requirements. High school students must submit the standard application, application fee, a recommendation from the high school, an outstanding high school academic record, and specify the courses in which they plan to enroll. The College of Arts and Sciences monitors the progress of these students very carefully. Students are approved for enrollment on the basis of space available in the selected class.

## International Admission

For purposes of admission, international applicants are defined as all persons who are not citizens or permanent residents of the United States.

In most cases, international applicants seeking admission to Kansas State University must meet the same academic standards for admission as those required of American students. There are wide variations, however, between educational systems throughout the world that make exact comparisons of educational standards difficult. International applicants are selected on the basis of their prior academic work, English proficiency, probability of success in the chosen curriculum (as evidenced by prior work in the academic area involved), and certification of adequate financial resources.

International applicants must submit a completed international application form, a \$40 nonrefundable application fee, translated secondary schooling records, and when applicable, translated college transcripts, results from the Test of English as a Foreign Language (TOEFL) and notarized affidavit of financial sponsorship.

## TOEFL/English proficiency

A minimum score of 550 on the TOEFL is required for admission. Proficiency also may be demonstrated by passing a full academic year of college-level freshman English (i.e., equivalent to ENGL 100 and ENGL 120) with a grade of C or better at an accredited institution of higher education in the United States.

## Deadlines for international application

1. For students currently studying in the United States:

<i>Apply by</i>	<i>For</i>
June 15	Fall semester
October 15	Spring semester
April 1	Summer term

2. For students outside the United States:

<i>Apply by</i>	<i>For</i>
April 15	Fall semester
July 15	Spring semester
January 1	Summer term

## Advanced credit for international evaluation

The following methods are used by Kansas State University to validate the awarding of advanced standing credit for international students who have completed work in their home countries at the postsecondary level:

1. Credit is granted based upon recommendation by recognized academic publications, primarily the *World Education Series* of American Association of Collegiate Registrars and Admissions Officers.

2. Validation by a comparable credit-granting department at Kansas State University. Validation by one of the following two options will be at the discretion of the credit-granting department.

*Option A:* Course-by-course evaluation examination by comparable K-State academic department.

*Option B:* The advisor and/or academic dean's office makes a preliminary evaluation of the level a student has completed and begins the student at that level. Upon successful completion of that course, all related lower-level courses in that area, as determined by the department granting credit, would be validated and credit awarded.

## English Proficiency

### Admission requirements

All undergraduate students whose native language is not English must show proficiency in English before being admitted. Students may do this by presenting acceptable results from TOEFL, SAT or ACT. If the student cannot show adequate proficiency the following conditional admission options may be offered:

1. Full-time study in the English Language Program before pursuing academic studies.
2. A combination of part-time study in the English Language Program and part-time study in his or her academic area.

## Enrollment requirements

All new students whose primary language is not English must demonstrate English Language proficiency before completing enrollment for the first time at the university. This requirements applies to international and non-international, permanent residents, immigrants, transfer and non-transfer student alike. An assessment test of written and spoken proficiency is given by the English Language Program prior to each enrollment period. If results of the student's proficiency level indicate inadequate preparation, the director of the English Language Program may recommend one of the following conditional enrollment options.

1. Full-time study in the English Language Program until adequate proficiency is demonstrated.
2. A combination of part-time study (6 hours) in the English Language Program and part-time study (6 hours) in the academic area until adequate proficiency for full-time academic study is demonstrated.
3. Full enrollment in the academic program with no English language requirements.

## Fraudulent Applications

Individuals who withhold or provide fraudulent information on applications for undergraduate admissions or readmissions are subject to immediate dismissal from the university. The decision for immediate dismissal will be made by the director of admissions. This decision will be made after a complete and thorough review of the situation and an individual conference with the student involved. The individual dismissed has the right to appeal the decision to the Admissions and Enrollment committee, whose decision will be final.

# Academic Advising

## Advising Responsibilities

Kansas State University is committed to providing effective advising services to students as an essential component of their educational experience.

Advising generally is required as a condition for enrollment, especially for new students. Continuing students are encouraged to seek academic advising regularly throughout their academic careers. Students are responsible for initiating advising contacts and preparing for advising sessions.

Department- and college-based advisors are available to all students for assistance in assessing educational goals, planning programs of study, understanding program requirements, and knowing policies and procedures.

Ultimately, students are themselves responsible for fulfilling all the requirements of the curriculum in which they are enrolled. The intellectual mentoring relationship between academic advisor and student is protected by confidentiality and strengthened by listening with understanding to student concerns. Intellectual mentoring by the academic advisor fosters:

1. Development of an awareness of available choices, alternatives and resources;
2. Guidance with decision making;
3. Encouragement to expand horizons by full participation in university life; and
4. Promotion of readiness to meet career, life and graduate/professional school challenges.

Students are expected to take responsibility for a successful university experience and effective advising sessions by:

1. Participating in orientation/early enrollment programs, providing standardized test scores as required by Board of Regents policy, and providing an academic history that aids in course selection decisions;
2. Scheduling appointments with advisors prior to early enrollment and at other times as needed;
3. Identifying class choices from requirements of the preferred program or major;
4. Identifying questions to address;
5. Informing advisors of any special needs, deficiencies or barriers that might affect academic success;
6. Knowing academic policies and academic calendar deadlines, procedures (e.g., registration, fee payment) and degree or program requirements;

7. Remaining informed about progress in meeting academic requirements by maintaining careful academic records and seeking assistance to resolve any errors or questions; and

8. Following through on recommendations to seek assistance from the various student support services provided by the university.

## Credit By Examination

Many opportunities exist at Kansas State University to earn college credit by examination. K-State participates in the College Level Examination Program (CLEP), Proficiency Examination Program (PEP), DANTES, high school International Baccalaureate, and the College Board high school Advanced Placement Testing Program. Local examinations (quiz outs) also are given in many course areas by individual departments within the university.

Details concerning testing opportunities are available on request from the Office of Admissions, 119 Anderson Hall, Manhattan, Kansas 66506-0102, or Academic Assistance Center, 101 Holton Hall, Manhattan, Kansas 66506-1307. Also see the catalog section on the Academic Assistance Center.

## Credit By Departmental Examination

Students who are enrolled in K-State courses may petition a K-State department for permission to attempt to earn credit for a specific K-State course through a special departmental examination. Credit may be granted for any course with the consent of the head of the department offering credit for that subject. 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. Credit earned by special examination is considered resident credit.

Credit by examination may receive letter grades or a notation "credit" as determined by the department. The graded work will receive grade points to be computed in the student's GPA. Nongraded credit by examination will be treated as graded hours in implementing A/Pass/F policy.

## Extension and Correspondence Credit

College-level credit earned through accredited extension divisions may be applied toward credit requirements for a degree at K-State. The credit must be applicable to the curriculum chosen and the amount of credit that can be used is limited. Contact the appropriate dean's office for further information.

## Pre-Law Advising

While the Association of American Law Schools does not specify a particular pre-law curriculum, it does emphasize the selection of rigorous courses that will enable students to achieve comprehension and expression in words; critical understanding of the human institutions and values with which the law deals; and creative power in thinking. The development of these capacities is a highly individualized process vigorously pursued in a variety of disciplines and degrees.

Students in *all* majors who are considering law study should consult with the K-State pre-law advisor in the dean's office of the College of Arts and Sciences as early as possible in their undergraduate careers. Also see catalog information on pre-law studies in the Colleges of Arts and Sciences, Business Administration, Engineering, and Human Ecology.

# Enrollment

Donald E. Foster, University Registrar  
118 Anderson Hall  
532-6254

Enrollments for fall and spring semesters, for summer term, and winter and spring intersessions occur at specified times during the academic year. The specific times are outlined in the *Class Schedule*, a booklet published by the Registrar's Office, or in a similar pamphlet published by the Division of Continuing Education.

## Assignment to Classes

Students are responsible for fulfilling all requirements of the curriculum in which they are enrolled. They should consult with their advisors and be familiar with the *K-State Undergraduate Catalog*.

A catalog is given to each new student and copies are maintained for student use in the Office of Admissions, all deans' offices, Farrell Library, and all departmental offices. Catalogs may also be purchased at the K-State Union Bookstore.

No student is officially enrolled in courses or for private lessons in music or other subjects until a formal course assignment is completed.

A student may not enroll later than 10 class days after the beginning of a semester (five days for summer term) except by permission of the dean. Students should enroll during regularly scheduled registration periods in order to avoid a late fee.

A student may not enroll for more than 18 K-State credit hours in a semester unless the student is granted permission to do so by the student's academic dean or the dean's representative. If the published curriculum of a college or department in which the student is enrolled requires that more than 18 K-State credit hours be taken during a semester, this 18-credit limit does not apply.

A student who has paid full fees on campus and who wishes to take a course through the Division of Continuing Education may, in certain instances, request a waiver of continuing education fees. Fee waivers do not apply to self-supporting courses and are contingent upon the college dean's approval for the additional hours and final authorization by continuing education staff. Credit courses administered by the Division of Continuing Education award regular university credit and are included in the credit limits established in the preceding paragraph.

## Faculty and employees

Full-time faculty members and regular employees, with approval of their department heads or deans, may enroll in graduate or undergraduate work not to exceed 6 credit hours in fall and spring semesters or 3 credit hours during the summer term.

## Late enrollment

A student who seeks to enter the university later than 10 calendar days after the start of the semester is admitted only by special permission of the student's dean. Those who enroll after the regular registration period and up through the 20th day (10th for summer term eight-week course) of class pay a late fee of \$15. However, anyone enrolling after the 20th day (10th for summer term eight-week course) of class must pay a \$35 late fee.

## Dropping and Adding Courses

If a student wants to drop or add a course or if an instructor recommends a change, the student should confer with an advisor.

The instructor *may* drop a student from a course after the first week of classes if the student has neither attended any of the scheduled class meetings nor notified the instructor of his or her intent to take the course. For purposes of this procedure enrollment in and payment of tuition for a course do not constitute notification of intent to take a course.

No student may add a course after the first week of classes without the permission of the instructor.

The last day for dropping a course without a W being recorded is at the end of the 25th day of the semester. After the 10th week of the semester, courses may not be dropped. In cases where courses are shorter than the full semester, deadlines will be applied pro rata.

A summer term eight-week course may be dropped without a W being recorded through the thirteenth day; after the fifth week a full-term course may not be dropped.

## Curriculum Change

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

## Retake Policy

Students may retake courses in order to improve the grades. If a course is retaken, the original grade is noted as retaken and removed from the grade point average.

Retakes can be accomplished only by re-enrolling in and completing a K-State resident course. Courses originally taken on a letter grade basis may be retaken on an A/Pass/F basis if appropriate, or if originally taken on an A/Pass/F basis may be retaken on a letter grade basis. The retake grade will always be used in the grade point average computation regardless of whether it is higher or lower than the original grade.

Although there is no limit to the number of times a course may be retaken, a student may retake a course with subsequent removal of the prior grade from calculation of the grade point average only once for each course, and for a total of five courses during the student's academic career at K-State. Any grades obtained from retaking courses beyond these limitations will be used in calculating the grade point average. A retaken course will count only once toward meeting degree requirements. Courses retaken before fall 1986 will not be used in determining whether five courses have been retaken.

Any course retaken after completion of a bachelor's degree will not affect the credits or the GPA applied to that degree.

## A/Pass/F Policy

Undergraduate students, except first-semester freshmen and students on academic warning, may enroll in certain courses for which they have the normal prerequisites under the A/Pass/F grading option. Under this option, students earning a grade of A in a course will have an A recorded on the transcript for that course; a grade of B, C, or D will be recorded as Pass; a Grade of F will be recorded as F.

Students may request the A/Pass/F option for eligible courses during the third and fourth weeks of each regular semester or during the second week of the summer term. Students requesting the use of the A/Pass/F option must obtain the signature of their advisors. The decision by a student to use the A/Pass/F option is treated with strict confidentiality.

It is the responsibility of a student requesting enrollment under the A/Pass/F option to be sure that such an enrollment is valid in the declared degree program. A course originally completed under the A/Pass/F option *may not* be converted at any time to a graded basis.

Students should be aware that some schools, scholarship committees, and honorary societies do not find work taken on a nongraded basis (Pass) acceptable. Furthermore, many employers do not view nongraded (Pass) course work favorably. All students should be cautious in using the A/Pass/F option.

Each department or division may specify which courses its majors may take under the A/Pass/F option consistent with the university requirements listed below.

1. A student may enroll under the A/Pass/F option for any free elective course offered under this option, that is, in any course that is in no way specified even in general terms in his or her curriculum. Courses that are specified by name or number and courses that meet general distribution requirements are not considered free electives.

2. A student may enroll under the A/Pass/F option for any general distribution requirement offered under this option, provided the course is in the upper division level (300 and above), for example, three courses in the humanities.

3. A student may not enroll under the A/Pass/F option in any course that is required by name or number as part of his or her program of study.

Students may submit Pass hours for graduation requirements up to and not exceeding one-sixth of the total number of hours required for a bachelor's degree. That is, five-sixths of all hours submitted for the degree must be hours submitted on a graded or credit basis.

## Credit/No Credit Courses

Certain courses for which the learning experience is based primarily on participation and/or attendance may be offered solely on a Credit/No Credit basis. No grades are given for such courses.

For courses that are normally given for a grade, the designation Credit may be obtained in the case of credit by examination. (See the Academic Advising section of this catalog.)

## Class Attendance

Class attendance policies will be determined by the instructor of each course. Instructors will determine if, and the manner in which, work and exams missed may be made up.

## Withdrawal From the University

A student who withdraws from the university must have an official withdrawal permit from the appropriate dean.

If a student withdraws during the first 25 days of the semester, no mark will be recorded on the student's transcript; thereafter, a mark of W is recorded. The deadline for withdrawing is the end of the 10th week of the semester.

If a student finds it necessary to withdraw from the university for verifiable nonacademic reasons after the 10th week, he or she should consult the appropriate dean's office.

## Auditing Courses

Auditing is attending a course regularly, without participating in course work or receiving credit, and is permitted on a space-available basis. Permission to audit a course is granted by the instructor, with the approval of the dean of the college in which the course is offered. Laboratory, continuing education, and activity courses may not be audited. A non-refundable fee is charged each auditor except full-time university faculty members, employees, and full-time students. No record is made on the academic transcript. Students process the audit permission through Enrollment Services. Students 60 years or older may audit on a space-available, no-fee basis.

## Dead Week

The week before the final examination period (known as dead week) is set aside as a period of curtailed social activity. No examinations, other than weekly laboratory quizzes, studio, or language proficiency examinations, may be given during the last five calendar days before final examinations.

## Dead Day

In the fall semester there is a weekend between the end of regularly scheduled courses and the beginning of final examinations. In the spring semester (through spring 1995) a single day, called dead day, is allowed between the end of courses and the beginning of final examinations. Dead day ends at 4:30 p.m.

Through spring 1995 semester courses end on Wednesday, dead day is Thursday, and examinations begin on Thursday at 7 p.m.

Beginning in the spring 1996 semester there will be a weekend between the end of regularly scheduled courses and the beginning of final examinations.

## Final Examinations

A final examination period during which no regular courses 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 term.

Except for honors, problems, seminars, and language and fine arts performance courses, the last examination (last unit test or comprehensive test) in a course must be given during the examination period specified by the University Admissions and Enrollment Committee and is published in the *Class Schedule*. Classes may have take-home examinations, projects, papers (excluding term papers), or other media, in lieu of written final examinations as the last evaluation instrument in the course. In such instances, a deadline for submittal of the medium may not be earlier than the time of the end of the course's scheduled examination period as published in the *Class Schedule*.

# Fees

Keith L. Ratzloff, Controller

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 before the beginning of any semester or summer term.

Students enrolled on a per-credit-hour basis or changing from 6 or fewer to 7 or more credit hours will be assessed for all hours in which they are enrolled, including those for which the grade of W is recorded. Students withdrawing from courses are eligible for refunds in accordance with the refund policy.

Students receiving scholarships or grants not processed through the K-State Office of Student Financial Assistance before registration will be required to pay the full amount of their fees from personal resources on the day they register.

## Payment of Fees

Unless a deferment is granted, students must pay the total amount of their semester or summer term fees on the day they register and should use a check for exact amount of fees, MasterCard, or VISA. For students' safety, cash and checks requiring change are discouraged. Late fees are assessed for students who register or pay their fees after the regular registration period.

### Deferments

If the student's eligibility to receive financial aid is verifiable prior to the student's fee payment date, the director of student financial assistance may authorize the deferment of payment of tuition and fees in accordance with the Board of Regents Policy and Procedures Manual (Chapter 2, Section E). The student's obligation to pay regularly assessed tuition and fees is not reduced by an approval to defer payment. A deferment may be authorized for:

1. Those students who have fulfilled the application requirements and whose awards have been made by the June packaging date, but whose checks are not in. Deferments may be granted only to the approved level of financial aid eligibility. The amount of fees over and above the anticipated financial aid award must be paid by the student at the time of fee payment. No late fee will be assessed.
2. Those students who have applied for financial aid, but have not met the scheduled application deadlines. Deferments will be limited only to the amount of anticipated aid eligibility. A payment of one-third down or an amount equal to the aid that has been received, whichever is greater, will be required.

3. Veterans receiving benefits. Full tuition deferment only. Will be required to pay campus privilege fees.

4. International students. Full tuition deferment only. Will be required to pay campus privilege fees. Late fee assessed.

### Returned checks

Fee payment checks that are returned uncollectible by financial institutions will be subject to a \$15 charge, in addition to all other fees.

### Withholding student records

The university withholds students' academic records for nonpayment of fees, loans, and other appropriate charges and for nonreturn of university property.

## Fee descriptions

### Tuition

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

### Educational Opportunity Fund

This fee aids the academic achievement and progress of underrepresented K-State students.

### Student services support

This fee finances adaption and equipping of Holton Hall for improved delivery of student services programs.

### Student health

For a description of the services provided by this fee, see the section on Lafene Health Center in this catalog.

### K-State Union repair and replacement

This fee is used for repairs and replacements at the K-State Union.

### Chester E. Peters Recreation Complex expansion fee

In 1991 a student referendum was passed allowing bonds to be issued to support the expansion of the Peters Recreation Complex. This bond issue is to be retired by the continuation of part of the previously assessed fee for the retirement of the original construction bond indebtedness.

### Bramlage Coliseum repair and replacement fee

1992 student legislation provided for the continuation of a portion of the debt retirement fee previously assessed for the Bramlage Coliseum bonds following their retirement in May of 1993.

### Farrell Library expansion fee

In 1991 a student referendum was passed providing for a \$5 million commitment by Kansas State University students to partially

fund the expansion of Farrell Library. This commitment is to provide a bond issue to be retired, in part, by a continuation of student debt service fees which were previously assessed for the retirement of Bramlage and Holton Hall bonds.

### Activity

This fee is used for a range of student interests and activities. Students enrolling in 6 or fewer credit hours do not pay a full activities fee and are not entitled to student ticket rates for certain activities.

### K-State Union

This fee is used for the administration, support, and operation of the student K-State Union.

### Student publications

This fee supports the *Collegian* and *Royal Purple*.

### Recreational Services

This fee supports the Chester E. Peters Recreation Complex (equipment, interior upkeep, supplies, etc.).

### KSDB-FM

This fee supports the student radio station (equipment, means of service to operate the station, recent upgrade of power wattage, etc.).

### Athletics

This fee supports intercollegiate athletics.

### Fine arts

This fee supports fine arts programming (theater, dance, music, art, etc.).

### Student publications equipment

This is a temporary fee to provide new equipment for student publications (*Collegian* and *Royal Purple*).

## Schedule of Fees

The following schedule of fees was in effect when this catalog was prepared.

A schedule of fees for Kansas State University at Salina follows this section.

### Contracts and compensatory charge

This schedule does not limit the charges that may be collected under arrangements with other governmental or private agencies, except that such arrangements may not provide for lesser charges. Compensatory or other charges to more nearly cover the actual cost of instruction are specifically authorized.

**Students enrolled in 7 or more semester credit hours:**

	<b>Resident</b>	<b>Non-resident</b>
<b>Tuition</b> (based on student classification)		
Undergraduate	\$ 786.00 <sup>c</sup>	\$3,095.00
Veterinary medicine	\$1,936.00 <sup>e</sup>	\$6,327.00 <sup>e</sup>
<b>Campus privilege fees</b>		
Educational Opportunity Fund	6.00	6.00
Student services support	3.00	3.00
Student health	80.00 <sup>a</sup>	80.00 <sup>a</sup>
K-State Union repair and replacement	3.00	3.00
Rec Complex expansion	22.25	22.25
Farrell Library expansion	6.25	6.25
Coliseum repair and replacement	1.00	1.00
Activity fee	8.00	8.00
K-State Union	27.00	27.00
Student Publications	7.80	7.80
Recreational Services	8.00	8.00
KSDB-FM	.95	.95
Athletics	17.00	17.00
Fine Arts	7.40	7.40
Student Publications equipment	3.90	3.90
Total undergraduate	<u>\$ 987.55</u>	<u>\$3,296.55</u>
Total veterinary medicine	<u>\$2,137.55</u>	<u>\$6,528.55</u>

**Students enrolled in 6 or fewer semester credit hours:**

		<b>Resident</b>	<b>Non-resident</b>
<b>Tuition</b> (based on student classification)			
Undergraduate	per credit hour	\$ 52.00 <sup>c</sup>	\$206.00
Veterinary medicine	per credit hour	\$129.00 <sup>e</sup>	\$422.00 <sup>e</sup>
<b>Campus privilege fees</b>			
Educational Opportunity Fund	total fee	3.00	3.00
Student services support	total fee	1.00	1.00
Student health	total fee	25.00 <sup>a</sup>	25.00 <sup>a</sup>
K-State Union repair and replacement	total fee	1.50	1.50
Farrell Library expansion	total fee	3.25	3.25
Rec Complex expansion	total fee	12.50	12.50
Coliseum repair and replacement	total fee	.25	.25
Activity fee	total fee	4.00	4.00
K-State Union	total fee	13.50	13.50
Student Publications	total fee	3.90	3.90
Recreational Services	total fee	3.50	3.50
KSDB-FM	total fee	.55	.55
Athletics	total fee	8.50	8.50
Fine Arts	total fee	3.25	3.25
Student Publications equipment	total fee	1.95	1.95

**Fees per summer term (based on student classification)**

		<b>Resident</b>	<b>Non-resident</b>
<b>Tuition</b>			
Undergraduate	per credit hour	\$ 52.00 <sup>c</sup>	\$206.00
Veterinary medicine	per credit hour	\$129.00 <sup>e</sup>	\$422.00 <sup>e</sup>
<b>Campus privilege fees</b>	per credit hour	13.55 <sup>d</sup>	13.55 <sup>d</sup>

**Auditing**

Auditing, permitted on a space-available basis, allows class attendance without participation or credit upon recommendation of the instructor and approval of the dean. This privilege is not applicable to laboratory and Division of Continuing Education courses. Any person 60 years or older may audit classes at no cost but still must obtain approval from the instructor and dean.

Undergraduate	per credit hour	\$ 52.00 <sup>c</sup>	\$206.00
Veterinary medicine	per credit hour	129.00 <sup>e</sup>	422.00 <sup>e</sup>

<sup>a</sup>Students enrolled in a spring semester but not attending summer school may use Lafene Health Center services during the summer by paying a \$23 fee prior to the first day of summer school classes. After the start of classes the fee for such students will be \$30, payable during the first visit to the health center. Students who have paid their health fees may elect to have their spouses covered if they pay, within 10 days of their own health fee payment, a spouse fee of \$80 for a semester, or \$30 for a summer term. Full-time K-State employees will not be assessed a student health fee, but they may choose to pay the fee and therefore be eligible for Lafene Health Center services.

<sup>b</sup>Students who will be attending classes at off-campus locations during an entire semester and who will reside outside of a 30-mile radius of K-State's Manhattan campus during that semester may elect to be exempted from all campus privilege fees.

<sup>c</sup>Employees (as defined in the Eligibility for Resident Fees section) are assessed the resident tuition at the hourly rate.

<sup>d</sup>Summer-term campus privilege fees are assessed only on the first 6 credit hours for each summer term and are not applicable to students enrolled in formally organized classes actually conducted at off-campus locations.

<sup>e</sup>Students in the veterinary medicine senior class will be assessed three equal tuition payments based on 6 credit hours for the summer term and full-time tuition for the following fall and spring semesters. The tuition assessments will be equal, but the campus privilege fees assessments will be based on the applicable amounts for each enrollment period.

**Off-campus courses# (Based on course level)**

Undergraduate credit	\$72.00 per semester hour
No credit	Lowest advertised tuition rate per semester hour
Non-credit courses	Vary to correspond with total direct costs

**Regents Center construction fee**

Students enrolled in K-State courses offered in the KU Regents Center in Kansas City will be assessed a \$10-per-credit-hour charge to defray costs of construction of this new facility.

**Course charge**

Additional charges may be made to correspond with the actual costs of equipment, media fees, testing, video/audio tapes, and other items that are an integral part of a course.

**TELENET media fee**

(For courses delivered via Kansas Regents Network)

1-credit-hour course	\$17
2-credit-hour course	\$23
3-credit-hour course	\$29

#As approved by the Board of Regents, off-campus courses may be offered for either resident or extension credit. Resident credit will be awarded only with the approval of the appropriate campus faculty council. (For off-campus courses, the established off-campus fees per credit hour for graduate courses are to be collected and an amount equal to the on-campus incidental fee per credit hour deposited to the general fee fund.)

**On-campus fees administered through the Division of Continuing Education**

Credit	Resident	Non-resident
<b>Tuition</b>		
Undergraduate per credit hour	\$ 62.00	\$216.00
Veterinary Medicine per credit hour	139.00	432.00

**Course charge**

Additional charges may be made to correspond with the actual costs of equipment, media fees, testing, video/audio tapes, and other items that are an integral part of a course.

**Non-credit**

<b>Tuition</b>	Vary to correspond with total direct costs
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**Student fees (both credit and applicable non-credit courses)**

Campus privilege fees	per day	\$ .55*	\$ .55*
Student health fees	per day	\$ .22*	\$ .22*

\*To a maximum of the part-time activity fee of \$60.65 per semester

\*\*To a maximum of \$25 per semester

**Conferences, institutes, and seminars**

Non-credit	Vary to correspond with total direct costs
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**Application for admission processing fees (not subject to refund)****Applications**

For first-time admission	\$15.00
For international students	40.00
For admission to Non-traditional Study Program	25.00

**Veterinary medicine applications**

Application for admission to first professional program in College of Veterinary Medicine	20.00
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**Private music lessons**

Students enrolled in a degree program with a major in music, music education, or applied music and dual majors in music and theatre are exempt from fees for private music lessons.

For other students enrolled in credit courses, fees are payable in advance and are as follows (Enrollment subject to availability of staff and facilities.)

	Students
<b>Two 30-minute lessons a week</b>	
Semester	\$75.00
Summer session	37.00
<b>One 30-minute lesson a week</b>	
Semester	45.00
Summer session	22.50
<b>Single lessons, per lesson</b>	<b>7.50</b>
<b>Practice piano</b>	
Semester, 1 hour daily	9.00
Summer session, 2 hours daily	9.00
<b>Practice organ, two-manual</b>	
Semester, 1 hour daily	18.00
Summer session, 2 hours daily	18.00
<b>Practice organ, three-manual</b>	
Semester, 1 hour daily	37.50
Summer session, 2 hours daily	37.50

**Engineering equipment fee**

For undergraduates enrolled in the College of Engineering:

**Fall or spring semesters**

\$100 per student per semester if enrolled in 7 or more credit hours  
\$50 per student per semester if enrolled in 4, 5, or 6 credit hours  
\$25 per student per semester if enrolled in 3 or fewer credit hours

**Summer term**

\$50 per student per summer term if enrolled in 4 or more credit hours  
\$25 per student per summer term if enrolled in 3 or fewer credit hours

**Intersessions**

\$25 per student per intersession.

**Field camps**

Summer field camps in geology, archaeology	\$300.00
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**Late registration or fee payment****Not subject to refund**

After regular registration through 20th day of classes	\$15
After 20th day of classes	\$35

Exceptions: The \$15 fee begins after the last regular evening registration if registering for evening courses only; after the starting date for late-starting courses; and after the first Friday of classes for faculty, staff, and teachers. For summer terms, the fee increases from \$15 to \$35 after the 10th day of classes. Late fees do not apply to corrections of fee assessments.

**Study abroad program fee****Not subject to refund**

Administrative fee per semester or summer term for each student enrolled in a study abroad program not taught or conducted by K-State faculty	\$25
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**Military training and experience evaluation**

Administrative fee for evaluating the military training and experience of a student to determine college-level equivalency	\$25
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**Additional fees**

Copies of public documents  
At cost

Laboratory courses

Cost of breakage

Parking misuse fees

As filed in the Board of Regents office

Interlibrary loan and other charge

As appropriate when authorized

Library misuse fees

As appropriate when authorized

Loans and related interest and charges

As appropriate when authorized

Rental and use fees for recreational equipment

As appropriate when authorized

Returned check fee

\$15 per check

ROTC property

As appropriate when authorized

Student health services

As appropriate when authorized

Transcript fee

\$3 per transcript

Student identification card replacement

\$10 per each replacement

Student fee receipt replacement

\$1 per each replacement

Administrative service fee for all students applying for federal Stafford Loans

\$10 per academic year

Students are required to reimburse the institution for the cost of excess breakage and wastage of materials, and materials used in excess of those required for completion of course work.

**American Institute of Baking students**

Students enrolled in a regular semester at the American Institute of Baking will be considered adjunct students by paying the fees, other than tuition, under "Students enrolled in 7 or more hours" on the Schedule of Fees. These students will be entitled to use the Lafene Health Center, K-State Union, and Recreational Center, and to purchase tickets for athletic and cultural events at student prices.

**Other expenses**

In addition to the applicable fees, students are required to purchase textbooks, drawing instruments, 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 an undergraduate Kansas resident—Manhattan campus .....	\$ 988
Books and supplies, approximately .....	309
Room and board in university housing .....	1,700
Clothing, laundry, postage, travel, extra meals, phone, social activities (varies with the individual), miscellaneous .....	1,015
Total estimated expenses (half of academic year) .....	\$4,012

**Schedule of Fees for K-State at Salina**

The following schedule of fees was in effect when this catalog was prepared.

**Contracts and compensatory charges**

This schedule does not limit the charges that may be collected under arrangements with other governmental or private agencies, except that such arrangements may not provide for lesser charges. Compensatory or other charges to more nearly cover the actual cost of instruction are specifically authorized.

**Students enrolled in 12 or more semester credit hours:**

	<b>Resident</b>	<b>Non-resident</b>
<b>Tuition</b> (based on student classification)		
Undergraduate	\$ 571.00	\$2,067.00
<b>Campus privilege fees</b>		
Student service and activity	43.00	43.00
Educational Opportunity Fund	4.00	4.00
Student Union operation	16.80	16.80
Campus vehicle parking	6.00	6.00
<b>Total undergraduate</b>	<b>\$ 640.80</b>	<b>\$2,136.80</b>

**Students enrolled in 11 or fewer semester credit hours:**

	<b>Resident</b>	<b>Non-resident</b>
<b>Tuition and audit fees</b> (per credit hour)		
Undergraduate	\$48.00	\$172.00
<b>Campus privilege fees</b> (per credit hour)		
Student service and activity	3.60a	3.60a
Educational Opportunity Fund	.35a	.35a
Student Union operation	1.40a	1.40a
Campus vehicle parking	.50a	.50a

**Fees per summer term**

	<b>Resident</b>	<b>Non-resident</b>
<b>Tuition and audit fees</b> (per credit hour)		
Undergraduate	\$48.00	\$172.00
<b>Special fees</b>	5.85a	5.85a

**Flight training lab fees (per hour)**

	<b>Solo/hour</b>	<b>Dual/hour</b>
<b>Aircraft</b>		
Cessna 150/152	\$ 35.00	\$ 55.00
Cessna 172	48.00	68.00
PA-28	48.00	68.00
Cessna 177	55.00	75.00
Beechcraft "Musketeer"	55.00	75.00
Beechcraft 24R (Sierra)	70.00	90.00
Cessna 310	130.00	150.00
B-33A Bonanza	100.00	N/A
B-58 Baron	200.00	N/A

**Ground time**

One-on-one instruction	5.00
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**Other fees**

International student matriculation (non-refundable)	25.00
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**Off-campus credit courses**

Workshops, conferences, and seminars; when announced (per credit hour)	57.00
A & P program only (per credit hour)	68.00
Deferred payment processing (non-refundable)	10.00

**Additional fees**

Transcript fee	\$ 3.00
Library misuse fees	
As appropriate when authorized	

Students are required to reimburse K-State at Salina for cost of:  
excess breakage and waste of materials and materials used in excess of  
those required for course work.

# People Eligible for Resident Fees

## 1. Residents

Usually includes adults who have been residents of Kansas for 12 months or longer prior to registering for any semester or term and minors of parents who meet these residency requirements. The official residency determination for fee purposes is made by the Registrar's Office.

## 2. Employees

a. Employees for universities under the Kansas Board of Regents, other than hourly student employees, working four-tenths time or more as follows:

For fall semesters: More than half of September and all of October and November pay periods.

For spring semesters: More than half of February and all of March and April pay periods.

For summer terms: Part of June and all of July pay periods, or more than half of February and all of March and April pay periods preceding the summer sessions.

Exceptions to the above requirements can be made for the term in which a graduate degree is awarded.

Pay periods start on the 18th of the preceding month and end on the following 17th; e.g., September pay period starts August 18 and ends September 17.

b. Employees of the federal government given adjunct appointments at Kansas State University or assigned to one of the ROTC units at K-State.

## 3. Military

a. Military personnel stationed and living in Kansas except military personnel assigned to K-State as full-time students.

b. People who are domiciliary residents of the state, who were in active military service prior to becoming domiciliary residents of the state, who were present in the state for a period of not less than two years during their tenure in active military service, whose domiciliary residence was established in the state within 30 days of discharge or retirement from active military service under honorable conditions, but whose domiciliary residence was not established in time to meet the residence duration requirement.

## 4. Dependents

Dependent spouses and children of the employees and military personnel defined above.

## 5. Exchange students from Missouri

Students eligible to pay resident fees at the University of Missouri who are enrolled in the following programs at Kansas State University: Bachelor of Architecture; B.S. in architectural engineering; B.S. in bakery science and management; B.S. in construction science; B.S. in feed science and management; B.S. in milling science and management; B.S. in horticultural therapy; and Bachelor of Interior Architecture.

This privilege is granted in exchange for resident fees for Kansas students arbitrated by Kansas Board of Regents and Missouri Board of Education.

## 6. Kansas high school graduates

Students who have graduated from an accredited Kansas high school within 6 months of enrollment at K-State who were Kansas residents at the time of high school graduation or within 12 months prior to graduation.

## 7. Recruited/transferred employees

People who have been recruited to full-time employment in Kansas or transferred to a Kansas location and their dependents.

# Refund Policy

The following table applies to students who completely withdraw from a semester, summer term, geology field camp, or private music lessons and to the reduction, if any, in fees for students who reduce their enrollment. Refunds will not be made until sufficient time has lapsed to ensure that fee payment checks have been honored by the bank—usually 15 days after student pays. Reduction in fees resulting from action taken after the last day of a semester or term will not be refunded.

## Withdrawal

The following rates apply to students who completely withdraw from a semester, summer term, field geology camp, or music lessons and to students who reduce their enrollment. During fall and spring semesters, refund percentages will not apply if enrollment is reduced but later increased during the same percentage period.

### On-campus students

Regular semesters:

100% refund through week two

50% refund through week four

No refund after week four

Summer term:

100% refund through week one

50% refund through week two

No refund after week two

Courses less than five weeks:

100% refund through the day after the course begins

No refund after that time

### Military

Students serving in the National Guard or reserves who are called to active duty during an academic term are entitled to receive a full refund of tuition and fees. Students who are drafted and must report for active duty during an academic term are entitled to receive a full refund of tuition and fees. All refunds are subject to presentation of official military documentation. Students who volunteer for military service will be subject to the university's non-military refund policy. Room and board charges will be prorated to the extent that services have been provided.

## Continuing education refunds

### Extension credit courses

100% refund if requested prior to second course meeting or if the course is canceled.

50% refund if requested after the second class meeting.

No refund if requested after one-third of the scheduled class meetings.

Extension course fees are not transferable.

### Non-credit courses

Fees are non-refundable unless, subsequent to acceptance of the fees, the service, at the option of the university, is not provided.

### Conference, institutes, and seminars

100% refund if cancellation of registration is received by official notification at least 48 hours prior to the time of the scheduled event.

# Degrees

## Common Degree Requirements

The common requirements for all curricula leading to an undergraduate degree are: Expository Writing, 6 credits; Public Speaking, 2 credits; Principles of Physical Fitness, 1 credit.

## Degree Requirements

To graduate, 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 167 hours, according to the curriculum taken.

There are two grade point averages a student must meet to be awarded a degree: (1) at least 2.0 on K-State resident graded courses that are applied to the degree, and (2) at least a 2.0 cumulative GPA for all resident graded courses taken at K-State. Professional curricula may impose additional degree requirements.

Students must file an application for graduation clearance in the appropriate dean's office during the first four weeks of the semester (first two weeks for summer term) in which the degree is to be completed.

It is the student's responsibility to be certain that transcripts from all transfer institutions are on file in the Registrar's Office before the end of the semester or summer term the degree requirements will be completed.

Up to half of the credits required for a normal four-year degree may be completed at an accredited two-year college.

Each student must complete at least 30 resident credits to be considered for a degree. Further, the student must complete 20 of the last 30 hours of resident credit at K-State. 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 K-State. The student must submit satisfactory plans and reasons for completing the degree requirements at another institution, such as a dental, medical, law, or medical technology school, before earning a degree here.

Resident work includes all regularly scheduled course or laboratory instruction given by the regular university faculty.

At least five-sixths of the credit hours taken at K-State and applied toward a degree must be graded hours. Required courses of an internship or practicum nature or credit by examination, offered on a Credit/No Credit basis only, are to be considered as graded hours in implementing the five-sixths policy.

Candidates for spring graduation should attend commencement. Fall graduates are asked to participate in the commencement exercises in December or the following spring.

Prospective summer graduates may participate in the exercises before or after graduation.

Students generally complete degree requirements in the normal four or five academic years allotted for that purpose. However, it could take additional time because of a significant change of educational objective. A student may interrupt studies for one or more semesters. Normally, the student will be expected to complete the degree program in not more than two years beyond the scheduled time. The individual whose education has been interrupted may have to meet new degree requirements if a change has occurred.

### Dual degrees

Students may elect to earn two degrees at the same time. The requirements for both must be satisfied. Students should confer with each academic dean as early as possible to determine appropriate programs of study.

Students who are eligible to graduate with two degrees must file an application for graduation for each degree in the academic dean's offices during the first four weeks of the semester they plan to complete degree requirements. Summer graduates must file their applications for graduation during the first two weeks of the summer term.

### Undergraduate minors

Undergraduate minors provide students an opportunity to emphasize study in an area outside their major curriculum. Because expertise in areas related to a major may be beneficial, students are encouraged to consider broadening their course of study through pursuit of a minor. Students completing all requirements for a minor will receive official recognition for their emphasis on their permanent records.

A minor requires completion of at least 15 designated hours of course work. Faculty in departments offering minors have specified courses that enable students to acquire moderate expertise in their discipline. Courses forming a minor may be used to satisfy the general

requirements of a major curriculum, including free electives.

Declaration of a minor is optional. Students are not required to complete a minor to graduate.

Students interested in completing one or more minors should consult their advisor. Additional counsel should be sought from the faculty in the minor department. Students are encouraged to seek advice and information about potential areas of emphasis early in their academic planning.

For more information on specific minors, consult individual department course listings.

## Math Requirements for Degrees

The degrees shown below are conferred on completion of the prescribed curricula. The letter that precedes each curriculum indicates the suggested high school math courses that students should have completed in high school.

- (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
- (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

#### Bachelor of science in agriculture

- (E) Agribusiness (B.S. in agribusiness)
- (E) Agricultural economics
- (E) Agricultural education
- (E) Agricultural journalism
- (E) Agricultural technology management
- (E) Agronomy (crops and soils)
- (E) Animal sciences and industry
- (E) Bakery science and management (B.S. in bakery science and management)
- (E) Feed science and management (B.S. in feed science and management)
- (E) Food science and industry (B.S. in food science and industry)
- (E) Horticulture
- (E) Horticultural therapy
- (E) Milling science and management (B.S. in milling science and management)
- (E) Recreation and park administration
- (E) Park resource management
- (E) Pre-veterinary medicine (nondegree)

## College of Architecture and Design

- (F) Architecture—five years (bachelor of architecture)
- (F) Interior architecture—five years (bachelor of interior architecture)
- (F) Landscape architecture—five years (bachelor of landscape architecture)

## College of Arts and Sciences

### Bachelor of arts, bachelor of fine arts, bachelor of music, bachelor of music education, and bachelor of science

- (B) Anthropology, B.A. or B.S.
- (A) Art, B.A. or B.F.A.
- (E) Biochemistry, B.A. or B.S.
- (E) Biology, B.A. or B.S.
- (E) Chemistry, B.A. or B.S.
  - General chemistry
  - Chemical science
- (B) Economics, B.A. or B.S.
- (A) English, B.A.
- (E) Fisheries and wildlife biology, B.A. or B.S.
- (B) Geography, B.A. or B.S.
- (E) Geology, B.A. or B.S.
- (E) Geophysics, B.A. or B.S.
- (A) History, B.A. or B.S.
- (B) Mass communications, B.A. or B.S.
- (E) Kinesiology, B.A. or B.S.
- (F) Mathematics, B.A. or B.S.
- (E) Medical technology, B.A. or B.S.
- (E) Microbiology, B.A. or B.S.
- (A) Modern languages, B.A.
- (A) Music
  - Music, B.A.
  - Applied music, B.M.
  - Music education, B.M.E.
- (A) Philosophy, B.A. or B.S.
- (E) Physics, B.A. or B.S.
- (B) Political science, B.A. or B.S.
- (E) Pre-dentistry, B.A. or B.S.
- (E) Pre-law (nondegree)
- (E) Pre-health information management (nondegree)
- (E) Pre-medicine, B.A. or B.S.
- (E) Pre-nursing (nondegree)
- (E) Pre-occupational therapy (nondegree)
- (E) Pre-optometry (nondegree)
- (E) Pre-pharmacy (nondegree)
- (E) Pre-physical therapy (nondegree)
- (E) Pre-respiratory therapy (nondegree)
- (E) Pre-veterinary medicine (nondegree)
- (E) Psychology, B.A. or B.S.
- (E) Social work, B.A. or B.S.
- (E) Sociology, B.A. or B.S.
- (A) Speech, B.A. or B.S.
- (A) Speech pathology-audiology, B.A. or B.S.
- (A) Statistics, B.A. or B.S.
- (A) Theatre, B.A. or B.S.

### Interdisciplinary studies

- (A) Humanities, B.A.
- (D) Life science, B.A. or B.S.
- (E) Physical science, B.A. or B.S.
- (A) Social science, B.A. or B.S.

## College of Business Administration

### Bachelor of science in business administration

- (E) Accounting
- (E) Finance
- (E) Management
- (E) Marketing

## College of Education

- (A) Elementary education (bachelor of science in elementary education)

### Secondary education (bachelor of science)

- (A) Education—Art
- (E) Education—Biological science
- (B) Education—Business
- (E) Education—Chemistry
- (E) Education—Earth science
- (B) Education—Economics
- (A) Education—English
- (A) Education—English and journalism
- (A) Education—Geography
- (A) Education—History
- (A) Education—Journalism
- (F) Education—Mathematics
- (A) Education—Modern languages
- (E) Education—Physical science
- (E) Education—Physics
- (B) Education—Political science
- (B) Education—Sociology
- (A) Education—Speech

## College of Engineering

- (F) Agricultural engineering (B.S. in agricultural engineering)
- (F) Architectural engineering (B.S. in architectural engineering)
- (F) Chemical engineering (B.S. in chemical engineering)
- (F) Civil engineering (B.S. in civil engineering)
- (F) Computer engineering (B.S. in computer engineering)
- (F) Computer science (B.S. in computer science)
- (D) Information systems (B.S. in information systems)
- (F) Construction science and management (B.S. in construction science and management)
- (F) Electrical engineering (B.S. in electrical engineering)
- (F) Industrial engineering (B.S. in industrial engineering)
  - Manufacturing systems engineering
- (F) Mechanical engineering (B.S. in mechanical engineering)
- (F) Nuclear engineering (B.S. in nuclear engineering)

## College of Human Ecology

- B.S. in clothing and textiles**
- (C) Apparel and textile marketing
- (C) Apparel design
- (C or F) Textiles

## B.S. in dietetics

- (C) Dietetics

## B.S. in foods and nutrition

- (C) Community health and nutrition
- (C or F) Food science
- (F) Nutritional sciences (pre-medical)
- (C or F) Nutrition and exercise sciences)

## B.S. in hotel and restaurant management

- (C) Hotel and restaurant management

## B.S. in human development and family studies

- (C) Early childhood education
- (C) Human development and family studies
  - Family life community services
  - Family and consumer economics
  - Life span human development
  - Human development and family studies and social work

## B.S. in human ecology

- (C) General human ecology
  - Home economics education
  - teacher certification

## B.S. in human ecology and mass communications

- (C) Human ecology and mass communications

## B.S. in interior design

- (C) Interior design

## College of Technology

### Associate of technology

- (E) Aviation maintenance
- (F) Civil engineering technology
- (F) Computer engineering technology
- (B) Computer information systems
- (E) Computer science technology
- (F) Electronic engineering technology
- (F) Industrial engineering technology
- (F) Mechanical engineering technology
- (E) Professional pilot
- (F) Surveying technology
- (F) Environmental engineering technology

### Associate of applied science

- (E) Aviation maintenance
- (E) Avionics technology

### Aviation maintenance certificate

- (B) Aviation maintenance

## Bachelor of science in mechanical engineering technology

- (F) Mechanical engineering technology

## Bachelor of science in electronic engineering technology

- (F) Electronic engineering technology

## College of Veterinary Medicine

### Veterinary medicine (doctor of veterinary medicine)

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

# 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  
**I**, for incomplete  
**IX**, for unfinished incomplete, equivalent to F  
**P**, for grades of B, C, or D in courses taken under the A/Pass/F grading option  
**Cr**, for credit in courses for which no letter grade is given (nongraded courses)  
**NC**, for no credit in courses for which no letter grade is given (nongraded courses)  
**NR**, for no grade reported  
**NX**, for NR converted to the equivalent of F  
**W**, for withdrawn

The grade of Incomplete (I) is given in regular courses (other than independent studies, research, and problems) upon request of the student for personal emergencies that are verifiable. The faculty member has the responsibility to provide written notification to the student of work required to remove the incomplete. The student has the responsibility to take the initiative in completing the work, and is expected to make up the incomplete during the first semester in residence at the university after receiving the grade of I. If the student does not make up the incomplete during the first semester in residence at the university after receiving it, a grade may be given by the faculty member without further consultation with the student.

If after the end of the first semester the I remains on the record it will be designated as IX for record-keeping purposes and will be computed in the student's GPA, weighted at 0 points per credit. A grade of NR will be treated in a like manner using the designation NX.

Courses in which a Cr or P grade is received will be used in fulfilling graduation requirements. Only the grades A, B, C, D, and F (and the designations IX and NX under conditions described above) are used in calculating resident grade averages.

## Report of Grades

Academic progress reports for new freshmen are mailed to students and deans' offices at the close of the fifth week of courses.

The instructor reports final semester grades, based on examinations and course work, to the Registrar's Office.

If a student drops a 16-week course after the 25th day of courses, a mark of W is reported on the transcript. No 16-week course may be

dropped after the tenth week of the semester. Regardless of the time of withdrawal, a final grade is reported if all the required work of the course has been completed.

In case of absence from the final examination, the instructor reports a mark of I for incomplete or computes the grade on the basis of zero for the final examination. If an Incomplete is reported, a reasonable time, usually not over one month, is allowed in which to take the examination.

## Points

For each semester hour of graded work, students earn points, as follows:

A = 4.0	F = 0
B = 3.0	IX = 0
C = 2.0	NX = 0
D = 1.0	

## Scholastic Deficiencies

Students are notified of their scholastic status by the appropriate academic deans from information supplied by the Registrar's Office. The scholastic record of each undergraduate is evaluated twice yearly, at the end of the fall semester and at the end of the spring semester. The student's scholastic status does not change as a result of work taken in summer session or intersession.

Students (excluding students in the College of Veterinary Medicine) are placed on academic warning or dismissal according to the following policy.

### Students who earn less than a 1.0 GPA in a given semester

Students who earn less than a 1.0 GPA in any semester are considered to have neglected their academic responsibilities. The following policy applies:

1. Any student (freshman or transfer) who earns less than a 1.0 semester GPA in his or her first semester at K-State will be dismissed.
2. Any continuing student enrolled at K-State not dismissed by university academic standards policies but who earns less than a 1.0 semester GPA will have registration for the next term withheld subject to review by the academic dean or the dean's representative(s).

### Academic warning

1. Students who earn less than a 2.000 K-State semester or cumulative GPA will be placed on academic warning.
2. Students will be automatically taken off academic warning when the cumulative K-State GPA reaches 2.000.

### Academic dismissal

1. Credit hours used to determine the appropriate threshold will include transfer hours accepted, all K-State graded hours, and miscellaneous hours completed.
2. Credit hours used in calculating semester and cumulative grade point averages will include only K-State graded hours. Grades for courses accepted in transfer from another institution will not be used in the grade point average calculation.
3. Students with a K-State cumulative GPA of 1.0 or greater will not be dismissed until they have accumulated at least 20 semester credit hours as defined in item 1. (Exception: A student who earns less than a 1.0 semester GPA in his or her first semester at K-State will be dismissed.)
4. Students must be on academic warning the semester prior to dismissal. (Exception: A student who earns less than a 1.0 semester GPA in his or her first semester at K-State will be dismissed.)
5. Students will be academically dismissed if their K-State cumulative GPA is below the following threshold values:
 

Total Hours Accumulated*	KSU GPA
20-29	1.50
30-45	1.75
46-60	1.80
61-75	1.85
76-90	1.90
91-105	1.95
greater than 105	2.00

 \*Defined in item 1 above
6. Students who earn a K-State semester GPA of 2.200 or more on 12 or more graded hours (or the minimum grade point average established by the student's college, if higher) during the semester in question will not be dismissed.
7. Students who neglect their academic responsibilities may be dismissed at any time on recommendation of the academic dean.
8. Dismissed students will be readmitted only when approved for reinstatement by the Academic Standards Committee of the college the students are attempting to enter. Normally students must wait at least two semesters before being considered for reinstatement and are on academic warning at the time of readmission.

9. Students who have been dismissed or have had their registration withheld will receive a letter providing a contact person and information about reinstatement or registration procedures.

Reinstatement

Normally a student must wait at least two semesters before being considered for reinstatement.

A dismissed student will be readmitted only when approved for reinstatement by the academic standards committee of the college the student is attempting to enter; the application for reinstatement must be directed to the academic standards committee.

Students who earn a semester grade point average of at least 2.0 but less than 2.2 on 12 or more credits during the semester they are dismissed can be considered for immediate reinstatement.

Honors

Graduation honors

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 K-State academic average are designated as *summa cum laude*. The remaining students in the upper three percent of the college graduating class are designated *magna cum laude*. Those remaining in the upper 10 percent are graduated *cum laude*. Doctor of veterinary medicine degree candidates are eligible to receive these honors based on courses completed in the professional program.

Semester honors

Students with 12 graded hours whose semester grade point average places them in the upper 10 percent academically of their classes and colleges will be awarded semester scholastic honors.

Credits for Extracurricular Work

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

Subject	Semester	Total
KSU Symphony Orchestra	1	4

Bands (Marching, Symphonic, Pep, etc.)	1	4
Concert Choir	1	4
Collegiate Chorale	1	4
K-State Singers	1	4
Concert Jazz Ensemble and Jazz Labs	1	4
Men's Glee Club	1	4
Women's Glee Club	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	1	4
K-State Engineer	1	2
Royal Purple Journalism	1	4
Men's Athletics	1	4
Women's Athletics	1	4

\*Maximum is 4 credits; however, the number allowed can vary depending on college.

Extracurricular credit is also available with the K-State Dance Workshop (through Dance Production class).

Credits may be counted as electives in a student's curriculum. A student may use no more than 8 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, with permission of the instructor in charge of the work. A student participating in one or more of these activities must be enrolled even though the credits exceed the maximum for graduation.

Classification of Students

An entering high school graduate with less than 30 semester hours accumulated credit is classified as a freshman. A student is advanced to a higher classification upon successful completion of sufficient credit hours to meet the requirements as listed below:

Freshman	Sophomore	Junior	Senior	Fifth-year student*
Less than 30	30	60	90	120

\*Applies only to the College of Architecture and Design and the College of Engineering.

Student Records

University policy

Kansas State University maintains various student records to document academic progress and to record interactions with university staff and officials. To protect each student's rights to privacy, and to conform with federal law, the university has an established policy for handling student records. Interpretation of this policy is based on experience with educational records, and the policy itself may subsequently be modified in light of this experience. Notice of this policy and of a student's rights under federal law is given annually. Copies of this policy are available at the

Registrar's Office, 118 Anderson Hall, and it is published in the *Undergraduate Catalog* and in the *Class Schedule*.

Directory information

Certain information concerning students is considered to be open to the public upon inquiry. This public information is called directory information and includes a student's name, local address and telephone number, permanent mailing address, college, curriculum, year in school, date and place of birth, dates of attendance at K-State, awards and academic honors, degrees and dates awarded, most recent educational institution attended, participation in officially recognized activities and sports, and height and weight of members of athletic teams.

Directory information as defined above will be released for individual students by the Registrar's Office to anyone upon inquiry, unless the student has requested after registering that directory information not be released. The student's request to have directory information withheld must be submitted for each semester the student is enrolled and should be made at the Registrar's Office, which will notify other appropriate university offices.

Confidential information

With the exception of the information noted above, student records are generally considered to be confidential. The following policies govern access to confidential student records:

1. Each type of student record is the responsibility of a designated university official, and only that person or the dean, director, or vice president to whom that person reports has authority to release the record. The responsible officials are:

- a. Academic records: For undergraduates, the registrar, Anderson Hall.
- b. Admissions records: For undergraduates, the director of admissions, Anderson Hall.
- c. Financial aid records: director of Student Financial Assistance, Fairchild Hall.
- d. Business records: Controller's Office, Anderson Hall.
- e. Security/police records: head of KSU Police Department, East Stadium.
- f. Medical records: director, Student Health Service, Lafene Health Center.
- g. Counseling records: director, University Counseling Services, Lafene Health Center.
- h. Actions of academic standards committees: college dean.
- i. Academic disciplinary records: chair, Undergraduate Grievance Committee.
- j. Nonacademic disciplinary records: dean of student life, Holton Hall.
- k. Housing records: director of housing and dining services, Pittman Building.

l. Placement records: director of Career Planning and Placement Center, Holtz Hall.

m. Evaluations for admission to graduate or professional programs: dean (of the Graduate School or the appropriate college) or department head.

n. Special academic programs: faculty member in charge of the program, and dean of the college.

o. Foreign student records: foreign student advisor, International Student Center.

p. Test scores for College Level Examination Program (CLEP), American College Testing Program (ACT), Miller Analogies Test (MAT), etc.: director, Academic Assistance Center, Holton Hall.

2. Confidential educational 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, or in connection with the student's application for financial aid, or in response to a judicial order or subpoena, or in a bona fide health or safety emergency; or, upon request, to other schools in which the student seeks or intends to enroll; or to the U.S. comptroller general, the secretary of H.E.W., the U.S. commissioner of education, the director of the National Institute of Education, the assistant secretary for education, state educational authorities, or state and local officials where required by state statute adopted before November 19, 1974.

3. The responsible official may release records to university personnel who have a legitimate need for the information in order to carry out their responsibilities.

4. All student records are reviewed periodically. Information concerning the frequency of review and expurgation of specific records is available in the Registrar's Office.

5. With certain exceptions, students may review records that pertain directly to them upon request and may obtain a copy of the record at cost, according to the following schedule:

a. Transcript of academic record—\$3 per copy.

b. Housing department records—four cents per page.

c. Medical records (Lafene Health Center)—no charge to patient for medical purposes. A charge of \$15 to \$25 to outside parties with patient release.

d. Other records—no charge.

The major exceptions to student review are medical and counseling records. These may be released, however, to other medical or psychological professionals at the written request of the student; and may be inspected by the patient at the discretion of the professional staff. Other exceptions are law enforcement

records, private notes of staff members, and financial records of parents.

6. A student may waive the right to review a specific record by submitting in writing a statement to this effect to the official responsible for that record. Examples are recommendations for career placement or admission to graduate study.

*7. University personnel who have access to student educational records in the course of carrying out their university responsibilities shall not be permitted to release the record to persons outside the university, unless authorized in writing by the student or as required by a court order. Only the official responsible for the records has the authority to release them.*

8. All personal educational 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. A record is maintained showing who has had access to student records, and this record is open to inspection by the student.

## Release of grades

Reports of a student's grades are routinely sent to the student. Parents of dependent students may obtain grades by writing to the Registrar's Office. Proof of dependency is required. The grades of other students will be sent to their parents only with written permission of the student.

## Withholding records

In the case of a student who is delinquent in an account to the university, or about whom official academic and/or disciplinary action has been taken, the appropriate university official may request that the student's record not be released. The effect of this action is that transcripts, registration forms, and diplomas are withheld as well as the process of dropping or adding a course. In order for the action to be rescinded, the Registrar's Office must receive authorization from the official who originally requested the action, indicating that the student has met the obligation. Further information concerning this policy can be obtained from the Registrar's Office, 118 Anderson Hall, 532-6254.

## Review and challenge of records

Upon request to the official listed above, a record covered by the act will be made available to the student within a reasonable time and no later than 45 days after the request. Copies are available at the student's expense and explanations and interpretations of the records may be requested from the official in charge. If the official 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 record's content. 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, a hearing may be requested. The hearing, conducted by a hearing officer appointed by the president, will be held within two weeks. The student will have the opportunity at the hearing to present any relevant evidence, and a decision will be rendered within two weeks after the hearing. If the result does not satisfy the student, he or she may place a statement in the file.

## Complaints

A student who believes the university has not complied with federal law or regulations may send a written complaint to The Family Educational Rights and Privacy Act Office, 400 Maryland Avenue, S.W., Washington, D.C. 20202.

## Transcript

A transcript is a certified, official copy of a student's permanent academic record. Since the transcript contains confidential information, it cannot be released to anyone other than the student except as follows: if a specific signed request by student for release to another party or a release in compliance of federal regulations is submitted.

The prepaid fee for a transcript \$3. Payment may be made by cash, check, money order, VISA, or MasterCard. A request for a transcript must be made through the Registrar's Office, 118 Anderson Hall, Manhattan, KS 66506-0114. The telephone number is 532-6254. Transcript service will not be provided for a student who has outstanding financial obligations.

The transcript request must include the following:

1. Student's current name, plus any other name or names used while attending K-State.
2. Student I.D. number.
3. Student's date of birth.
4. Student's beginning and ending dates of attendance at K-State.
5. The number of transcripts requested.
6. Where the transcript is to be sent.
7. Transcript fee: \$3 per copy, plus additional mail/FAX service if requested.
8. Student's signature.
9. Student's current home address and daytime telephone number.
10. If transcript is to be held for current semester grade/degree, indicate on request.

Transcripts picked up by or sent to the student are stamped "issued to student" and are not accepted as official by some institutions.

# All-University Regulations

## Student Conduct

### Philosophy of student conduct

The purpose of discipline in the university setting is to protect the campus community and its members. To achieve this protection, students at K-State are expected to follow university rules and policies pertaining to nonacademic conduct. Persons who violate these policies, interfere with the rights of others, disrupt the educational process, or commit other unlawful acts will be held accountable for their actions.

The following principles govern the disciplinary process: every effort is made to bring about outcomes that are positive for all parties involved; students will be members of all Student Governing Association judicial bodies; formal hearing processes are fundamentally fair and respect the rights of the individuals involved; confidentiality will be maintained; records of proceedings will be released only on written authorization of the student involved. The procedures are outlined in the SGA Judicial Code, included in the by-laws to the SGA Constitution.

Descriptions of the judicial structure and process, as well as university policies, are free and are available in the Student Activities and Services Office in the K-State Union.

### Prohibited conduct

Important definitions of terms describing prohibited conduct are stated in the Student Conduct Code, available in the Student Activities and Services Office in the Union.

The following misconduct is subject to disciplinary action:

1. Intentionally or recklessly causing physical harm to any person on university premises or at university-sponsored activities, or intentionally or recklessly causing reasonable apprehension or fear of such harm.
2. Unauthorized use, possession, or storage of any weapon on university premises or at university-sponsored activities.
3. Intentionally initiating or causing to be initiated any false report, warning, or threat of fire, explosion or other emergency on university premises or at university-sponsored activities.
4. Intentionally or recklessly interfering with university or university-sponsored activities, including, but not limited to, studying, teaching, research, university administration, or fire, police, or emergency services.

5. Knowingly violating the terms of any disciplinary sanction imposed in accordance with this code.

6. Unauthorized distribution, use, or possession of a controlled substance as described in Chapter 65, Article 41 of Kansas Statutes Annotated, including but not limited to marijuana, cocaine, and heroin, on university premises or at university-sponsored activities.

7. Violation of the university's published alcohol and cereal malt beverage policy.

8. Intentionally or recklessly misusing or damaging fire safety equipment on university premises or at university-sponsored activities.

9. Forgery, unauthorized alteration, or unauthorized use of any university document or instrument of identification.

10. Intentionally and substantially interfering with the freedom of expression of others on university premises or at university-sponsored activities.

11. Theft of property or of services on university premises or at university-sponsored activities; knowing possession of stolen property on university premises or at university-sponsored activities.

12. Intentionally or recklessly destroying or damaging the property of others on university premises or at university-sponsored activities.

13. Unauthorized presence in or use of university premises, facilities, or property.

14. Negligently, recklessly, or intentionally participating in the hazing of another. (Consent by the person hazed shall be no defense to hazing.)

15. Intentionally or recklessly engaging in conduct which clearly and directly impairs, interferes with, or obstructs the missions, processes, and functions of the university.

16. Telephone harassment, which shall include making calls containing lewd or obscene remarks; making calls intended to harass whether or not conversation ensues; making the telephone ring repeatedly with intent to harass; and making repeated calls in which conversation ensues solely to harass.

Attempts to commit acts prohibited by this code shall be considered violations to the same extent as completed acts.

Sanctions may be imposed for prohibited conduct pursuant to the Student Governing Association Constitution and By-Laws.

## Academic Dishonesty

All academic relationships ought to be governed by a sense of honor, fair play, trust, and a readiness to give appropriate credit for the intellectual endeavors of others when credit is due. Since the academic community expects that the process of intellectual and creative endeavor is beneficial to a student, the student's original work, created in response to each assignment, is normally expected. K-State's policy on academic dishonesty assures due process and provides guidelines for action in instances where the proper academic relationships and attitudes have broken down.

Any student enrolling at K-State implicitly accepts the university's stipulations concerning academic honesty and the procedures they entail.

Complete copies of the academic dishonesty policy are available in the Office of Student Activities and Services in the K-State Union. The policy outlines grievance procedures for all matters of academic dishonesty, grade appeals, or other academic grievances brought by students against faculty members or faculty members against students.

### Plagiarism

Plagiarism, taking someone else's intellectual work and presenting it as your own, covers unpublished and published sources. Borrowing another's term paper, handing in a paper purchased from an individual or agency, or submitting papers from living group, club, or organization files are all punishable as plagiarism.

The standard for attribution and acknowledgement of literary indebtedness is set by each discipline. Students should consult with their department or with recognized handbooks in their field if in doubt.

The guidelines apply to faculty and research assistants in their possible use of students' and colleagues' research and ideas, as well as to students' use of source materials and authorities, and student use of other students' ideas and work.

### Other forms of academic cheating

Other forms of academic dishonesty subject to penalties include, but are not limited to, consultation of books, library materials, or notes during a test; use of crib sheets or hidden notes during an examination or looking at another student's test; having a confederate supply questions or answers from an examination to be given or in progress; having another person stand in on an exam or other graded activ-

ity; deliberate falsification of lab results; submission of falsified data; procurement or alteration, without permission, of examinations or other academic exercises; collaborating on projects where collaboration is forbidden; submitting previously graded work for a new assignment (without the instructor's consent), and other forms of academic dishonesty and fraud.

## Adjudication and penalties

Guidelines for adjudicating charges of dishonesty are described in the policy. Further information is contained in the Faculty Senate Minutes, April 11, 1989, Student Grievance Procedures.

The minimum penalty for cheating on an examination or paper, if proved, is an F for the assignment; maximum penalty is dismissal from the university. Minimum penalty for cheating on a comprehensive final, if proved, is an F for the course; maximum penalty is dismissal from the university.

In a second proved instance of academic dishonesty, suspension from the university is automatic. Dismissal from the university is the maximum penalty.

## University Policies

Students, faculty, and administrators are members of a community dedicated to the growth and development of individuals.

Enrollment at K-State entails responsibilities as well as privileges. Acceptance of and adherence to the following policies is necessary for the protection of the rights of others and the protection and health of the community. Copies of the following policies are available in the Office of Student Activities and Services in the K-State Union and the Dean of Student Life Office in Holton Hall, unless otherwise indicated.

### Academic grievance

The following procedures will be employed to deal with all matters of cheating, academic dishonesty, grade appeals, or other academic grievances brought by students against faculty members or faculty members against students. These procedures will serve three functions: (1) safeguard the rights and academic freedom of both students and faculty, (2) assure due process, and (3) provide for consistency in handling undergraduate academic grievances throughout the university.

### Grievances against faculty or administrators

Unethical actions by faculty or administrators should be reported as soon as possible so that appropriate action can be taken. The grievance must be made within six months of the alleged unethical action(s). Students

should begin by contacting the office of their dean. The dean, or a representative of the dean, will describe the procedure to be followed and will aid the student in procedural matters. Further, the dean or representative will appoint a faculty member as an advocate for the student if the situation seems to warrant an advocate or if the student requests an advocate. If a faculty advocate is appointed, the student will participate in the selection of, and must agree to the appointment of, the person selected. The advocate need not be in the college.

### Grievances involving student academic dishonesty

The procedures for handling charges of cheating or other academic dishonesty are given in the policy on academic dishonesty which immediately follows this section on academic conduct. In any case involving academic dishonesty, the Undergraduate Grievance Board may take other equitable actions in addition to any penalties provided by the academic dishonesty policy.

### Grievances involving change of grade (but not academic dishonesty)

a. All efforts will be made by the student and instructor involved in any grievance to settle all disputes that may arise. Grade appeals must be initiated within six months following the issue date of the grade in question.

b. If a grade change grievance is not resolved by the student and instructor, the student may appeal in writing to the department head concerned who will act as a mediator in the dispute. This appeal should be made within two weeks of the date of the original appeal. At this time, the student may petition the dean of his/her college for an ombudsperson. The duties of the ombudsperson are to arrange meetings of all concerned parties and report actions taken at each level to the appropriate persons or groups. The role of the ombudsperson is to expedite the process and to ensure a fair hearing.

c. If the grievance has not been settled to the student's satisfaction at the department level, written appeal may be made to the dean of the college in which the course is taken. This appeal should be made within two weeks of the date of receipt of the appeal by the department head. The dean will act as a second mediator.

d. If the student does not feel that an adequate solution has been reached in any academic dispute, she/he may appeal in writing to the Undergraduate Grievance Board, which will arbitrate the dispute. This appeal should be made within two weeks of the date of receipt of the appeal by the dean.

e. The two week time limits given in the sections above are intended to move the grievance process along at a reasonable rate. The limits may be modified for reasonable reasons such as illness, scheduled academic holidays, or mutual consent of both parties.

## Advertising, sales, and solicitation

Facilities of Kansas State University are not available for unrestricted use by non-university groups. University property may not be used for commercial purposes except when sponsored by a university-affiliated organization or department. The regulations governing fund-raising and the posting and distribution of literature are available in the SAS office only.

## AIDS, ARC, and AIDS virus guidelines

Under the direction of the Kansas Board of Regents, the university has developed guidelines to assist students, staff, and faculty members in the event that they have to deal with situations involving acquired immune deficiency syndrome (AIDS) or AIDS-related complex (ARC). Complete copies of the guidelines are also available in the Lafene Health Center.

## Alcohol and cereal malt beverage policy

The legal drinking age in Kansas for alcoholic beverage is 21. The Kansas Board of Regents policy permits the use and sale of cereal malt beverages (3.2 beer) under authorized and appropriately controlled conditions and regulations. By state law, the sale of alcoholic liquor is not permitted on state property. Included in the K-State policy is information on alcohol and cereal malt beverage consumption in residence halls, at athletic events, and for student organizations.

## Drug-free workplace policy

In 1988, Congress passed the Drug-Free Workplace Act. This act applies to all institutions holding and applying for federal grants and contracts. K-State adopted the policy that the unlawful manufacture, distribution, dispensing, possession, or use of controlled substances is prohibited in its workplace.

## Facilities usage

K-State facilities are available for use by authorized groups for activities that complement the teaching, research, and service programs of the university. Policies and procedures for use of K-State facilities (other than the K-State Union) are available in the Division of Facilities Management in Dykstra Hall.

Policies and procedures for use of the K-State Union are available in the Union Reservations Office on the second floor or in the Handbook for UAB Registered Organizations.

## Gender

The goal of this policy is to create an environment in which all students, faculty, and staff interact solely on the basis of individual strengths and characteristics without having those interactions shaped by generalizations, stereotypes, or valuations based on gender. Copies are also available in the Women's Center in Holton Hall and Affirmative Action Office in Anderson Hall.

## Political activity guidelines

All members of the university community are encouraged to take advantage of opportunities to educate themselves regarding the candidates and issues relating to national, state, and local elections. Copies of the university guidelines related to political activities on campus are available in the SAS office only.

## Prayer at university functions

Nonsectarian prayers, invocations, benedictions, or silent meditations are permitted at university functions to enhance mutual respect and awareness.

## Racial and/or ethnic harassment

Racial and/or ethnic harassment is prohibited by K-State and includes, but is not limited to, verbal, physical, or written behavior directed toward or relating to an individual or group on the basis of race, ethnicity, or racial affiliation. It has the purpose or effect of creating an intimidating, hostile, or offensive work or educational environment; interfering with an individual's work, academic performance, living environment, personal security, or participation in any university-sponsored activities; and threatening an individual's employment or academic opportunities.

Racial and/or ethnic harassment should be reported to the university administrator responsible for the department or unit or to the Affirmative Action Office. For students with complaints of harassment by other students, the dean or associate dean of student life may be regarded as the appropriate administrator. Copies of the policy are also available from the Affirmative Action Office in Anderson Hall.

## Religious activities

In a pluralistic, multicultural, and interdenominational university environment, freedom of worship is supported. Religious programs and activities must comply with university policies as well as federal, state, and local laws. In keeping with its education mission, the university may specify the time, place, and manner of religious events, but may not regulate their content.

## Sexual harassment policy

K-State prohibits sexual harassment and has defined sexual harassment as any behavior that, through inappropriate sexual content or disparagement of members of one sex, interferes with an individual's work or learning environment. This policy applies to the working and learning relationships of all individuals within the university community—faculty, staff, and students.

Sexual harassment should be reported to the university administrator responsible for the department or unit or to the Affirmative Action Office. For students with complaints of harassment by other students, the vice president for institutional advancement may be regarded as the responsible administrator. Copies of the Policy Prohibiting Sexual Harassment are available from the SAS office, departmental offices, or the Affirmative Action Office in Anderson Hall.

## Sexual violence

No form of sexual violence will be tolerated or condoned at Kansas State University. This policy prohibits not only those acts commonly understood to constitute "sexual assault," but all attempts to coerce sexual activity as well. This university will investigate acts of sexual violence perpetrated by and/or against students and will respond with appropriate action, which may include suspension or dismissal. Copies are available also in the Women's Center in Holton Hall.

# Student Financial Assistance

Larry Moeder, Director  
104 Fairchild Hall  
532-6420

Kansas State University administers an extensive financial aid program to bridge the gap between family contribution and the cost of attending the university. Detailed information concerning financial aid is available on request from the Office of Student Financial Assistance, 104 Fairchild Hall.

The Free Application For Federal Student Aid (FAFSA) should be used by students applying for all federal and state aid programs. Students living in Kansas may obtain the FAFSA from any high school counselor or from K-State. The priority date for submitting the FAFSA is March 15 before the fall semester in which the student intends to enroll.

## Programs

### Scholarships

Each year nearly 4,000 Kansas State University undergraduate students receive more than \$4 million of scholarship assistance based on their academic records, financial need, and/or leadership qualities. The K-State scholarship application is due by February 1 each year for the following academic year. Applications and scholarship information are available from high school counselors, the Office of Student Financial Assistance, and the various colleges at K-State.

### Grants

Approximately 6,000 students are assisted through two federal grant programs.

Assistance exceeds \$10 million. The Free Application For Federal Student Aid is the application for these programs and should be filed by March 15.

### Loans

K-State has six kinds of student loans: the Federal Perkins Loan, the Federal Subsidized Stafford and the Federal Unsubsidized Stafford loans, the Federal Parent Loan for Undergraduate Students (PLUS), the Health Professions Student Loan (HPSL), and Alumni/Foundation Loans.

The Perkins Loan is a five percent interest loan. The Stafford Loan is a variable interest loan that is funded by participating lending agencies. HPSL carries a five percent interest rate. No interest is charged while a student is attending school. At the time the borrower begins repaying these loans, the interest begins accruing on the unpaid balance. The repayment period may be up to 10 years.

The Federal Subsidized and Unsubsidized Stafford Loans contain the same basic annual limits and interest rates (6.22 percent 1993-94). The Subsidized Stafford Loan is based on financial need while the Unsubsidized Stafford does not carry a need requirement. Repayment on the principal of both loans begins six months after the student stops attending at least half time. In school interest payments on the Subsidized Stafford Loan is maintained by the federal government and by the student on the Unsubsidized Stafford Loan.

The Alumni Loan/Foundation Loan charges six percent interest payable annually from the date of the loan, with \$50 monthly payments beginning six months after the borrower leaves school.

The Federal PLUS loan is given at 6.89 percent for 1993-1994. It begins accruing interest 60 days after the borrower receives the money. Parents borrowing on their student's behalf, begin monthly payments either 30 or 60 days (depending on the lender) after receiving the money.

Qualified students also may borrow through emergency, alumni, and endowment funds to meet specific needs. Interested students should contact the Office of Student Financial Assistance.

### Employment

Kansas State University provides services for students seeking part-time employment to help offset educational, living, and social expenses. The Student Employment Center handles two categories of jobs: College Work-Study Program jobs and Campus Payroll jobs. In addition, the center handles the advertising of several off-campus employment positions. All of the center's jobs are posted on the job board, which is in the K-State Union.

To be employed on the hourly student payroll, a student must be enrolled in at least 6 resident semester credit hours at K-State during a fall or spring semester, and at least 3 resident semester credit hours at K-State during a summer term, or have been enrolled in at least 6 resident semester credit hours at K-State during the preceding spring semester.

### Services for veterans

The university maintains a veterans' service to aid veterans and children of deceased or disabled veterans in securing educational benefits.

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 Vietnam.

Information may be obtained from your nearest Veterans' Administration Office or the Office of Student Financial Assistance.

### 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 Administration, Kansas State Department of Education, 120 East 10th Street, Topeka, Kansas 66612.

## Satisfactory Academic Progress

Federal regulations require that financial aid recipients make satisfactory academic progress in order to be eligible for federal financial aid programs. Included are students who receive aid from any of these programs: Pell Grant, Supplemental Educational Opportunity Grant, State of Kansas Scholarship, Perkins Loan, Stafford Student Loan, Parent Loan for Undergraduate Students, Health Professions Student Loan, and College Work-Study.

K-State has established a framework for evaluating a student's efforts to achieve an educational goal (degree) within a reasonable period of time. This includes a quantitative measure (number of hours earned each academic year and a maximum number of allowed credit hours) and a qualitative measure (grade points earned for hours completed each academic year).

All recipients of student financial assistance will be required to meet the standards of satisfactory academic progress. The only programs not covered by this policy are athletic grants-in-aid and non-federally funded aid.

### Definition of satisfactory progress

Federal guidelines for awarding financial aid are based on specific minimum federal standards. Satisfactory academic progress is determined by the formula:

Hours for which federal financial aid is awarded  
– Hours completed  
= Credit or deficiency

Students begin satisfactory academic progress measurement during the first term federal aid is received. Credits or deficiencies from all terms are carried forward. Credits or deficiencies apply only to satisfactory academic progress measurement. Minimum hours required for these programs are:

	Hours per academic year
<b>Undergraduates</b>	
Full-time grant	18
3/4-time grant	14
1/2-time grant	8
<b>Graduates</b>	
Full-time	14
3/4-time	10
1/2-time	8

Courses in which a grade of F or incomplete (I), (IX), withdrawn (WD), NR, or NC is recorded are not counted in the satisfactory progress measurement. Graduate students will receive credit for incompletes in research that follows the published degree requirements as elective or required courses, or courses taken as part of developmental studies.

Hours completed in excess of the required minimum standards will be credited to student's overall academic achievement. A student may attempt the following number of accumulated credit hours: undergraduates—no more than 180; master's degree students—no more than 60; doctoral students—no more than 120. Any student who reaches the above maximum number of hours attempted will not be eligible, without going through the established appeals process, for additional federal financial assistance.

Courses earned by a student while at another institution will be credited only after a transcript from the other institution is received by the Registrar's Office at Kansas State University and the credit is accepted. The course or courses will count for the academic year in which K-State accepted the credit.

Qualitative measurements for financial aid recipients will be based on the scholastic deficiencies policies in the undergraduate catalog. However, federal regulations require students to earn a 2.0 cumulative grade point by the end of their sophomore year (60 hours) to receive additional federal financial assistance.

**Transfer students**

Transfer students shall receive financial aid for the first semester at K-State and then follow the same standards for satisfactory progress as all other students.

**Financial aid warning**

Students who are deficient in hours during the academic year will be placed on financial aid warning for one academic year. At the end of the next term, a student's performance will again be measured. A student will be reinstated to satisfactory status for financial aid awarding purposes if the deficiencies have been removed. A student will be placed on financial aid exclusion if the deficiency has not been eliminated.

**Financial aid exclusion**

Students on financial aid exclusion will be denied financial assistance until they meet the qualifications for satisfactory progress. Students may file an appeal for satisfactory academic progress to the Office of Student Financial Assistance. If an appeal is approved, financial aid (if available) may be reinstated for the term in question.

**Appeal process**

Appeal forms for satisfactory academic progress are available at the Office of Student Financial Assistance. Appeals are made in writing to the Office of Student Financial Assistance indicating the circumstances of the appeal. The student's academic advisor must state that a conference has been held with the student to discuss the academic deficiencies and to decide what action is being taken to improve the student's academic record.

The appeal may be either approved or denied. If approved, financial aid may be reinstated subject to its availability. The student may be required to participate in special activities to improve his or her academic program. Decisions regarding appeals are final and not subject to further review.

# Services for Students

## Academic Assistance Center

Mike Lynch, Director  
Holton Hall  
532-6492

The Academic Assistance Center provides a comprehensive and coordinated system for the identification, diagnosis, advisement, counseling, and referral of students to the various academic support services available at K-State. In addition, the AAC provides direct academic support through programs which include:

### Tutorial assistance

Free tutoring is available in a variety of introductory courses through the EOF tutoring program. Students desiring assistance are assigned to small groups that meet on a weekly basis with a peer tutor who assists them with course content and learning strategies.

### Study Skills Lab

The AAC provides instruction in basic academic and study skills through the course Study Skills Laboratory (DED 051). Any student may enroll in the Study Skills Lab for 1 to 3 hours of graded credit. Topics covered include note-taking, textbook mastery, how to prepare for and take examinations, time management, stress management, etc.

### The University Experience

The AAC offers the course EDCEP 111 The University Experience to new students for 1-3 hours of credit. This course provides any new student with a general orientation to K-State and university life. Topics covered include study skills, effective use of campus resources, academic planning, career decision making, and university policies and procedures.

### Math lab

The AAC provides a computer-assisted math lab for students desiring either a basic review of pre-algebra mathematics before actually enrolling in a formal mathematics course or assistance with Intermediate and College Algebra. Students enrolling in The University Experience may receive math lab assistance as a part of the course. Students who are unsure of which math course to enroll in may take a 45-minute math placement exam. This assessment is available on a walk-in basis in the AAC.

### Credit by examination

K-State offers students a variety of quiz-out programs through which a student may earn academic credit in specific courses. The AAC is the campus service agency for the College-Level Examination Program (CLEP), the DANTES Program, and the American College Test Proficiency Examination Program (ACT-PEP). The center will also provide consultation and conduct utility studies for academic departments interested in implementing a credit-by-examination program. Information and registration for the CLEP, DANTES, and ACT-PEP programs are available from the AAC.

### Entrance and professional examinations

The AAC administers the following examinations, which are often required to enter selected undergraduate, graduate, or professional programs. Contact the AAC to obtain further information concerning these and other examinations.

American College Test (ACT)  
Dental Admissions Testing Program  
Graduate Management Admissions Test  
Graduate Record Examination  
Insurance Institute Exams  
Law School Admission Test  
Medical College Admission Test (MCAT)  
Miller Analogies Test  
Optometry Admission Testing Program  
Praxis Series (NTE, PPST)  
Scholastic Aptitude Test (SAT)  
Test of English as a Foreign Language (TOEFL)  
Test of Spoken English  
Veterinary College Admission Test  
COPA (Planners)

## Academic and Career Information Center

Tracey Fraser, Coordinator  
14 Holton Hall  
532-7494

The Academic and Career Information Center provides assistance to student in their exploration and selection of academic majors and career options. ACIC resources include a variety of printed and computer software programs. *DISCOVER*, an interactive software program, is designed to assist students with the major/career choice. The *Graduate School Selector* program is a self-directed computerized information bank for students electing to continue their education. Printed materials include curriculum guides for various majors,

information on career options, and opportunities available to specific majors.

The Academic and Career Information Center is staffed by trained professionals, graduate assistants, and peer paraprofessionals.

## Adult Student Services

Nancy Bolsen, Director  
201 Holton Hall  
532-6434

Adult Student Services assists undergraduate and graduate students who are married, have children, are re-entering the educational system after several years, or are 25 years of age or older. Staff members assist students with admission and enrollment and provide information or referrals for housing, child care, refresher and study skills courses, tutoring, financial aid, insurance, public school enrollment, community family programs, emergency locator and commuter information. Staff members work with university and student groups, such as the Non-Traditional Student Association, to make their experiences as adult students at K-State successful ones. The staff may be able to assist the returning K-State student in advising about remedying past academic deficiencies. Staff also help students with their everyday challenges and special concerns before, during, and after their admission to K-State.

## Alcohol and Other Drug Education Service

Bill Arck, Director  
214 Lafene Health Center  
532-6927

The Alcohol and Other Drug Education Service offers information about physical effects and social issues related to alcohol and other drug use or abuse. Campus services provided include media activities such as newspaper ads, posters, brochures, and radio public service announcements; coordination of and participation in awareness events, such as National Collegiate Alcohol Awareness Week and presentations providing information on alcohol and drug-related topics.

This office can also make referrals to various resources for those with concerns about their own or another's possible alcohol and/or drug use or abuse.

## Career and Employment Services

James N. Akin, Director  
Holtz Hall  
532-6506

Career and Employment Services is available to assist students and alumni in their career development. The staff is committed to fostering self-direction and personal responsibility in those seeking help with their career development. Strong academic programs, capable students, a strong work ethic, and a coordinated job-search program combine to give K-State students a distinct advantage over those from many other institutions in planning and achieving vocational/professional goals.

The office provides job search assistance for students of all colleges and departments searching for part-time jobs, career-related experience, and career employment. It brings together students, faculty members, and employers seeking college-educated personnel. Services include part-time job listings; cooperative education work assistance; individual job search advising; workshops on resume building, job search strategies, and interview techniques; candidate referrals; a government job center; summer employment assistance; an extensive career library; job vacancy bulletins; on-campus interviews; and career fairs. Career and Employment works closely with the Academic and Career Information Center to promote a self-directed academic and career planning and development process.

## Cooperative Houses

### Clovia

Alpha of Clovia Cooperative House accommodates up to 62 women. Although 4-H members are given preference, any undergraduate woman is welcome to apply for membership. To keep the house self-supportive, the women at Clovia contribute four to six hours a week for duties. Providing economical living conditions for members is a main goal at Clovia. House bills are approximately \$180 per month, and vary according to social activities and other house functions. Applications can be obtained at County Extension Offices, the State 4-H Department at Kansas State University, or the Clovia Membership Chairman, 1200 Pioneer Lane, Manhattan, Kansas 66502, (913) 539-3575.

### Smith Scholars Program

The Smith Scholars Program provides a broad learning experience for 38 young men each year. Smith Scholars are selected on the basis of academic promise and potential to contribute to a structured program of organized living. The Smith Scholars live in Smith

Scholarship House, a cooperative living arrangement wherein the men do the cooking and housekeeping, providing a substantial savings in housing costs over most other types of living groups.

The Smith Scholars Program is a joint project of the Maitland E. Smith Scholarship House Alumni Association and the KSU Foundation. For more information write to the Smith Scholars Program, 331 North 17th Street, Manhattan, Kansas 66502; or phone (913) 539-4685.

## Dean of Student Life Office

Pat J. Bosco, Associate Vice President for Institutional Advancement and Dean of Student Life  
122 Anderson Hall  
532-6237

Susan M. Scott, Associate Dean  
E. Bernard Franklin, Assistant Dean  
102 Holton Hall  
532-6432

Student life services, including Admissions, Student Financial Assistance, Greek Affairs, Housing, K-State Union, New Student Services, Recreational Services, Registrar, and the Associate Dean of Student Life Office, are coordinated and directed by the associate vice president and dean. These units meet the needs of prospective and enrolled students.

The office is responsible for the Student Governing Association, student activities, leadership development, the administration of the judicial program for nonacademic misconduct, and off-campus housing. Student Activities and Services, Adult Student Services, Religious Affairs, Women's Center, and the International Student Center are supervised and supported by this office. Staff members coordinate assistance to students and families in times of personal crisis and are available to students for general advice, counsel, and assistance with personal problems.

## Disabled Student Services

Gretchen Holden, Director  
Holton Hall  
V/TT 532-6441

Disabled Student Services works to meet the needs of students with physical disabilities and documented learning disabilities by providing academic, financial, and vocational counseling. Staff will work as a liaison with students' instructors. Reading and study skills instruction may be of special interest to learning disabled students.

Other supportive services include tutorial assistance, readers, notetakers, typing, and an errand service. Assistance is provided in obtaining taped texts. Test taking accommodations, including extended time for test taking, oral examinations, and scribes, can be arranged through this office. Classes scheduled in inaccessible locations will be relocated for students with mobility impairments. Individualized help with enrollment is available. Efforts will be made to provide interpreters for hearing impaired students when requested.

Special equipment available to students includes a talking calculator, Archenstone Reading Machine, variable-speed tape recorders, and a TT (telephone for the hearing impaired). A shuttle van, equipped with an hydraulic lift, operates on campus between all buildings and is available to students with either temporary or permanent physical disabilities. Accessible housing is available.

## Educational Supportive Services

Charlotte Shoup Olsen, Director  
Holton Hall  
532-5642

Low-income students, physically limited students, and students of color are assisted in setting and attaining realistic educational goals and are provided information about graduate-level educational opportunities. Students admitted and enrolled at K-State are offered educational supportive services including counseling (personal, career, academic, and financial), academic preadvancing, individualized tutorial assistance, and a variety of referral services.

## Greek Affairs

Barb Robel, Advisor  
Holton Hall  
532-5546

### 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.

House bills in sororities will average approximately \$1,500 a semester. This includes room, board, and sorority dues. Freshman members, however, live in residence halls and pay sorority dues of approximately \$70 a month.

The following national sororities have established chapters at K-State: Alpha Chi Omega, Alpha Delta Pi, Alpha Kappa Alpha, Alpha Xi Delta, Chi Omega, Delta Delta Delta, Delta

Sigma Theta, Gamma Phi Beta, Kappa Alpha Theta, Kappa Kappa Gamma, Pi Beta Phi, Sigma Gamma Rho, Sigma Kappa, Sigma Lambda Gamma, Sigma Sigma Sigma, and Zeta Phi Beta.

## Fraternities

Fraternities select new members primarily during the summer months. High school seniors are often guests at fraternity houses during their senior year, 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 invitations to membership before classes start and if they cancel their residence hall contracts. Costs will average \$1,500 a semester.

The following national fraternities are established at K-State: Acacia, Alpha Gamma Rho, Alpha Kappa Lambda, Alpha Phi Alpha, 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, Omega Psi Phi, Phi Beta Sigma, Phi Delta Theta, Phi Gamma Delta, Phi Kappa Tau, Phi Kappa Theta, Pi Kappa Alpha, Pi Kappa Phi, Sigma Alpha Epsilon, Sigma Chi, Sigma Lambda Beta, Sigma Nu, Sigma Phi Epsilon, Tau Kappa Epsilon, Theta Xi, and Triangle.

## Housing and Dining Services

Charles Werring, Director  
Pittman Building  
532-6453

The university encourages all students new to K-State to live in an organized living group, such as a residence hall, fraternity, or sorority. The advantage of living in some form of residential community is that adjustment to the university setting will be quicker and smoother. Students who choose a living group are offered both more interaction with other students and university staff and more opportunities to participate in organized social events.

Kansas State University provides residence hall living for approximately 4,000 students, and 576 apartments for students and their families.

### Residence halls

The residence halls at K-State have a rich tradition in providing a living and learning environment for students that encourages personal growth and success.

A number of lifestyle options exist, including academic cluster areas, intensive study floors,

and graduate student/upperclass areas. Additional information on these opportunities is available on request.

Edwards Hall is primarily for graduate and upperclass students.

Contracts are issued on receipt of a residence hall room application and \$25 nonrefundable application fee for fall enrollees and \$12.50 for those entering in the spring.

When the application and fee are received by the Department of Housing and Dining Services, an academic-year housing and dining services contract is forwarded to the student. The cost of the contract is set on an annual basis, and is one of the lowest room and board rates in the Big Eight.

Students may elect either the full-semester payment plan or monthly payment plan.

### Smurthwaite Scholarship House

The Smurthwaite Scholarship House Women's Leadership Program is a special leadership and personal development experience for women students who would like to become active in leadership positions in student government, academic organizations, and co-curricular organizations.

Assignment to Smurthwaite Scholarship House and the Women's Leadership Program is made through a special application process. Because space is limited and assignment is not guaranteed, it is best to also go through the regular residence hall application and contract process.

### Leadership opportunities and programs

Hall (HGB) and floor governments plan, and implement educational and cultural programs, intramural events, community service projects, and more. The Judicial Board provides an opportunity to students to address one another regarding policy violations that impact the community. The Kansas State University Association of Residence Hall (KSUARH) works closely with hall representatives to develop and implement policies that promotes respect and acceptance of all students in the residence hall.

### Family housing

Student families have access to one- and two-bedroom apartments at Jardine Terrace, both furnished and unfurnished. These low-cost apartments are close to the campus. Coin-operated laundry facilities are available.

The rental includes gas, water, and trash. A deposit is required. Assignments are made on a first-come, first-served basis, and early application is recommended. Families residing in Jardine Terrace Apartments use a residents' council form of government to regulate community life.

Apartments are partially accessible for people with physical limitations. The Department of Housing and Dining Services is pleased to work with students and family members to accommodate special needs.

## International Student Center

Donna Davis, Director  
532-6448

The International Student Center provides a comfortable atmosphere where people wanting to increase their international perspective can find new friends. Made possible by a private gift, the center includes a multipurpose meeting room, dining room, kitchen, and reading lounge. Students from everywhere pass through the center each day, sharing cultures, traditions, recipes, language lessons, and their common concern for what is happening in today's world. Everyone is welcome to join in the programs and activities of the International Student Center and the various international student organizations.

### Foreign Student Office

Adjacent to the International Student Center is the Foreign Student Office. This office provides administrative services required for international students and scholars by their home countries and the United States Immigration and Naturalization Service. The office also acts as the university's primary resource for international student programs.

The university recommends that international students and their dependents (if they are with the student) purchase or be in possession of a medical insurance policy or equivalent coverage. Medical insurance can be purchased on the campus or from other independent agencies.

## K-State Information Center

2 Holton Hall  
532-6442

The K-State Information Center is the call-in/walk-in campus information center. The center answers questions about campus and community activities, services, and programs. The center provides a part-time job listing and a listing of tutors, typists, and babysitters. The K-State Information Center assists students, faculty, staff, and community members with any questions they may have—from a phone number or address to campus, community, or national information. Hours during the regular semester are Monday–Thursday 9 a.m. to 9 p.m. and Friday 9 a.m. to 6 p.m.

## K-State Union

Jack Sills, Director  
532-6591

The K-State Union is the campus center for social, recreational, educational, and cultural activities. It opened in March 1956 and is supported only by generated revenue and student fees.

The K-State Union was built entirely by student fees. It features a full-service bookstore; a food service operation; a recreation area complete with bowling, billiards, video games, snack bar, and pro shop; Union Station; an art gallery; information counter; check cashing service, automatic bank teller machines; lounges; copy center; two auditoriums; campus vending service; and much more.

Union Program Council is the student volunteer arm of the K-State Union. UPC provides more than 450 programs each year for the social, cultural, educational, and personal growth of students. Student Activities and Services offices are located on the ground floor.

The Union Governing Board is the body that establishes policy under which the K-State Union director and staff operate.

## Lafene Health Center

Lannie W. Zweimiller, Director  
532-6544

The Lafene Health Center is a modern ambulatory healthcare facility designed to provide for most student outpatient health needs. The health center is fully accredited by the Joint Commission on Accreditation of Healthcare Organizations. Students who have paid the health fee as a part of their tuition are eligible for care. Non-student spouses, university conference participants, and other campus visitors may receive care upon payment of a special fee.

Lafene Health Center provides, through a full complement of medical and other professional personnel, a range of services that include special clinics for sports-related injuries, women, and allergies and immunizations, as well as a clinic for general care. Also included are services in health education, nutrition, and physical therapy. The services of a pharmacy, laboratory, and x-ray are available at reduced rates.

The center is staffed by full-time physicians with medical support personnel. When necessary, the student is referred to specialists for treatment at the student's expense.

After regular clinic hours, a student who is ill or injured may receive medical care at a local

hospital, at the student's expense. Home visits are not made. The local ambulance service is available, when needed, to transport patients to the appropriate health care facility.

### Insurance

It is strongly recommended that all students at K-State carry medical insurance, either through the parents' plan at home or through the university-sponsored student health insurance plan available at special rates. This latter plan covers most services provided at Lafene Health Center and allowed claims for medical expenses if the student requires care away from the campus.

### Medical history

K-State requires a complete medical history, including a current immunization record, on all new students or transfer students. This history must be completed on the Kansas State University medical history form and is required prior to provision of non-emergency treatment at the health center. A physical examination is not required, but encouraged, and a copy of this examination assists the staff in evaluating illnesses. If a student has a continuing medical problem, a summary from the attending physician is helpful should treatment at the center be needed. Students receiving allergy injections must furnish instructions from their allergist before injections can be administered at the health center.

## Multicultural Student Organizations

Laura Grabhorn, Coordinator  
201 Holton Hall  
532-6436

The Office of Multicultural Student Organizations provides support and assistance to all multicultural students through individual counseling as well as through building strong cultural groups that help foster the educational development of multicultural students on campus. The office provides assistance to Asian-American Students for Intercultural Awareness (ASIA), Black Student Union (BSU), the Hispanic American Leadership Organization (HALO), the Native American Student Body (NASB), and other cultural and academic interest organizations focusing on multicultural students. The office assists organizations in sponsoring programs and activities that heighten multicultural awareness at K-State and in the community.

## New Student Services

Pat J. Bosco, Associate Vice President/  
Dean of Student Life  
122 Anderson Hall  
532-7091

New Student Services works with prospective students and their families. Admissions representatives meet with high school students during school visits, college fairs, and special events.

New Student Services coordinates campus visits, orientation and enrollment, and the Presidential Lecture Series.

## Off-Campus Housing

The Dean of Student Life Office maintains an up-to-date listing of major apartment complexes, real estate agents, and property management companies. This office also maintains a bulletin board that lists available rental units, with information on cost, size, restrictions, etc., and other housing options. A roommate matching service is also available.

## Recreational Services

Raydon H. Robel, Director  
532-6980

Recreational Services is responsible for the intramural, recreational sports, and fitness programs for the campus.

Intramural sports are the scheduled competitive activities of the recreation program. Teams are organized by fraternities, sororities, residence hall floors, and off-campus, co-rec, and faculty/staff groups. More than 30 different intramural activities are offered for competition.

The natatorium at the Ahearn Sports Complex has two 25-yard swimming pools, one diving pool with two one-meter and two three-meter boards, and a sun deck.

The Chester E. Peters Recreation Complex houses 16 handball/racquetball courts; two gyms (convertible to basketball, volleyball, tennis, and badminton courts); two weight and exercise areas; combatives area; a running track; locker rooms; and a central supervisory and check-out area.

Outdoor facilities include lighted tennis and handball/racquetball courts, multi-purpose playfields, a fitness cluster, and running trails. Outdoor recreational equipment and camping equipment can be rented at the Outdoor Rental Center. The department provides employment as lifeguards, sports officials, building managers, and office assistants.

## Religious Affairs

Don Fallon, Coordinator  
102 Holton Hall  
532-6432

The coordinator of religious activities in Holton Hall provides information regarding religious activities and organizations on campus and in the community. Pastoral care and counseling are available through this office and by referral. Students may seek counseling regarding relationships, sexuality, death and loss, or other personal and spiritual concerns. Two memorial chapels on campus, Danforth and All Faiths, are available for student worship, weddings, and private meditation.

## Student Activities

Tricia Nolfi, Coordinator  
K-State Union, Office of Student Activities and Services  
532-6541

The Office of Student Activities and Services helps students identify activities and avenues of campus and community involvement. The office houses the Student Governing Association and student judicial system, Student Legal Services, Consumer Relations Board and the SGA finance committee, and assists individuals and groups who wish to organize and register their activities on the K-State campus. Leadership workshops are organized annually, and consultation is available for leadership development to interested campus leaders and organizations.

## Student Government

Tricia Nolfi, Coordinator of Student Activities  
K-State Union, Office of Student Activities and Services  
532-6541

The purpose of the Student Governing Association is to help students voice concerns, suggestions, or grievances. Every student is a member of the Student Governing Association and is represented by a college council (elected by the students in each respective college), and by the student body president. The student senators and the student body president are elected by the K-State student body.

SGA is divided into three branches: legislative, judicial, and executive. The legislative branch—student senate—is composed of six standing committees: academic affairs, communications, finance, senate operations, student affairs and social services, and legislative affairs. A major function of student senate is the allocation of the student activity fee and the Educational Opportunity Fund, which are

collected as part of the tuition payment. These funds are used to assist student and university organizations in providing programming and services for the K-State community.

The judicial branch is composed of judicial council, student review board, tribunal, parking citation appeals board, and the living group judicial boards.

The student body president and cabinet make up the executive branch. The president has the responsibility to promote the general welfare of the students and acts as the official voice of the student body to the faculty, administration, and public.

### Student organizations

More than 350 organizations are available to students, faculty members, staff, and community members.

Any organization desiring to become a registered organization must adhere to University Activities Board guidelines. Registered groups may schedule rooms and tables in the K-State Union, use most campus facilities, and post notices on campus bulletin boards.

## University Counseling Services

Fred Newton, Director  
232 Lafene Health Center  
532-6927

University Counseling Services is open 8 a.m. to 5 p.m. weekdays. Emergencies from 5 to 9 p.m. on weekdays and 10 a.m. to 2 p.m. on Saturdays are handled through the Lafene Health Center (532-6544). Professional counselors, psychologists, and a psychiatrist are available to assist K-State students.

Individual, couple, and/or group counseling is offered for people wishing to discuss academic, career, or personal concerns. Psychological testing may be used as an adjunct to career or personal counseling. Counseling is a confidential service. Anything you say to a counselor, the fact that you used this service, or test results will not be disclosed to other persons or agencies within or outside the university, within ethical limitations. No information about counseling goes on your academic record.

University Counseling Services is funded in part by the student health fee. Students receive up to 5 individual sessions without charge per year. A nominal fee is charged for additional services. Lafene Health Center eligibility fees for spouses and non-enrolled summer students do not apply to UCS.

Programs using a workshop or seminar format are offered to enhance personal growth and skill development. These may include stress management, biofeedback, career life planning, assertiveness training, relationship enhancement, responsible drinking, and ACOA support. A Career Life Planning course is offered for academic credit.

The University Counseling Services staff, and the APA-accredited internship training program in psychology, adhere to the ethical code of the American Psychological Association.

## Upward Bound

Reginland McGowan, Director  
202a Holton Hall  
532-6497

This federally funded program provides academic and personal counseling and guidance to disadvantaged high school students from Junction City, Manhattan, Rock Creek, and Riley County high schools. Designed to motivate students with academic potential to pursue a postsecondary education, Upward Bound provides its 9th, 10th, 11th, and 12th grade participants with academic, social, cultural, and career-oriented activities and experiences during the school year, and with a summer residential program for credit.

## Women's Center

Judy Davis, Director  
206 Holton Hall  
532-6444

The Women's Center serves to promote the academic and personal well-being of K-State students. Center services include support, advocacy, and referral services to individual students experiencing difficulties; study and support groups; educational programs on a variety of gender-related topics to classes and to student, faculty, and community groups; a newsletter; and a browsing/lending library.

# Auxiliary Services and Facilities

## Affirmative Action Office

214 Anderson Hall  
532-6220

The Affirmative Action Office is available to students on matters of equal opportunity in all areas including admissions, access to programs and activities, and employment. The university is committed to a policy of equal educational opportunity regardless of race, sex, national origin, handicap, religion, age, or sexual orientation. Any barriers that students encounter for these reasons should be discussed with this office so that we may aid in their removal.

## Alumni Association

Fred Thibodeau, President  
KSU Foundation Center  
2323 Anderson, Suite 400  
532-6260

The Kansas State University Alumni Association is a 31,500-member organization. It is an independent group of alumni and friends devoted to the university.

The nonprofit organization supports K-State through student recruitment programs, maintenance of records on more than 114,000 alumni and friends, publication of the *K-Stater*, and sponsorship of local alumni gatherings, Homecoming and Family Weekends, and class reunions.

## Child Care

### KSU Child Development Center

Lorna Ford, Director  
200 Jardine Terrace, Building L-9  
539-1806

The KSU Child Development Center is a nonprofit corporation serving the child care needs of K-State students, faculty, and staff. It is fully licensed by Kansas and is professionally staffed.

The center offers full-day programs for toddlers (ages 12 months and walking through 2½), preschoolers (ages 2½ through 5), and school-age children (ages 5–12). Limited part-time program spaces are offered to families of toddler and preschool children who need regular flexible care. The Center is open all year offering care Monday through Friday from 7 a.m. to 5:30 p.m.

## Department of Human Development and Family Studies

Mary DeLuccie, Director  
Justin Hall  
532-5510

This department operates two child care facilities. Both are licensed by the Kansas State Department of Health and Environment and accredited by the National Academy of Early Childhood Programs. Enrollment in these programs is open to members of the K-State and Manhattan communities.

The Hoefflin Stone House Child Care Center is on the northeast edge of campus. The center provides full day care for 30 children ranging in age from 18 months to 5 years. Priority is given to children of working parents. The program focuses on the children's developmental needs and interests.

The Early Childhood Laboratory on the east edge of campus hosts an interagency program with USD 383. The facility integrates children who have disabilities with nonhandicapped children, and accommodates an age range from 3 to 5 years in a part-day program.

The activities and environment at both facilities are designed to foster children's cognitive, language, social, emotional, and physical growth and development.

## Computing and Network Services

John E. Bucher, Director  
16 Nichols Hall  
532-6311

Computing and Network Services supports K-State's academic, research, and public-service activities by providing computing resources for students, faculty, and staff.

The department provides access to several computer networks, including BITNET, the Internet (through MIDnet), and KARENET (Kansas REgents NETwork). These networks allow K-Staters to electronically communicate and to access information at other educational and research institutions worldwide.

CNS maintains a fiber-optic campus network that connects the majority of K-State's buildings. By providing file-sharing and electronic-communication capabilities, the network facilitates campuswide communication and information sharing. It also allows quick access to K-State's mainframe and the public Unix system, many departmental computers, and public printing facilities. Through an Equinox

data switch, users can access K-State's computing resources from off-campus locations.

Many programming languages and applications packages are available on the campus network. The Computing Information Center in Fairchild Hall has a current list of facilities and services. CNS teaches non-credit courses to introduce faculty, staff, and students to campus computing.

CNS services include:

- Free computing accounts on K-State's mainframe and public Unix system allow access to electronic mail, file transfers, and the Internet.
- Public computing labs give users access to IBM-compatible and Macintosh microcomputers, and Unix workstations. All labs have free printing.
- Free lectures provide an overview of campus computing topics such as mainframe and Unix operating systems, electronic editors, electronic mail, Unicorn, and networking tools.
- Computer consulting is available between 8:30 a.m. and 5 p.m. Monday through Friday when classes are in session. Walk-in contact is preferred at the Consulting Office, 9 Fairchild Hall, but users may also call 532-7722 or send electronic mail to [consult@ksuvm](mailto:consult@ksuvm).
- The Unicorn campuswide information system provides calendars of campus events, weather data, line schedules and a closed-class list, job listings and employment information, K-State news and announcements, as well as other campus and community information.
- Free computing information flyers are available in the CNS Information Center, 203 Fairchild Hall, 532-4922.

The personal computing accounts are available to all students, faculty, and staff; accounts are non-transferable and are not to be used for monetary gain or for business activities. All computer users are expected to follow normal standards of ethics and polite conduct in their use of the computing resources.

## Family Center

Stephan R. Bollman, Director

Nancy T. O'Conner, Director  
Marriage and Family Therapy Clinic  
Campus Creek Road  
532-6984, 776-6566  
1-800-227-3578  
FAX: 913-532-6523

The Family Center provides applied educational experiences to students while offering family-related educational outreach, therapy,

and consultation services to the Manhattan community and the state. The Family Center provides an interdisciplinary focus with faculty participation from different disciplines.

Students, under faculty supervision, offer services involving marriage and family therapy and family life education. Affiliated programs include the State Training Office for Kansas Child Care Training Opportunities and Cultural Competency grants from Social and Rehabilitation Services. Special workshops address particular family topics, including working parents, parent education, and family life. The annual National Rural Families Conference features the Ruth Hoeftlin Forum on Family Issues.

Services are available to students and the general public. A fee may be assessed for services based on an ability-to-pay program.

## Foundation

Mark S. Moore, President  
KSU Foundation Center  
2323 Anderson, Suite 500  
532-6266, 532-7500

The Kansas State University Foundation, the official fund-raising arm of the university, is a nonprofit organization certified under Section 501 (C) (3) of the IRS Code of 1954. The Foundation acts as the custodian for gifts to the university and is encouraged to receive and hold in trust any real and personal property given for the use of Kansas State University, and to administer and control all the gifts to provide services that are not or cannot be provided through appropriated funds.

Although the Foundation is not a bank it offers many of the same services and is responsible for the administration of more than 2,500 fund accounts and the processing of 51,000 gifts annually, while administering total assets of \$123 million. Policy is formulated by a 175-member board of trustees and an executive committee of 15 members to which the staff, directed by the president, is responsible.

## Information Systems

John W. Streeter, Director  
2323 Anderson Avenue, Suite 215  
532-6281

The administrative computing community of the university is supported by the Office of Information Systems. Services consist of data base administration, software development, systems project management, systems analysis, applications programming, and a user helpdesk hotline.

Major application systems include admissions; financial assistance; registration; and student, employment, financial, property, and alumni records. Most systems are operated on the university's central mainframe computer system in the IBM MVS/XA CA-IDMS-DC environment, however, movement of applications to networked distributed processing is in progress.

COBOL and CA-ADS/O are the principal programming languages. Database services are provided by CA-IDMS-DB. A fourth-generation language, FOCUS, is available for end user report preparation on the IBM VM/XA system. Distributed systems will support Character Terminals, as well as, DOS/Windows/XWindows/Macintosh portable and desktop workstations from Novell and UNIX servers on the campus ethernet.

## Institutional Advancement

Robert S. Krause, Vice President  
122 Anderson Hall  
532-5942

The vice president for institutional advancement is responsible for the external relations of the university and is the chief student affairs officer. Additionally, the vice president coordinates ongoing activities with the KSU Foundation, KSU Alumni Association, and Department of Intercollegiate Athletics, and external relations with governmental agencies, the Board of Regents, and other university constituents. The vice president for institutional advancement reports directly to the president and serves as chief spokesperson for the university.

## Libraries

Brice Hobrock, Dean of Libraries  
Farrell Library  
532-6516

Kansas State University Libraries provide support for the educational, research, extension, and public services objectives of K-State. The libraries' staff is responsible for acquiring, maintaining, and providing access to collections of materials requisite to the university's program requirements. Librarians at K-State are dedicated to organizing, promoting, and interpreting the collections for the university community and the citizens of Kansas.

Farrell Library is the central unit of the university library system. It is supplemented by four specialized subject libraries: Weigel Library of Architecture and Design (Seaton Hall), Chemistry/Biochemistry (Willard Hall), Math/Physics (Cardwell Hall), and Veterinary

Medical (Veterinary Medical Teaching Building).

The libraries contain more than 1.2 million volumes and that number is increasing at an annual rate of about 40,000 volumes. Current journal and serials subscriptions total 9,477. In addition to the volumes cataloged according to the library of Congress Classification, the libraries contain a document depository collection of U.S. government publications that numbers more than 1.2 million; about 100,000 maps; a complete archival collection of ERIC (Educational Resources Information Center) documents; and more than 2.2 million pieces of microforms. Audiovisual materials number approximately 47,000 items and include sound recordings, tapes, slides, and printed music scores. A collection of more than 200 newspapers is maintained from Kansas communities, major U.S. cities, and other countries.

Specialized collections and the university archives contain a variety of old, rare, and unusual books, manuscripts, and other materials. The archives offer an assortment of published and unpublished material, including photographs, documenting K-State history. The Minorities Resource and Research Center is a special collection of materials by and about Blacks, Hispanics, and Native Americans. The juvenile literature collection numbers about 12,000 volumes of children's books and is used primarily by students in teacher education.

The reference unit, located on the first floor of Farrell Library, is the service center of the system. It provides traditional reference service as well as computerized information retrieval from more than 200 online and compact disc databases. Staff members are available to help students, faculty, and others find the information they need. Terminals for LYNX, the libraries' online catalog, are located here, throughout Farrell, and in the branch libraries.

Other areas of Farrell Library contain collections and provide services to students. These include audio-visual, reserves/copy center, microforms/periodicals, government documents, interlibrary loan, and circulation units. ISSA, Information and Support Services for Agriculture, provides information to developing nations on postharvest handling of cereal grains and legumes, and research information about developing countries.

The instructional services unit helps students acquire and develop library use skills necessary for lifelong learning.

To take advantage of the library resources in the region, the Regents Libraries operate a daily courier service between all Regents libraries. The Regents libraries are connected through OCLC, a nationwide computerized cataloging and interlibrary loan network, as well as their individual online catalogs. All

Regents libraries allow direct borrowing by students and faculty.

An expansion of the central library will be completed in 1996 that will create a discrete science library operation and provide additional shelving space for books, facilities for new electronic information services, and seating for students.

## Police Department

701 N. 17th  
Southeast corner, Memorial Stadium  
532-6412 business  
911 emergency

The University Police Department is responsible for the protection of all properties owned and operated by the state educational institution or its affiliates. This authority is granted under state law. While service to the K-State community is of great concern to the department, the prevention of crime and investigation of all reported crimes is also of prime importance.

The department assists with parking control and regulates traffic control. Traffic and parking regulations are established by a student-faculty/staff Traffic and Parking Council, by authority of K.S.A.-74:3211.

The department is responsible for providing physical security on campus property. This includes opening and closing buildings, monitoring security cameras, and maintaining 16 emergency telephones strategically located throughout the university.

The University Police Department is open 24 hours a day. It provides a contact for emergency repairs and acts as the university operator outside normal business hours. The department has sworn police officers on duty 24 hours a day.

## Postal Service

113 Dykstra Hall  
532-6306

All mail for students must be addressed to their off-campus Manhattan address or residence hall/Greek address.

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 Contract Post Office sells stamps, money orders, and other postal supplies; weighs, insures, and registers mail; and receives outgoing U.S. mail. A self-service postal unit is in the K-State Union.

## Speech and Hearing Center

Caroline Salva, Director  
107 Leasure Hall  
532-6879, 532-6873

The Speech and Hearing Center provides evaluation, management, and consultation services to university students with articulation, fluency, voice, language, or hearing impairments. These clinical services are also available to children and adults of the surrounding communities. The center provides educational and clinical experiences for students preparing for careers in speech-language pathology and audiology.

## Student Publications

Ron Johnson, Director  
103 Kedzie Hall  
532-6555

Student Publications Inc. is a nonprofit student publishing corporation that publishes the daily student newspaper, *The Kansas State Collegian*; the student yearbook, the *Royal Purple*; and the *Campus Directory*. Student Publications is governed by the Board of Student Publications, composed of five students elected by the student body annually and three faculty members appointed by the university president.

The Board of Student Publications names an editor in chief and advertising manager of the *Collegian* three times each year, for fall, spring, and summer semesters. The *Royal Purple* editor is chosen in the spring for the following year. The editors and advertising managers hire students for staff positions.

The *Collegian* and *Royal Purple* each have faculty advisors, but their content is determined and controlled solely by the editors and student staffs.

## Telecommunications Services

Fred Damkroger, Director  
109 East Stadium  
532-7001

Telecommunications provides the voice, data, and video transmission capabilities for the university. The department provides approximately 5,000 telephone lines to university departments and 2,000 lines to the student residence halls.

Three PBX switches, linked together by leased lines, connect the main campus in

Manhattan, with the Foundation Center and the Salina campus. Fiber optic cables connect remote modules of the main campus PBX switch and carry data to all academic buildings and residence halls.

The department provides long distance service to students living in the residence halls. An authorization code assigned to each student identifies the caller and ensures proper billing. Voice mail, call waiting, and other advanced features of the system are also available to students in the residence halls.

Connections to the state KANS-A-N network provide long-distance service to all departments along with facilities provided by other long distance carriers. Authorization codes are also available for faculty and staff.

The campus paging system and all radios on campus are the responsibility of the department. The Office of Telecommunications provides the service for all wiring additions, moves, and changes to all existing and new buildings.

## University Press of Kansas

Fred M. Woodward, Director  
2501 W. 15th  
Lawrence, Kansas 66049  
(913) 864-4154

Kansas State University, in association with the other five Regents' universities, operates and supports the University Press of Kansas for the purpose of publishing scholarly and regional books on a nonprofit basis.

The press is governed by a board of trustees, who are the chief academic officers of the sponsoring institutions and who appoint two members and two alternates from each faculty to serve on the advisory editorial committee.

## University Relations

John Fairman, Assistant Vice President for University Relations  
122 Anderson Hall  
532-6269

University Relations is responsible for licensing activities related to the institution's name and logos, and coordinates public information for K-State activities and events through University Relations and its four units: News Services, Photographic Services, Printing Services, and University Publications.

News Services is the official outlet for print and broadcast news materials relating to K-State policies and administration. News Services also publishes *In-View*, the official faculty-staff newsletter.

Photographic Services offers photoprocessing, location and studio photography, and slide reproduction.

Printing Services prints books, brochures, business cards, envelopes, letterheads, posters, and other printed matter. Second- and third-class mailing services are available to all departments and affiliated organizations.

University Publications provides editing, design, and production coordination of enrollment management, recruitment, and informational publications.

# International Programs

William L. Richter, Assistant Provost for International Programs  
Connie Noble, Office Manager  
304 Fairchild Hall  
532-5990

Building upon several decades of international involvement, K-State provides a range of programs that link the campus with other parts of the world. Many of these are coordinated through individual departments or colleges; others serve the whole university.

The Office of International Programs is responsible for coordinating international programs. The office houses the assistant provost for international programs, study abroad programs, and the various international and area studies programs. Coordination is assisted by an International Activities Council that is broadly representative of the university.

## International and Area Studies Programs

Students interested in world affairs may take advantage of several interdisciplinary opportunities. The South Asia Center and the Latin American studies and international studies programs offer secondary majors to undergraduates. For more information, see the Secondary Majors section of this catalog.

Several other international programs that do not offer degrees provide advice and opportunities to interested students and faculty. These include international trade studies, Canadian studies, and groups of scholars with interests in the Middle East, Western Europe, Eastern and Central Europe, and Africa. For more information, contact the Office of International Programs or the following:

International studies  
Charles Bussing, 532-6727 or 532-5990

International trade studies  
Mark Parillo 532-6730 or 532-5990

Latin American studies  
Marcial Antonio Riquelme, 532-5990

South Asian studies  
Lelah Dushkin, 532-4964 or 532-5990

Canadian studies  
Judith Zivanovic, 532-6900

Russian studies  
Walter Kolonosky, 532-6760; John C.K. Daly, 532-6730

Middle East studies  
Michael Suleiman, 532-6842

African studies  
Donald Adamchak, 532-4960

## Study Abroad Programs

Study Abroad Programs  
304 Fairchild

International Student Exchange Program  
Barry H. Michie, 532-5990 or 532-1698

The Office of Study Abroad provides information for students who wish to study in another country. K-State has bilateral exchange agreements with more than two dozen universities abroad. In addition, the university participates in the International Student Exchange Program (ISEP), through which many other exchanges are possible.

Qualified students are encouraged to apply for Rhodes, Marshall, Fulbright, Rotary, and other international scholarships.

## Programs

**Austria**  
Leopold Franzens University

**China (People's Republic of)**  
Luoyang Institute of Technology and Henan Agricultural University

**Central America (Regional)**  
Higher Council of Central American Universities

**Costa Rica**  
University of Costa Rica

**Czechoslovakia**  
Charles University  
Czech Technical

**Denmark**  
Aarhus School of Architecture

**England**  
Nottingham University  
Sunderland University

**France**  
Aix-Marseille University; Ecole Supérieure d'Agriculture de Purpan; Institut National Polytechnique de Lorraine; Université Blaise Pascal

**Germany**

Justus Liebig Universitat, Giessen; Ludwig Maximilian Universitat, Munich; Technical University, Trier

**Honduras**

Escuela Agricola Panamericana, Tegucigalpa; Ministerio de Recursos Naturales de Honduras, Tegucigalpa

**Japan**

Nakajo, Niigata

**Korea (Republic of)**

Korea University

**Mexico**

Instituto Tecnologico y de Estudios de Monterrey

**Netherlands**

Agricultural University of Wageningen

**New Zealand**

University of Otago, Dunedin

**Paraguay**

National University, Asuncion; Catholic University, Asuncion

**Switzerland**

Eidgenossische Technische Hochschule, Zurich

**Italian Semester Program**

Richard Forsyth, 532-5950

**Mexican Summer Program**

Maureen Ihrle, 532-6760

**Russia**

Novosibirsk State University

**Summer Abroad in English Education**

Ray Kurtz, 532-5391

**Scholarship programs for foreign study**

**Fulbright, Pearson**

Walter Kolonosky, 532-5990 or 532-6760

**Marshall, Rhodes**

Nancy Twiss, 532-6900

**Giessen Program (Germany, Switzerland)**

Carol Miller, 532-6760

**Rotary International**

Jerry Weis, 532-6615

**Yamani (Middle East)**

Michael Suleiman, 532-6842

**International students**

See the Admission, International Student Center, and English Language Program sections of this catalog.

## International Development Programs

The Office of International Agricultural Programs, the Food and Feed Grains Institute, the International Grains Program, the International Meat and Livestock Program, the Human Ecology Paraguay Project, and other units maintain projects abroad, provide short-term consultants, and provide short-course training for foreign visitors. The International Trade Institute, in addition to its training programs, provides advice and assistance to Kansas manufacturers seeking overseas export markets.

K-State is a member of the MidAmerica International Agricultural Consortium and the Association of Big Eight Universities, through which collaborative development projects are pursued.

**International Agricultural Programs**

Marc A. Johnson, Dean of Agriculture, 532-7137

**International Trade Institute**

Wayne Norvell, Director, 532-6799

Neelima Gogumalla, Associate Director, 532-6799

**International Community Service Program**

Carol A. Peak, Director, 532-5701

**Food and Feed Grains Institute**

Roe Borsdorf, Associate Director, 532-6161

Marc A. Johnson, Dean of Agriculture, 532-7137

**International Grains Program**

Charles Deyoe, Director, 532-6161

Roger Johnson, Associate Director, 532-6161

**International Sorghum and Millet Program**

Richard Vanderlip, 532-7249

**Paraguay Project**

Barbara Stowe, 532-5508

**Resources for Developing Countries**

Nancy Donoghue, 532-7451

**Wheat Genetics Resource Center**

Bikram Gill, 532-5692

**International Meat and Livestock Program**

Jack Riley, Director, 532-6533

**MidAmerica International Agricultural Consortium**

Marc A. Johnson, Dean of Agriculture, 532-7137

**Association of Big Eight Universities,**

**International Committee**

William L. Richter, 532-5990

# Secondary Majors

K-State University offers secondary majors in American ethnic studies, gerontology, industrial and labor relations, international studies, Latin American studies, natural resources and environmental sciences, and women's studies. Open to students in all colleges, these secondary majors are designed to be taken concurrently with a primary major. Most programs of study will allow students to take both a primary and a secondary major within the normal four-year program, especially because courses applied toward the secondary major may also satisfy requirements for general education or restricted electives.

Program requirements follow a common pattern. Each includes two or more of the following features: an interdisciplinary introductory course (which might also satisfy distribution requirements); a list of electives from which students choose about 18 hours; and an interdisciplinary senior seminar featuring supervised independent study.

Each program has a supervisory committee and a director to whom students may refer for advising.

## American Ethnic Studies

Harriet Ottenheimer, Director

Professors Boyer,\* Fedder,\* Finnegan,\* McElroy,\* O'Brien,\* H. Ottenheimer,\* Rappoport,\* and Suleiman,\* Associate Professors Armagost,\* D. Benson,\* J. Benson,\* Cochran,\* L. Kremer,\* A. Pigno,\* and Prins,\* Assistant Professors Baird-Olson,\* Rodgers,\* Watson,\* and Wigfall\*, Emeritus R. Taylor.

The American ethnic studies program primarily focuses on African Americans, Asian Americans, Hispanic Americans, and Native Americans, but includes the study of other ethnic groups in the United States as well. The courses in the program meet the educational and career needs of students by preparing them to function intellectually in a multiethnic, multiracial, multicultural nation and world.

Students are encouraged to enroll in American ethnic studies courses whether or not they select the option of a secondary major in American ethnic studies.

## Secondary major

Students completing 24 semester hours of course work in a minimum of two departments may earn a secondary major in American ethnic studies. The director assists

and advises secondary majors in planning appropriate schedules.

### Course requirements

AMETH 160	Introduction to American Ethnic Studies .....	3
ANTH 200	Introduction to Cultural Anthropology .....	3
AMETH 499	Senior Research Project in American Ethnic Studies .....	3

### Area courses

The distribution of area courses must include at least two American ethnic groups and at least one general/comparative course. No course can be used to fulfill more than one course requirement.

A.	African American, Asian American, Hispanic American, and Native American ethnic groups of the United States .....	9
B.	Background/ancestral cultures of African American, Asian American, Hispanic American, and Native American ethnic groups of the United States ..	3
C.	Any United States ethnic group or the ancestral culture of a United States ethnic group .....	3

## Interdisciplinary courses

**AMETH 160. Introduction to American Ethnic Studies.** (3) I, II. This course introduces students to the major concepts related to ethnicity and to some of the major American ethnic groups.

**AMETH 499. Senior Research Project in American Ethnic Studies.** (3) I, II. Guided research in American ethnic studies. Students prepare a research paper on a relevant subject of their choice. Each student is responsible for arranging to work with a member of the American ethnic studies faculty. Pr.: AMETH 160.

**AMETH 501. Recitation Leadership.** (1-3) I, II. Integrative review of concepts in American ethnic studies under faculty supervision. Preparation for leading discussions, workshops and reviews in American ethnic studies. Students attend two lecture sessions per week concurrent with AMETH 160, one additional seminar session focused on planning and preparation for recitations, and are responsible for leading discussions in one or more recitation sections in AMETH 160 per week. May be repeated for a maximum of 6 hours credit.

**AMETH 560. Topics in American Ethnic Studies.** (1-4) I, II. Selected topics of special interest in American ethnic studies. Repeatable with change of topic. Pr.: AMETH 160.

## Area courses

A. African American, Hispanic American, and Native American

<b>General</b>	
EDCEP 886	Multicultural Counseling
EDCIP 455	Teaching in a Multi-Cultural Society
EDCIP 733	Curriculum Materials for Ethnic Diversity
EDCIP 730	Education of the Disadvantaged
ENGL 280	American Ethnic Literature
ENGL 655	Readings in American-Ethnic Minority Literature
MC 530	Ethnic Media in America
POLSC 616	Discrimination and the Law
PSYCH 557	Psychology of Ethnic Humor
SOCIO 570	Race and Ethnic Relations in the U.S.A.
THTRE 672	American Ethnic Theatre

### African American

ANTH 517	African American Music and Culture
ANTH 536	African American Cultures
ENGL 395	Topics: Contemporary Afro-American Fiction
ENGL 399	Topics in Contemporary African American Literature
HDFS 652	Black Families

HIST 539	Black American History
MUSIC 420	History of Jazz
MUSIC 424	Jazz in Kansas City and the Southwest
MUSIC 425	Topics in Jazz
KIN 703	Minority Groups in Sports
POLSC 616	Discrimination and the Law

### Asian American

ANTH 522	Topics: New Immigrants
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### Hispanic American in the U.S.

SPAN 569	Special Studies: Chicano Language and Literature
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### Native American

ANTH 533	Indians of Kansas
ANTH 630	Indians of North America
ART 662	Southwestern Indian Arts and Culture
HIST 537	History of the Indians of North America
LING 594	Comanche Texts

B. Background/ancestral cultures of African American, Asian Americans, Hispanic American, and Native American ethnic groups of the United States.

### African

ANTH 550	Cultures of Africa
ANTH 517	African American Music and Culture
ANTH 536	African American Cultures
POLSC 626	African Politics

### Latin American

ANTH 432	Indians of Mexico, Central America, and the Caribbean
ANTH 532	Central America: Its Peoples and Problems
ANTH 634	Indian Cultures of South America
ANTH 673	Precolumbian Civilizations of Mexico and Guatemala
GEOG 620	Geography of Latin America
HIST 560	Latin American Nations
HIST 561	Colonial Hispanic America
HIST 562	Modern Mexico
POLSC 622	Latin American Politics
SPAN 563	Introduction to the Literature of Spanish America
SPAN 566	Hispanic American Civilization
SPAN 752	Contemporary Spanish American Narrative
SPAN 772	Hispanic World Today

### Native American

ANTH 570	American Indian Archaeology
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C. Any United States ethnic groups and the ancestral cultures of those groups (all the courses listed under categories A and B, along with the following)

### General

ANTH 220	Introduction to Linguistic Anthropology
ANTH 516	Ethnomusicology
ANTH 519	Practical Anthropology
ANTH 676	Archaeology of the Old World
ANTH 685	Race and Culture
BIOL 320	Economic Botany
ENGL 560	American Folklore
ENGL 580	Selected World Literature
GEOG 100	World Regional Geography
GEOG 640	Geography of Europe
HIST 582	Modern Eastern Europe
KIN/	
SOCIO 435	Sport in Contemporary Society
POLSC 602	Class, Power, and Public Policy
POLSC 629	Development Policy and Administration
PSYCH 535	Social Psychology
SOCIO/	
SOCWK 510	Social Welfare as a Social Institution
SOCIO 740	Comparative Social Systems

### Asian

ANTH/ECON/GEOG/HIST/POLSC/SOCIO 505 and 506	Introduction to the Civilizations of South Asian I and II
ANTH 545	Cultures of India and Pakistan

ART 420	History of South Asian Art
HIST 350	Gandhi and the Indian Revolution
HIST 504	History of Hinduism
GEOG 680	Geography of Asia
POLSC 511	Contemporary Chinese Politics
POLSC 623	South Asian Politics
POLSC 625	Southeast Asian Politics
POLSC 652	International Politics of South Asia
SOCIO 742	Society and Change in South Asia

<b>French</b>	
FREN 510	Modern French Culture
FREN 514	French Civilization

<b>German</b>	
GRMN 530	German Civilization

<b>Jewish</b>	
ENGL 280	American Ethnic Literature: Holocaust Literature
HIST 596	Holocaust: The Destruction of the European Jews

<b>Middle Eastern</b>	
ARCH 601	Topics: Architecture and Urbanism of the Middle East
POLSC 624	Middle Eastern Politics
POLSC 653	International Politics of the Middle East

<b>Russian</b>	
GEOG 650	Geography of the Soviet Union
HIST/	
RUSN 250	Russian Culture and Civilization
HIST 564	The Russian Revolution and the Soviet System
HIST 591	History of Russia to 1801
POLSC 627	Eastern and Central European Politics

## Credit and content

All courses regularly offered for American ethnic studies credit have at least 40 percent or a major focus of content concerned with American ethnic groups, their ancestral cultures, or American ethnicity. Instructors and students of courses not regularly included in the American ethnic studies program may petition for credit on the basis of the same criteria.

Examples of specific courses for which the granting of American ethnic studies credit may vary are the following:

ANTH 420	Ethnography of Language
SOCIO 541	Wealth, Power, and Privilege
SOCIO 741	Social Differentiation and Stratification

In addition, departments offer courses on special topics, seminars, pro seminars, honors seminars, and independent studies that may apply for credit.

Relevant K-State-validated courses of transfer students will be accepted for American ethnic studies credit upon validation by the American Ethnic Studies Governance Board.

# Gerontology

Center for Aging  
1 Fairchild Hall  
532-5945

The rapid growth of an older population in the United States is creating an increasing demand for personnel who possess specialized training in gerontology in a variety of occupations and professions.

The secondary major in gerontology is a 24-hour program of study. It includes two required courses, Introduction to Gerontology and Seminar in Gerontology, and 18 semester hours from the approved list of gerontology electives offered in participating departments. Elective courses must be taken in a minimum of three separate departments.

Along with the secondary major, students can take an emphasis in long-term care administration. This emphasis requires completing the secondary major in gerontology, ACCTG 231 Accounting for Business Operations<sup>1</sup>, MANGT 420 Management Concepts, an approved 480 clock-hour internship (6 credit hours, GERON or DHE 615), GERON 610 Seminar in Long-Term Care Administration, and at least one course in each of 10 training code areas as defined by the Kansas Board of Adult Care Administration. The adult care codes are listed in the advising guide available at the Center for Aging. With planning, the emphasis can be completed within 27 credit hours and a 6-credit-hour internship. Courses listed below will carry credit in the gerontology studies program and new courses will be added to the program as the curriculum is updated.

## Interdisciplinary courses

**GERON 315. Introduction to Gerontology.** (3) I. Multidisciplinary introduction to the field of aging. Examines social, psychological, developmental, organizational, and economic aspects of aging. Theoretical, methodological, and applied issues of aging related to contemporary American society. Pr.: None.

**GERON 600. Senior Seminar in Gerontology.** (3) II. An interdisciplinary course organized topically, with students presenting papers on aging-related issues that draw upon the students' previous and concurrent academic experience. Provides supervised independent study and subsequent discussion, allowing students to integrate and order their perceptions about gerontological issues. Pr.: Completion of 15 hours of course work in gerontology.

**GERON 610. Seminar in Long-Term Care Administration.** (3) (Offered Intersession only) Administration principles involved in the planning, organizing, and directing of long-term care agencies. Includes an in-depth exposure to federal and state standards and regulations governing long-term care.

**GERON 615/DHE 615. Long-Term Care Administration Internship.** (6) Includes: (a) field experience in the general administration of long-term care programs and/or facilities: planning, budgeting, program management, and service delivery; (b) exposure to federal and state standards and regulations governing long-term care; and (c) professional leadership development. Pr.: Junior standing, 15 hours of gerontology, MANGT 420, ACCTG 231, GERON 610, and GPA of 2.5 or above (3.0 or above in long-term course administration coursework).

## Departmental course electives

See the appropriate college sections of this catalog for further description.

### College of Agriculture

<b>Horticulture</b>	
HORT 525	Horticulture for Special Populations ..... 3

### College of Architecture and Design

<b>Architecture</b>	
ARCH 730	Environment and Aging ..... 3

### Landscape architecture/regional and community

<b>planning</b>	
PLAN 315	Introduction to Planning ..... 3 <sup>4</sup>
PLAN 715	Planning Principles ..... 3 <sup>4</sup>
PLAN 760	Community Development Workshop ... 3 <sup>4</sup>

### Interior architecture

IAR 730	Facility Management ..... 3 <sup>4</sup>
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## College of Arts and Sciences

### Horticulture

GERON 315	Introduction to Gerontology ..... 3
GERON 600	Seminar in Gerontology ..... 3 <sup>2</sup>
GERON 610	Seminar in Long-Term Care Administration ..... 3 <sup>2</sup>
GERON 615	Long-Term Care Administration Internship ..... 3 <sup>2</sup>

### Biology

BIOL 404	The Biology of Aging ..... 3
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### English

ENGL 535	Literature of Aging ..... 3
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### History

HIST 520	Death and Dying in History ..... 3
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### Kinesiology

KIN 335	Physiology of Exercise ..... 3
KIN 796	Topics in Physical Education ..... 3 <sup>3</sup>

### Psychology

PSYCH 520	Life-Span Personality Development ..... 3
PSYCH 715	Psychology of Aging ..... 3

### Social work

SOCWK 566	Social Work in Aging Services ..... 3
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### Sociology

SOCIO 535	Population Dynamics ..... 3
SOCIO 744	Social Gerontology: An Introduction to the Sociology of Aging ..... 3
SOCIO 944	Seminar in the Sociology of Aging ..... 3

### Speech

SPPAT 605	Communication Disorders and Aging ... 3
THTRE 665	Theatre for Special Populations ..... 3 <sup>4</sup>

## College of Business

### Accounting

ACCTG 231	Accounting for Business Operations .... 3 <sup>1</sup>
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### Finance

FINAN 450	Essentials of Finance ..... 3 <sup>2</sup>
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### Management

MANGT 420	Management Concepts ..... 3 <sup>1</sup>
MANGT 520	Organizational Behavior ..... 3 <sup>3</sup>
MANGT 530	Industrial and Labor Relations ..... 3 <sup>3</sup>
MANGT 531	Personnel and Human Resources Management ..... 3 <sup>4</sup>

### Marketing

MKTG 400	Marketing ..... 3 <sup>3</sup>
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## College of Education

### Adult and continuing education

EDACE 782	Educational Gerontology ..... 3
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## College of Human Ecology

DHE 615	Long-Term Care Administration Internship ..... 3 <sup>2</sup>
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### Clothing, textiles, and interior design

IDH 610	Housing for Special Needs ..... 3
IDH 751	Design for Exceptional Needs ..... 3

### Foods and nutrition

FN 132	Basic Nutrition ..... 3
FN 400	Human Nutrition ..... 3
FN 610	Life Span Nutrition ..... 3
FN 718	Physical Health and Aging ..... 3
FN 817	Nutrition and Aging ..... 2-3

### Human development and family studies

HDFS 510	Human Development and Aging ..... 3
HDFS 654	Death and the Family ..... 2-3
HDFS 704	Seminar in Human Development and Family Studies ..... 3 <sup>3</sup>
HDFS 708	Topics in HDFS ..... 2-3 <sup>3</sup>
HDFS 770	Economics of Aging ..... 3
HDFS 845	Adult Development and Aging ..... 3

<sup>1</sup>Required for long-term care administration emphasis, but no credit as gerontology elective in secondary major.

<sup>2</sup>Required for long-term care administration emphasis.

<sup>3</sup>Center for Aging approval required for gerontology credit.

<sup>4</sup>Project approval from Center for Aging required.

<sup>5</sup>Credit as long-term care administration elective only.

## Industrial and Labor Relations

Stan Elsea, Management  
101 Calvin Hall  
532-4353

Clive Fullagar, Psychology  
469 Bluemont Hall  
532-6850

Berkeley Miller, Sociology  
255 Waters Hall  
532-4968

The secondary major in industrial and labor relations provides a valuable opportunity to obtain the academic background and skills pertinent to the negotiation and administration of labor contracts as well as those relating to dispute settlement in industrial, governmental, and institutional settings. There is an increasing demand for people with these skills in all sectors of the economy.

The secondary major in industrial and labor relations is a 28-hour interdisciplinary program of study, offered jointly by the Department of Management in the College of Business Administration and the Departments of Economics, Psychology, and Sociology, Anthropology, and Social Work in the College of Arts and Sciences. Twenty-two of the hours must be taken outside the student's primary major area. MANGT 330 and five additional courses are required as shown in group I below. In addition, two elective courses must be chosen from each of groups II and III below.

Business students interested in the secondary major in industrial and labor relations should contact Dr. Stan Elsea, Department of Management, 101 Calvin Hall, 532-6296.

### I. Required courses (16 hours)

ECON 620	Labor Economics
MANGT 330	Introductory Seminar
MANGT 530	Industrial and Labor Relations
MANGT 630	Labor Relations Law
PSYCH 560	Industrial Psychology
SOCIO 647	Sociology of Work

### II. Restricted electives (6 hours)

Two courses from:

ECON 540	Managerial Economics
MANGT 637	Industrial Conflict Resolution
SOCIO 546	Bureaucracy in Modern Societies
PSYCH 550	Group Dynamics

### III. Group electives

Two courses are to be selected from the following groups (only one course may be chosen from any group):

<b>Group A</b>	
MANGT 531	Personnel and Human Resources Management

MANGT 622	Decision Analysis
MANGT 639	Advanced Labor Relations
ECON 627	Contemporary Labor Problems

#### Group B

PSYCH 563	Gender Issues in the Workplace
PSYCH 625	Engineering Psychology
PSYCH 564	Psychology of Organizations

#### Group C

SOCIO 550	Introduction to Social Interaction
SOCIO 570	Race and Ethnic Relations in the U.S.

#### Group D

POLSC 616	Discrimination and the Law
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## International Studies

Charles Bussing, Director  
202 Dickens Hall  
532-6327

The international studies program promotes understanding of the international community. The program encourages a substantial distribution of foreign and international course work under the direct, personal guidance of an interdisciplinary faculty committee. Students must enroll in another major before taking international studies as a secondary major.

Students who complete the secondary major in international studies are expected to include the following within their areas of knowledge or competency: speaking capability in a foreign language; basic geographic knowledge of the world; ability to understand and analyze cultures other than their own; some understanding of developmental processes; some understanding of international relations and processes of interaction; and some integration of their program of study into a meaningful and coherent whole.

### Requirements

Students must complete the equivalent of four semesters of a modern foreign language. They must also complete 24 hours of course work, distributed as follows:

<b>Geographic knowledge</b>	
GEOG 100	World Regional Geography

<b>Cultural understanding</b>	
ANTH 200	
or 201	Cultural Anthropology

<b>Development</b>	
At least one course marked D in the approved course list.	

<b>International relations</b>	
At least one course marked I in the approved course list.	

<b>Program integration</b>	
DAS 425	Senior Research in International Studies or approved alternative.

During the senior year, the student will write a research paper or complete a project on an international topic. The research may be an honors thesis or design project in one of the participating colleges, or it may involve independent study. Students may enroll in DAS 425 or in an approved alternative course, such as GENAG 505 or ARCH 702. In all cases, the student must have the permission of a faculty

member to supervise and evaluate the work. All students enrolled in "Senior Research in International Studies" must have their topics approved by the director of the secondary major in international studies.

Depending on the number of students enrolled in the course during any given semester, special class sessions may be scheduled for participants to discuss their work and to share their preliminary findings. As part of the course requirements, students will be expected to present their final paper or project, or a summary of the same, at a meeting of students and faculty in international studies.

### Electives

The remaining 9 hours may be taken from the approved course listing. No more than hours (of the 24) may be applied from a single discipline, and no more than 6 hours may be counted toward both a secondary major in an area studies program and in international studies. Students are encouraged to take courses in at least two of the following colleges: agriculture, architecture and design, arts and sciences, business, and human ecology. Students are encouraged to consult with their international studies advisor on the design and coherence of their international studies program.

Courses listed below are those for which students may receive credit in the international studies program. Alternative courses may be approved by petition to the director of the international studies program.

### Interdisciplinary course

**DAS 425. Senior Research in International Studies.** (3) I, II. A research paper or project on an international topic. In order to complete supervised independent study, students will make presentation of the final paper or project report. Pr.: Completion of 15 hours of course work in international secondary major.

### Departmental electives

#### College of Agriculture

AGRON 430	Tropical Agronomy	2
GENAG 505	Comparative Agriculture	1-4
AGEC 615	International Agricultural Development	3 D

#### College of Architecture and Design

ARCH 702	Architecture Design Studio VI	5
LAR 702	Landscape Architecture Design Studio VI	5
IAR 702	Interior Architecture Design Studio VI	5
ARCH 655	Foreign Seminar	var.

#### College of Arts and Sciences

College of Arts and Sciences		
Anthropology		
ANTH 200	Introduction to Cultural Anthropology .....	3
ANTH 201	Introduction to Cultural Anthropology, Honors .....	4
ANTH 220	Introduction to Linguistic Anthropology .....	3
ANTH 505	Introduction to the Civilization of South Asia I .....	3
ANTH 506	Introduction to the Civilization of South Asia II .....	3
ANTH 507	Folk Cultures .....	3
ANTH 511	Cultural Ecology and Economy .....	3

ANTH 512	Political Organization in Folk and Nonliterate Cultures .....	3	
ANTH 532	Mexican and Central American Indians .....	3	
ANTH 536	Black Cultures of the Americas .....	3	
ANTH 545	Cultures of India and Pakistan .....	3	
ANTH 550	Cultures of Africa .....	3	
ANTH 604	Culture and Personality .....	3	
ANTH 633	Gender, Power, and International Development .....	3	
ANTH 634	Indian Cultures of South America ..	3	
ANTH 685	Race and Culture .....	3	
ANTH 736	Applied Agricultural and Rural Change .....	3	
<b>Economics</b>			
ECON 505	Introduction to the Civilization of South Asia I .....	3	
ECON 506	Introduction to the Civilization of South Asia II .....	3	
ECON 636	Capitalism and Socialism .....	3	
ECON 681	International Trade .....	3	I
ECON 682	Economics of Underdeveloped Countries .....	3	I
<b>Geography</b>			
GEOG 440	Geography of Natural Resources ....	3	
GEOG 450	Geography of Economic Behavior ..	3	
GEOG 460	Future Worlds .....	3	
GEOG 620	Geography of Latin America .....	3	
GEOG 640	Geography of Europe .....	3	
GEOG 650	Geography of the Soviet Union .....	3	
GEOG 710	Geography of Hunger .....	3	D
GEOG 715	World Population Patterns .....	3	
GEOG 730	World Agricultural Systems .....	3	D
<b>History</b>			
HIST 505	Introduction to the Civilization of South Asia I .....	3	
HIST 506	Introduction to the Civilization of South Asia II .....	3	
HIST 543	The U.S. and World Affairs, 1776–Present .....	3	
HIST 544	History of U.S.–Soviet Relations Since 1917 .....	3	I
HIST 560	Latin American Nations .....	3	
HIST 573	Twentieth-Century Europe .....	3	
HIST 574	Europe Since World War II .....	3	
HIST 577	European Diplomatic History Since Napoleon .....	3	I
HIST 595	Modern European Culture .....	3	
<b>Mass communications</b>			
MC 670	International Communications .....	3	
<b>Modern languages</b>			
FREN 502	French Literature in Translation .....	3	
GRMN 502	German Literature in Translation ...	3	
RSSN 504	Russian Literature in Translation: The 19th Century .....	3	
SPAN 505	Spanish Literature in Translation ...	3	
MLANG 507	European Literature in Translation .	3	
RUSSN 508	Russian Literature in Translation: The Soviet Period .....	3	
FREN 514	French Civilization .....	3	
GRMN 530	German Civilization .....	3	
SPAN 565	Spanish Civilization .....	3	
SPAN 566	Hispanic-American Civilization .....	3	
<b>Political science</b>			
POLSC 505	Introduction to the Civilization of South Asia I .....	3	
POLSC 506	Introduction to the Civilization of South Asia II .....	3	
POLSC 545	The Politics of Developing Nations .....	3	D
POLSC 621	European Politics .....	3	
POLSC 622	Latin American Politics .....	3	
POLSC 623	South Asian Politics .....	3	
POLSC 624	Middle Eastern Politics .....	3	
POLSC 625	Southeast Asian Politics .....	3	
POLSC 626	African Politics .....	3	
POLSC 627	Soviet-Style Regimes .....	3	
POLSC 628	Comparative Security Establishments .....	3	
POLSC 629	Administration in Developing Nations .....	3	D

POLSC 641	International Relations .....	3	I
POLSC 642	International Conflict .....	3	I
POLSC 645	International Politics of Europe .....	3	I
POLSC 647	International Law .....	3	I
POLSC 649	International Defense Strategies .....	3	I
POLSC 651	International Organization .....	3	I
POLSC 652	International Politics o South Asia .....	3	I
POLSC 653	International Politics of the Middle East .....	3	I
<b>Sociology</b>			
SOCIO 505	Introduction to the Civilization of South Asia I .....	3	
SOCIO 506	Introduction to the Civilization of South Asia II .....	3	
SOCIO 633	Gender, Power, and International Development .....	3	D
SOCIO 734	Sociology of Agricultural Development .....	3	D
SOCIO 736	Applied Agricultural and Rural Change .....	3	
SOCIO 740	Comparative Social Systems .....	3	
SOCIO 742	Society and Change in South Asia .....	3	

**College of Business Administration**

FINAN 554	International Financial Management .....	3	
MANGT 690	International Management .....	3	
MKTG 544	International Marketing .....	3	I

**College of Human Ecology**

FN 702	Nutrition in Developing Countries .....	3	
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**Latin American Studies**

Marcial Antonio Riquelme, Director  
304C Fairchild Hall  
532-1697

The secondary major in Latin American studies provides opportunities for students to examine issues related to Latin America from a variety of perspectives. This interdisciplinary approach is designed to help students understand the systematic nature of political, socioeconomic, technological, and environmental problems in Latin America and the value systems of the people involved.

The program allows students to work with specialists in the humanities, social sciences, engineering, and natural and biological sciences and to benefit from the expertise of professionals who are engaged in development projects in Latin America. Students who complete the secondary major will be qualified to pursue graduate work in Latin American studies. The curriculum will enhance student qualifications for employment in research, economic development, social action, trade, and diplomacy related to Latin America.

A student from any college may choose the secondary major in Latin American studies to complement course work in his or her major. Many courses may simultaneously meet the student's own college or major degree requirements. In this way, electives and required courses within a college curriculum may count toward the secondary major in Latin American studies.

**Requirements**

To fulfill the course requirements, undergraduate students must:

1. Complete two years (four semesters) of Spanish, or demonstrate by examination equivalent competence in Spanish or Portuguese.
2. Complete 21 hours of Latin American studies course work in a minimum of four departments. No more than 9 hours in any department may be counted toward the requirements of the secondary major.
3. Participate in the Senior Seminar (interdisciplinary independent study).

**Departmental electives**

**College of Agriculture**

HORT 407	Comparative Agriculture: Latin America
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**College of Arts and Sciences**

**Anthropology**

ANTH 432	The Indians of Mexico, Central America, and the Caribbean
ANTH 532	Central America: Peoples and Problems
ANTH 536	African-American Cultures
ANTH 555	Black Music of the Americas
ANTH 634	Indian Cultures of South America
ANTH 673	Pre-Columbian Civilizations of Mexico and Guatemala

**Geography**

GEOG 620	Geography of Latin America
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**History**

HIST 560	Latin American Nations
HIST 561	Colonial Hispanic America
HIST 562	Modern Mexico

**Modern languages**

SPAN 563	Introduction to the Literature of Spanish America
SPAN 566	Hispanic-American Civilization
SPAN 751	Spanish-American Narrative to 1950
SPAN 752	Contemporary Spanish–American Literature
SPAN 755	Spanish–American Poetry and Drama
SPAN 772	Hispanic World Today

**Political science**

POLSC 622	Latin American Politics
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**Sociology**

SOCIO 507	Political Sociology of Latin America
SOCIO 701	Problems in Sociology: Latin American Political Sociology
SOCIO 701	Problems in Sociology: Social Movements in Selected Latin American Countries

**Natural Resources and Environmental Sciences**

Steve J. Thien, Director  
122 Throckmorton Hall  
532-7207

The natural resources and environmental sciences secondary major prepares students to apply broadly-based scientific knowledge to the use, management, sustainability, and quality of soil, air, water, mineral, biological, and energy resources. The NRES program offers a timely and relevant academic emphasis to

broaden the environmental perspective students receive in their primary major.

Government, corporate, and public concerns about natural resource and environmental issues abound. These concerns translate into career opportunities for individuals with interdisciplinary training on how humanity affects global functions.

Because natural resource and environmental issues tend to be so extensive and complex, they exceed the scope of any single discipline. Students in the NRES secondary major study environmental issues from a wide base of academic viewpoints. Involvement with students and professors from other disciplines adds skills typically required in environmental careers.

## Requirements

### I. Entry requirements

Students must successfully complete the following courses to become eligible to pursue the NRES secondary major.

a. Four basic science courses (or their more advanced equivalent), and

MATH 100 College Algebra  
CHM 110 General Chemistry or CHM 210 Chemistry I  
PHYS 113 General Physics or PHYS 115 Descriptive Physics  
ECON 110 Principles of Macroeconomics or ECON 120 Principles of Microeconomics

b. Two of the following basic NRES courses. These courses must be from different departments and total a minimum of 6 credits.

AGRON 305 Soils  
AGRON 335 Environmental Quality  
BIOL 198 Principles of Biology  
BIOL 210 General Botany  
CE/AGE 551 Hydrology  
FOR 285 Introduction to Forestry  
FOR 375 Introduction Natural Resource Management  
GEOG 220 Environmental Geography I  
GEOG 440 Geography Natural Resources  
GEOL 100 Introductory Geology  
GEOL 105 Oceanography  
GEOL 125 Natural Disasters

### II. Block elective requirements

From the following lists, students must successfully complete a minimum of 5 courses (15 hours minimum) from at least four departments. One course must be taken from each of the designated areas (natural, applied, and social sciences/humanities), two courses must be numbered 500 or greater, and three courses must have a prerequisite. These lists are continuously being revised, See the director for the most recent version.

#### Natural science courses

AGRON 305 Soils  
AGRON 515 Soil Genesis and Classification  
BIOL 433 Wildlife Conservation  
BIOL 529 Fundamentals of Ecology  
BIOL 612 Introduction to Limnology  
BIOL 687 Microbial Ecology  
GEOL 305 Earth Resources  
GEOL 506 Environmental Studies  
GEOL 520 Geomorphology  
GEOL 702/3 Economic Geology/Lab  
GEOL 711 Water Resource Geochem.  
GEOL 716 Hydrogeology  
GEOG 221 Environmental Geog. II

#### Applied science courses

AGE 520 Energy Use/Control in Agriculture  
AGE 530 Soil and Water Engineering  
AGE 705 Irrigation and Drainage  
AGRON 330 Weed Management  
AGRON 335 Environmental Quality  
AGRON 501 Range Management  
AGRON 635 Soil Conservation and Management  
AGRON 645 Soil Microbiology  
AGRON 746 Physical Properties of Soil  
ATM 558 Soil Erosion/Sed. Pollution  
ATM 653 Irrigation Practices  
ATM 661 Water and Waste in the Environment  
ATM 670 Water Supply/Waste Management  
BIOL 303 Ecology of Environmental Problems  
BIOL 684 Wildlife Management  
BIOL 696 Fisheries Management  
CE/AGE 551 Hydrology  
CE 552 Hydraulic Engineering  
CE 563 Environmental Fundamentals  
CE 565 Waste and Wastewater Engineering  
CE 766 Wastewater Engineering/Biological Processes  
CE 762 Water Treatment Processes  
GEOG 705 Remote Sensing of Environment  
GEOL 730 Petroleum Geology  
GEOL 602 Mineral Exploration  
GEOL 605 Exploration Geophysics  
CHE 650 Hazardous Waste Engineering Seminar  
CHE 715 Biochemical Engineering

#### Social science/humanities courses

AGEC 525 Natural Res. & Environmental Economics  
ENGL 395 American Nature Literature  
GEOG 440 Geog. Natural Resources  
GEOG 720 Geography of Land Use  
GEOG 725 Geography of Water Resources  
GEOG 730 World Agricultural Systems  
GEOG 760 Human Impact on Environment  
GEOG 770 Perception of Environment  
HIST 511 Environmental History  
LAR 322 Environmental Ethics  
LAR 741 Public Lands Law  
LAR 758 Land Resource Information Systems  
LAR 759 Land Resource Evaluation  
PLAN 590 Problem Planning: Solid Waste Management

### III. Capstone course requirement

All students must successfully complete the NRES capstone course. This course should be scheduled during the senior year. Currently offered only in spring semester.

DAS 582, DEN 582, or GENAG 582 Natural Resources/Environmental Sciences Project

## Women's Studies

Anne Butler, Director

Professors Gray, Hedrick, McElroy, Oukrop, Saal, and Shoop; Associate Professors Anderson, Benson, Coyner, Culley, Dodd, McGrath, Nelson, Thurston, and Walker; Assistant Professors Coulson, Denning, Hubler, Huff-Corzine, Kremer, Scott, Verschelden, and, Zschoche; Courtesy appointments Chaudhuri, Davis.

The women's studies program focuses on women, whose changing roles and expectations are the most profound and widespread social phenomenon of our time.

Courses in women's studies examine various aspects of women's lives, including not only the barriers and prejudices that still hold women back but also women's achievements against the odds. Some courses focus on the

nature of sex differences and gender roles. Others focus on the interrelationships between women, gender roles, and the major institutions which shape our society. Humanities courses explore images and achievements of women in a wide range of creative media. History and anthropology discuss interrelationships of women and men in various cultural contexts across time and around the world.

Women's studies are direct preparation for many careers that serve, counsel, or communicate about women. A secondary major in women's studies combines especially well with such majors as journalism, any form of counseling, or pre-law. Women's studies is also an excellent liberal arts concentration, forming a firm basis for graduate work in any liberal professional field.

## Course requirements

To complete the secondary major, a student must take two required courses (Introduction to Women's Studies and Senior Seminar in Women's Studies), and 18 semester hours in elective courses from the Colleges of Arts and Sciences, Education, or Human Ecology, for a total of 24 semester hours. Elective courses must be taken in at least two colleges. Courses in the women's studies program also may serve to meet general education and major requirements, and interdisciplinary courses may be counted as either humanities or social sciences.

## Interdisciplinary courses

**WOMST 105. Introduction to Women's Studies.** (3) I, II. A systematic introduction to women's studies as an academic discipline, drawing research from humanities, social science, education, human ecology, and management to analyze images of women, status of women, sex differences, gender roles and stereotypes, patterns of success, women and relationships, current controversial issues affecting women, and feminism as a social and historical movement. An academic perspective on issues of equality and justice for women, emphasizing scholarship on how women perceive their own lives.

**WOMST 405. Senior Seminar in Women's Studies.** (3) I. An intercollegiate, interdisciplinary course organized topically with students presenting papers which draw upon previous and concurrent academic experience and which approach a given topic with a consistent focus on the role of women. Provides supervised independent study and subsequent discussion, allowing students to integrate and order their perceptions about the unique roles, problems, and contributions of women. Pr.: Introduction to Women's Studies and 15 hours of women's studies courses.

**WOMST 500. Topics in Women's Studies.** (var.) Exploration of an interdisciplinary topic in women's studies.

**WOMST 500. Topics: African American Women.** (var.) Utilizes an historical and literary perspective to examine the social and educational experiences of African American females.

**WOMST 505. Independent Study in Women's Studies.** (1-3) I, II. Independent, interdisciplinary, supervised studies in an area of women's studies which does not fall within the boundaries of a traditional department. May be repeated once for credit with change of topic. Pr.: Junior standing, consent of instructor(s), and approval of women's studies faculty.

**WOMST 506. Contemporary Feminist Frameworks.**

(3) II. Surveys major contemporary U.S. theories of gender and their development, including impact of feminist movement on the development of theory, interactions of race and gender, women's culture and men's roles. Compares approaches of social sciences and humanities. Pr.: Six hours of women's studies.

**WOMST 605. Gender: An Interdisciplinary Overview.**

(3) Advanced interdisciplinary overview of theory and scholarship on women and gender from disciplines in social sciences, humanities, and professions focusing on human beings. For students who already have some basic knowledge of women's studies.

**College of Arts and Sciences****Anthropology**

ANTH/

SOCIO 508 Male and Female: Cross-Cultural Perspectives

ANTH 633 Gender, Power, and International Development

**Art**

ART 654 Women in Art

ART 695 Topics in Art History (when offered as Women in Photography)

**English**

ENGL 425 Women in Literature

ENGL 707 Medieval Literature (when offered as Images of Women in the Middle Ages)

ENGL 720 Shakespeare Comedy and Gender

ENGL 850 Gender and Power in Shakespeare and the Renaissance

**History**

HIST 512 Women in European History

HIST 533 Topics in the History of the Americas (when offered as Gender Roles, Sexuality, and the American Medical Profession, 1800–Present; Women in Latin American History; or Women and the Family, 1607–1870)

HIST 541 Women in American History

HIST 563 Topics in Comparative History (when offered as Feminism: History and Theory)

HIST 598 Topics in Non-Western History (when offered as Women in the Middle East)

HIST 928 Seminar in American History (when offered as Women's History)

HIST 930 Seminar in Modern European History (when offered as Female Domesticity in Preindustrial Europe)

**Mass communication**

MC 612 Women and the Media

**Modern languages**

FREN 502 French Literature in Translation (when offered as Women in African Literature)

**Philosophy**

PHILO 135 Feminist Theory

PHILO 150 Introduction to the Philosophy of Feminism

PHILO 397 Feminist Issues in Philosophy

PHILO 525 Social Political Thought (when offered as Women in Western Thought)

PHILO 665 Philosophy of Feminism

**Kinesiology**

KIN 598 Women and Sports

**Music**

Music 390 Music by Women Composers

**Political science**

POLSC 606 Gender and Politics

POLSC 799 Pro-Seminar in Political Science (when offered as Women and Law)

**Psychology**

PSYCH 540 Psychology of Women

PSYCH 543 Women and Mental Health Issues

PSYCH 563 Gender Issues in the Workplace

**Social work**

SOCWK 543 Women and Mental Health Issues

SOCWK 580 Women's Perspectives on Peace and War

SOCWK 610 Topics in Social Work (when offered as Violence Against Women or Women and Peace)

**Sociology**

SOCIO 545 The Sociology of Women

SOCIO 633 Gender, Power, and International Development

SOCIO 665 Women and Crime

**Speech and theatre**

SPCH 630 Topics in Rhetoric and Communication (when offered as Feminism and Rhetoric) or Women and Political Campaign Communication

THTRE 782 Women in Theatre

**College of Education****Educational administration**

EDADM 786 Topics in Education (when offered as Programming for Women's Concerns)

**Foundations and adult education**

EDACE 750 Women, Education, and Work

**Curriculum, instruction, and policy studies**

EDCIP 735 Curriculum Materials for Nonsexist Teaching

**College of Human Ecology****Human development and family studies**

HDFS 300 Problems in Family and Child Development (when offered as The Mature Woman: Middle Age and Later Years)

HDFS 302 You and Your Sexuality

HDFS 350 Family Relationships and Sex Roles

HDFS 600 Economic Status of Women

HDFS 708 Topics in Family and Child Development (when offered as The Legal Rights of Women)

HDFS 865 Human Sexuality

# Agriculture

Marc. A. Johnson, Dean and Director of the Kansas Agricultural Experiment Station and the Kansas Cooperative Extension Service

114 Waters Hall  
532-7137

David J. Mugler, Associate Dean and Director of Academic Programs  
Lawrence H. Erpelding, Associate Director  
John B. Riley, Assistant Director

117 Waters Hall  
532-6151

The College of Agriculture offers 15 bachelor of science degree programs, nine master of science programs, nine programs leading to the Ph.D., and a pre-veterinary medicine program. The programs and options provide flexibility to meet the needs of students who will enter varied careers in the food chain and related agribusinesses.

## 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.

## Faculty

More than 95 percent 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. This integration of teaching, research, and extension helps ensure that courses are current and relevant.

## Facilities

Effective instruction in the application of basic sciences to modern agricultural industries requires land, buildings, livestock, and equipment. More than 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 some of 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.

## Professional programs

Agribusiness—B.S.  
Agricultural economics—B.S., M.S., Ph.D.  
Agricultural education—B.S.  
Agricultural journalism—B.S.  
Agricultural technology management—B.S.  
Agronomy (crops and soils)—B.S., M.S., Ph.D.  
Animal sciences and industry—B.S., M.S., Ph.D.  
Bakery science and management—B.S.  
Entomology—M.S., Ph.D.  
Feed science and management—B.S.  
Food science—M.S., Ph.D.  
Food science and industry—B.S.  
Genetics—M.S., Ph.D.  
Grain science—M.S., Ph.D.  
Horticultural therapy—B.S.  
Horticulture—B.S., M.S., Ph.D.  
Milling science and management—B.S.  
Park resource management—B.S.  
Plant pathology—M.S., Ph.D.  
Pre-veterinary medicine—three years  
Recreation and park administration—B.S.

## Internships and cooperative education

Internships and co-op programs throughout the state and nation are available with agribusiness firms and agencies and in production agriculture to gain on-the-job experience. Specific internship and co-op requirements vary among departments and interdepartmental programs. Students may earn academic credit and money for approved internships and co-op experiences. The number of internships and co-op programs in the College of Agriculture is growing as companies seek to attract K-State graduates.

## Extracurricular activities

Leadership, communication, and interpersonal skills are essential for today's agriculture graduate. K-State offers many opportunities to become involved on campus through departmental clubs, service organizations, student government, agricultural competition teams, and much more. Each contributes to greater personal and professional development.

## Scholarships

All students applying for College of Agriculture scholarships must complete the K-State scholarship application. Obtain an application from your high school counselor, community college financial aid office or the College of Agriculture, Office of Academic Programs, 117 Waters Hall.

By completing the university's scholarship application, you become eligible for all university, college, and departmental scholarships

for which you are qualified. Scholarship applications should be submitted by February 1 to receive priority.

## General Requirements

### Selection of a major

Students usually select a curriculum or major when they enter the college. They are provided academic advisors in their major fields. 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 advisor in the academic programs office or an advisor in one of the academic departments. These students are urged to choose majors before the end of the freshman year.

The curriculum or major may be changed at almost any time and with relative ease, though a change after the sophomore year may delay graduation.

Electives permit adaptation of the program to the student's goals. The student should work with an advisor to develop the most beneficial and effective academic program.

Many students work part time at K-State laboratories, greenhouses, and farms. This experience adds greatly to students' learning and understanding.

### Selection of an option

Most major fields of study in agriculture provide for selection of groups of courses known as options. Some typical options include:

#### Business and industries

Students who wish to emphasize business, marketing, and management related to agribusiness firms may select an option in business and industries. Course work includes classes in business administration and economics.

#### Production/technical

Those who plan to enter farming, ranching, horticultural production, or other technical positions in agriculture or agribusiness may select a production/technical option. Study in one of these options allows students to gain more depth in the technical aspects of their majors.

#### Sciences/professional

A science/professional option prepares students for research and graduate and professional schools. This option allows students to structure programs strong in the basic sciences and/or other areas that will enhance success in

graduate and professional schools such as law and veterinary medicine.

Additional options are available in certain curricula or majors to allow students to develop specific strengths or specializations.

Suggested courses

Suggested humanities and social science electives

(must be taken from more than one department):

- College of Architecture and Design—any course in history or appreciation of architecture
- Art—courses in appreciation and theory
- Economics—above ECON 110 Principles of Macroeconomics
- English—any except courses in composition
- Geography—any except GEOG 220 Environmental Geography I and GEOG 221 Environmental Geography II
- History—any course
- Human development and family studies—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, anthropology, and social work—any course
- Speech—any course in theater and interpretation

Suggested additional communications courses

GENAG 410	Agricultural Student Magazine .....	2
ENGL 300	Expository Writing III .....	3
ENGL 516	Written Communications for the Sciences .....	3
SPCH 311	Business and Professional Speaking .....	3
SPCH 321	Public Speaking II .....	2
SPCH 325	Argumentation and Debate .....	3
SPCH 326	Small Group Discussion Methods .....	3
SPCH 726	Seminar in Persuasion .....	3
MC 400	News and Feature Writing .....	3
MC 470	Audio I .....	3
MC 480	Video I .....	3
MKTG 442	Sales Communications .....	3
EDSEC 706	Teaching Adults in Extension .....	3

Program Choices

General agriculture

Students who are undecided regarding the selection of a major in agriculture may want to enroll in general agriculture. Courses taken in this area are selected with the help of an advisor 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:

Example I		
ENGL 100	Expository Writing I .....	3
GENAG 101	Ag Orientation .....	1
ASI 102	Principles of Animal Science .....	3
ASI	An ASI Lab .....	1
MATH 100	College Algebra .....	3
FOR 285	Introduction to Forestry .....	3
KIN 101	Principles of Physical Fitness .....	1
		15

Example II		
AGEC 120	Agricultural Economics and Agribusiness .....	3
GENAG 101	Ag Orientation .....	1
CHM 110	General Chemistry .....	3

CHM 111	and General Chemistry Lab .....	1
or		
CHM 210	Chemistry I .....	4
ENGL 100	Expository Writing I .....	3
GRSC 100	Principles of Milling .....	3
KIN 101	Principles of Physical Fitness .....	1
		15

Example III		
GENAG 101	Ag Orientation .....	1
ECON 110	Principles of Macroeconomics .....	3
EDSEC 300	Introduction to Agricultural Education .....	1
AGRON 220	Crop Science .....	4
PSYCH 110	General Psychology .....	3
ASI 302	Introduction to Food Science .....	3
		15

Various general education and agriculture courses can be substituted in the examples above, depending on the student's interest.

Natural resource management

Students interested in natural resource management can pursue programs in park resource management; range management; recreation and park administration; and soil and water science.

Majors in park resource management and recreation and park administration can be earned in the Department of Horticulture, Forestry, and Recreation Resources.

Range management and soil and water science options are available through the Department of Agronomy.

These programs provide training for individuals interested in interpretation and application of ecological principles to environmental problems involving natural resources. Each program contains courses in the social sciences and humanities to help students become sensitive to the interactions between humans and their environmental surroundings. Courses in the physical and biological sciences help students understand and solve environmental problems, and courses in communications assist them in interpreting, conveying, and employing solutions.

Pre-veterinary medicine program

Students who satisfactorily complete the pre-veterinary medicine program 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.

GENAG 101	Ag Orientation .....	1
ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 105	Public Speaking IA .....	2
CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
CHM 350	General Organic Chemistry .....	3
CHM 351	General Organic Chemistry Laboratory .....	2
BIOCH 521	General Biochemistry .....	3
BIOCH 522	General Biochemistry Laboratory .....	2
PHYS 113	General Physics I .....	4
PHYS 114	General Physics II .....	4

BIOL 198	Principles of Biology .....	4
BIOL 455	Microbiology (with lab) .....	4
BIOL 510	Embryology .....	3
BIOL 511	Embryology Laboratory .....	1
ASI 500	Genetics .....	3
Electives	.....	9
Humanities and/or social science electives	.....	12

Dual degrees/dual majors

The agribusiness complex of industries (processing, preservation, distribution, and retailing of farm-produced food, and manufacture and sale of farm equipment, feeds, and agricultural chemicals) employs a variety of professionally trained personnel. The type of education required varies with the nature of the work performed. A dual degree or a dual major may be appropriate, depending on the student's occupational objectives.

Dual degrees may be earned by a student who desires a B.S. degree in some discipline in agriculture along with a B.S. degree in some other college at K-State. To earn a dual degree, the student must complete the requirements for each degree.

Dual majors are completed by students who wish to complete two different programs of study in agriculture while earning a bachelor of science degree in agriculture. This approach allows the student to select two majors to give greater depth and breadth to the educational program. The student is required to complete the requirements for both majors and earns a bachelor of science degree in agriculture.

Secondary majors

Certain departmental courses have been approved for credit toward secondary majors in gerontology, international studies, and natural resources and environmental sciences. A listing of approved courses may be found in the Secondary Majors section of this catalog.

Natural resources/environmental sciences secondary major

Increasing national and international concerns have generated opportunities for individuals to contribute to the resolution of environmental and resource problems.

These issues are so complex that they lie beyond the scope of any one discipline.

The natural resources and environmental science (NRES) secondary major broadens students' perspectives through course offerings and interaction with students and faculty from many disciplines. NRES prepares students to apply broadly-based knowledge to the use, management, sustainability, and quality of soil, air, water, mineral, biological, and energy resources.

NRES entry requirements are: at least five block courses selected from natural science, applied science, and social science/humanities offerings; and an interdisciplinary capstone

course. Interested students should contact Steve J. Thien, director, 317B Throckmorton Hall, 532-7207.

## Minors

To pursue a minor in the College of Agriculture, students must: (1) file a declaration of intent to pursue a minor with the minor-granting department, and (2) consult with an advisor in the minor-granting department prior to enrolling in the last three courses used to satisfy minor requirements.

Minors may be earned in agribusiness, agricultural economics, agronomy, animal sciences, and industry, entomology, horticulture, bakery science, feed science, cereal chemistry, and plant pathology. See departmental listings for more information.

## Agriculture honors program

Students who have attained a cumulative GPA of 3.5 or higher in 12 or more completed hours at Kansas State University will be invited to participate in the College of Agriculture Honors Program, typically at the end of their sophomore year. Community college transfers will be invited into the program following their first semester if they have met the GPA requirement.

The program provides honors students with greater curriculum flexibility, which encourages breadth and depth of study in one or more specific areas. It also exposes honors students to various areas of interest in agriculture. Each student in the program has a committee of three faculty members who assist the student in developing a program of study and in planning independent research activities.

Students seeking to enroll in the program will meet with the honors committee member from the department involved and, with an advisor, will develop an honors curriculum tailored to the student's particular goals. The student, with advice from the advisor, honors committee member, and other faculty member(s), will prepare a short proposal outlining the honors project. This proposal must be approved by the honors advisory committee of the College of Agriculture.

The honors advisory committee will review the proposals for possible scholarship funding priority. These honors project scholarships will be used exclusively for materials and supplies necessary for the completion of the student's honors project.

Students will enroll in the agriculture honors program (GENAG 000) each semester. Students will also enroll for up to 8 credits in a "special problems" course in the appropriate department to receive credit for the honors project. In the senior year, students will enroll in GENAG 515 Honors Seminar for the presentation of their projects.

Completion of the honors project requires presentation of a summary of the project in an honors seminar and a report written in a style suitable for publication in a referred journal in an appropriate field.

## Agricultural Economics

Orlan Buller, Interim Head

Barry L. Flinchbaugh, Program Leader—  
Extension

Arlo Biere, Undergraduate Program  
Coordinator

Allen Featherstone, Graduate Program  
Coordinator

Professors Barnaby, Barton,\* Biere,\* Borsdorf, Buller,\* Erickson,\* Fausett, Flinchbaugh, Johnson,\* L. Langemeier,\* Maxon, Norman,\* Phillips,\* Riley,\* Schurle,\* and Williams;\* Associate Professors Barkley,\* Burton,\* Darling, Featherstone,\* Grunewald,\* Kiser, Mintert,\* Schroeder,\* and Tierney; Assistant Professors Borges, Carriker,\* DeLano, Dhuyvetter, Diebel,\* Fox, Hugo, Lea,\* M. Langemeier,\* McEowen, Neils, Nelson, Stiegert,\* Vandever, Warmann, Wilson, and Young; Emeriti: Professors Dunbar, Figurski, Hess,\* Kelley,\* Knight,\* Koudele,\* Manuel,\* McCoy,\* McReynolds, Orazem,\* Parker, Pine,\* Schlender, Schruben,\* Sjo,\* Sobering, Sorenson,\* Thomas, and Walker.

## Agribusiness

Bachelor of science in agribusiness  
127 semester hours

Agribusiness is the study of the business and economics of agribusiness firms. Aspects unique to agribusiness are the risks and uncertainties of agricultural production, the heavy reliance on natural resources, the uniqueness of the institutions that govern food and agriculture, the competitive structures within the agribusiness sector, the technology of commercial agriculture and food processing, and the international dimensions of food and agriculture.

The agribusiness curriculum emphasizes agribusiness courses in agricultural economics and foundation courses in business administration.

### Suggested schedule for first two years

First semester	
ENGL 100	Expository Writing I ..... 3
MATH 100	College Algebra ..... 3
AGEC 105	Agricultural Economics and Agribusiness Orientation ..... 1
KIN 101	Principles of Physical Fitness ..... 1
	Agricultural or food science elective* ..... 3-4
	Social science elective*** ..... 3
<b>14-15</b>	

### Second semester

AGEC 120	Agricultural Economics and Agribusiness ..... 3
MATH 205	Calculus and Linear Algebra ..... 3
SPCH 105	Public Speaking 1A ..... 2
	Social science elective*** ..... 3
	Agricultural or food science elective* ..... 4-5
<b>15-16</b>	

### Third semester

ECON 110	Principles of Macroeconomics ..... 3
ENGL200	Expository Writing II ..... 3
	Humanities elective** ..... 3
	Natural science elective**** ..... 4-5
	Social science*** ..... 3
<b>16-17</b>	

### Fourth semester

AGEC 318	Agribusiness Management ..... 3
ACCTG 231	Accounting for Business Operations ..... 3
	Humanities electives** ..... 3
	Communication ..... 3
Three hours in English 201 or above, Speech 201, or 3 hours of modern language.	
<b>15-16</b>	

\*Select from the agricultural and food science electives list.

\*\*Select from history, music, art, English, philosophy, theatre, dance, or modern language.

\*\*\*Select from psychology, sociology, political science, anthropology, or history.

\*\*\*\*Select from General Chemistry, Principles of Biology, or General Physics.

### Agricultural and food science electives

AGRON 220	Crop Science	
	or	
HORT 201	Introductory Horticultural Science ..... 4	
AGRON 305	Soils ..... 4	
AGRON 330	Weed Management ..... 3	
ASI 102	Principles of Animal Science ..... 3	
	and	
ASI 103	Dairy Science	
	or	
ASI 104	Poultry Science	
	or	
ASI 105	Animal Science and Industry ..... 1	
ASI 300	Principles of Livestock Feeding ..... 3	
ENTOM 300	Economic Entomology ..... 3	
PLPTH 500	Principles of Plant Pathology ..... 3	
FOR 285	Introduction to Forestry ..... 3	
HORT 520	Fruit Production ..... 3	
HORT 560	Vegetable Crop Production ..... 3	
AGRON 340	Grain Grading ..... 2	
ASI 350	Meat Science ..... 2	
ASI 361	Meat Processing ..... 2	
ASI 302	Introduction to Food Science ..... 3	
GRSC 305	Fundamentals of Food Processing	
	or	
ASI 305	Fundamentals of Food Processing ..... 3	
GRSC 100	Principles of Milling ..... 3	
GRSC 120	Introductory Bakery Technology ..... 2	
GRSC 121	Introductory Bakery Technology Laboratory ..... 1	
FN 132	Basic Nutrition ..... 3	
FN 301	Food Trends, Legislation, and Regulation ..... 3	

### Additional requirements for B.S. in agribusiness

ACCTG 241	Accounting for Investing and Financing ..... 3
AGEC 490	Computer Applications ..... 2
AGEC 500	Production Economics ..... 3
AGEC 505	Agricultural Market Structures ..... 3
AGEC 515	Agribusiness Marketing ..... 3
AGEC 599	Agribusiness Management Strategies ..... 3

### Agricultural economics electives 15

AGEC 410	Agricultural Policy
AGEC 416	Agricultural Law and Economics
AGEC 417	Rural Banking
AGEC 420	Commodity Futures Marketing
AGEC 421	Livestock and Meat Marketing

AGEC 422	Grain Marketing
AGEC 513	Agricultural Finance
AGEC 525	Natural Resource and Environmental Economics
AGEC 590	Agricultural Economics and Agribusiness Honors Problems (open to honor students only)
AGEC 598	Farm Management Strategies
AGEC 605	Price Analysis and Forecasting
AGEC 610	Current Agricultural and Natural Resource Policy Issues
AGEC 615	International Agricultural Development
AGEC 623	International Agricultural Trade
AGEC 631	Principles of Transportation
AGEC 632	Agribusiness Logistics
AGEC 710	Advanced Agribusiness Management
AGEC 712	Linear Programming Application

<b>Two of the following</b> .....	<b>6</b>
FINAN 450	Business Finance
MANGT 420	Management Concepts
MKTG 400	Marketing

<b>Business elective</b> .....	<b>3</b>	
ECON 510	Intermediate Macroeconomics	
	<b>or</b>	
ECON 530	Money and Banking .....	3
Agricultural and food science electives .....		3-6
Statistics .....		3-6
Free electives .....		11-15
<b>Total including first two years</b> .....		<u>127</u>

Either AGECE 513 or FINAN 450 must be included in the program of study.

## Agricultural economics

Bachelor of science in agriculture 127 semester hours

Agricultural economics is the study of the economic factors affecting agricultural production, food consumption, commodity marketing, farm management, natural resource use and management, agricultural finance and agricultural trade.

### Farm management option

This option includes coursework in livestock and crop production, in agricultural technology and management, and in agricultural economics applied to the management of the farm, ranch, or commercial feedlot.

The suggested schedule for the first two years is the same as that for the agribusiness degree except that ASI 102 and a laboratory and AGRON 220 are the required agricultural science courses, and AGECE 308 Farm and Ranch Management replaces AGECE 318 Agribusiness Management. The additional requirements are below.

AGEC 490	Computer Applications .....	2
AGEC 500	Production Economics .....	3
AGEC 505	Agricultural Market Structures .....	3
AGEC 513	Agricultural Finance .....	3
AGEC 598	Farm Management Strategies .....	3

<b>Agricultural economics electives (including at least one numbered 600 or above)</b> .....	<b>15</b>
AGEC 410	Agricultural Policy
AGEC 416	Agricultural Law and Economics
AGEC 417	Rural Banking
AGEC 420	Commodity Futures Marketing
AGEC 421	Livestock and Meat Marketing
AGEC 422	Grain Marketing
AGEC 515	Agribusiness Marketing
AGEC 525	Natural Resource and Environmental Economics
AGEC 590	Agricultural Economics and Agribusiness Honors Problems (open to honor students only)

AGEC 599	Agribusiness Management Strategies
AGEC 605	Price Analysis and Forecasting
AGEC 610	Current Agricultural and Natural Resource Policy Issues
AGEC 615	International Agricultural Development
AGEC 623	International Agricultural Trade
AGEC 631	Principles of Transportation
AGEC 632	Agribusiness Logistics
AGEC 710	Advanced Agribusiness Management
AGEC 712	Linear Programming Application

ACCTG 241	Accounting for Investing and Finance ..	3
AGRON 305	Soils .....	4
ECON 510	Intermediate Macroeconomics or	
ECON 530	Money and Banking .....	3
Statistics .....		3-6
Advanced agricultural science electives (approved list available from department) .....		9
Agricultural technology management electives (approved list available from department) .....		3-4
Electives .....		6-11
<b>Total including first two years</b> .....		<b>127</b>

### Specialty option

This option allows students to combine agricultural economics with a specialty of 15 hours in another department or field.

Requirements for the first two years are the same as for the agribusiness degree. Additional requirements are below.

AGEC 490	Computer Applications .....	2
AGEC 500	Production Economics .....	3
AGEC 505	Agricultural Market Structures .....	3
ACCTG 241	Accounting for Investing and Finance ..	3
ECON 510	Intermediate Macroeconomics or	
ECON 530	Money and Banking .....	3
Statistics .....		3-6

**Agricultural economics electives (including at least two numbered 598 or above)** .....

AGEC 308	Farm and Ranch Management
AGEC 318	Agribusiness Management
AGEC 410	Agricultural Policy
AGEC 416	Agricultural Law and Economics
AGEC 417	Rural Banking
AGEC 420	Commodity Futures Marketing
AGEC 421	Livestock and Meat Marketing
AGEC 422	Grain Marketing
AGEC 513	Agricultural Finance
AGEC 515	Agribusiness Marketing
AGEC 525	Natural Resource and Environmental Economics
AGEC 590	Agricultural Economics and Agribusiness Honors Problems (open to honor students only)
AGEC 598	Farm Management Strategies
AGEC 599	Agribusiness Management Strategies
AGEC 605	Price Analysis and Forecasting
AGEC 610	Current Agricultural and Natural Resource Policy Issues
AGEC 615	International Agricultural Development
AGEC 623	International Agricultural Trade
AGEC 631	Principles of Transportation
AGEC 632	Agribusiness Logistics
AGEC 710	Advanced Agribusiness Management
AGEC 712	Linear Programming Application
Specialization in a second department or field, at least 6 credit hours at 500 level or higher .....	15
Electives .....	13-17
<b>Total including first two years</b> .....	<b>127</b>

### Professional option

This option requires additional mathematics, statistics, and computer science to prepare the student for advanced studies in agricultural economics.

Requirements for the first two years are the same as for the agribusiness degree except MATH 220 is required instead of MATH 205.

Additional requirements are below.

AGEC 490	Computer Applications .....	2
AGEC 500	Production Economics .....	3
AGEC 505	Agricultural Market Structures .....	3
ACCTG 241	Accounting for Investing and Finance ..	3
CIS 200	Fundamentals of Computer Programming .....	2
Computer programming laboratory .....		2
STAT 350	Business and Economic Statistics I .....	3
STAT 351	Business and Economic Statistics II .....	3
MATH 551	Applied Matrix Theory .....	3
ECON 510	Intermediate Macroeconomics .....	3

**Agricultural economics electives (including at least two numbered 598 or above)** .....

AGEC 308	Farm and Ranch Management
AGEC 318	Agribusiness Management
AGEC 410	Agricultural Policy
AGEC 416	Agricultural Law and Economics
AGEC 417	Rural Banking
AGEC 420	Commodity Futures Marketing
AGEC 421	Livestock and Meat Marketing
AGEC 422	Grain Marketing
AGEC 513	Agricultural Finance
AGEC 515	Agribusiness Marketing
AGEC 525	Natural Resource and Environmental Economics
AGEC 590	Agricultural Economics and Agribusiness Honors Problems (open to honor students only)
AGEC 598	Farm Management Strategies
AGEC 599	Agribusiness Management Strategies
AGEC 605	Price Analysis and Forecasting
AGEC 610	Current Agricultural and Natural Resource Policy Issues
AGEC 615	International Agricultural Development
AGEC 623	International Agricultural Trade
AGEC 631	Principles of Transportation
AGEC 632	Agribusiness Logistics
AGEC 710	Advanced Agribusiness Management
AGEC 712	Linear Programming Application
Electives .....	18-19
<b>Total including first two years</b> .....	<b>127</b>

## Agribusiness minor

**Prerequisites (in addition to any prerequisites required for specific AGECE courses taken):**

MATH 205	Calculus and Linear Algebra
ECON 110	Principles of Macroeconomics
AGEC 120	Agricultural Economics and Agribusiness Orientation or
ECON 120	Principles of Microeconomics
ACCTG 231	Accounting for Business Operations

### Required:

AGEC 500	Production Economics
AGEC 505	Agricultural Market Structures
AGEC 318	Agribusiness Management
AGEC 513	Agricultural Finance

**At least 3 credit hours below:**

AGEC 420	Commodity Futures Markets
AGEC 421	Livestock and Meat Marketing
AGEC 422	Grain Marketing
AGEC 515	Agribusiness Marketing

## Agricultural economics minor

**Prerequisites (in addition to any prerequisites required for specific AGECE courses taken):**

MATH 205	Calculus and Linear Algebra
ECON 110	Principles of Macroeconomics
AGEC 120	Agricultural Economics and Agribusiness Orientation or
ECON 120	Principles of Microeconomics

### Required

AGEC 500	Production Economics
AGEC 505	Agricultural Market Structures

And at least 9 credit hours from list below, (including at least three numbered 510 or higher)

AGEC 308	Farm and Ranch Management or
AGEC 318	Agribusiness Management
AGEC 410	Agricultural Policy
AGEC 420	Commodity Futures Markets
AGEC 421	Livestock and Meat Marketing
AGEC 422	Grain Marketing
ECON 510	Intermediate Macroeconomics
AGEC 513	Agricultural Finance
AGEC 515	Agribusiness Marketing
AGEC 525	Natural Resource and Environmental Economics
AGEC 598	Farm Management Strategies
AGEC 599	Agribusiness Management Strategies
AGEC 605	Price Analysis and Forecasting
AGEC 610	Current Ag and Natural Resource Policy Issues
AGEC 615	International Ag Development
AGEC 623	International Ag Trade
AGEC 631	Principles of Transportation
AGEC 632	Agribusiness Logistics

## Agricultural economics courses

### Undergraduate credit

**AGEC 105. Agricultural Economics and Agribusiness Orientation.** (1) I, II. Introduction to agricultural economics and agribusiness programs, activities, resources, and careers. Required of all students beginning a major in agricultural economics or agribusiness at K-State.

**AGEC 120. Agricultural Economics and Agribusiness.** (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 lec. a week.

**AGEC 308. Farm and Ranch Management.** (3) I. Decision-making process, cost concepts, farm records and financial management, budgeting, time value of money, and introduction to whole farm/ranch planning. Two hours rec. and two hours lab. a week. Pr.: AGECE 120 or ECON 120.

**AGEC 318. Agribusiness Management.** (3) I, II. A study of marketing, production, risk, and financial management in agribusiness firms. Particular attention is given to the application of economic principles to the management of marketing and farm supply firms. Pr.: AGECE 120 or ECON 120.

**AGEC 410. Agricultural Policy.** (3) I. Institutional and analytical treatment of historical and current economic problems, public policies and government programs affecting agriculture and rural America. Pr.: AGECE 120 or ECON 120 or ECON 110 and Junior Standing.

**AGEC 416. Agricultural Law and Economics.** (3) I. The legal framework for decision making by farm firms, families, and individuals; liabilities, real and personal property, contracts, uniform commercial code, organization of farm firms, intergenerational property transfers, water law, fence law, federal and state regulatory power, insurance, income tax, and social security. Three hours rec. a week. Pr.: ECON 110 and junior standing.

**AGEC 417. Rural Banking.** (3) II. Bank management in rural areas, place of rural banks in the banking system, asset appraisal, loan analysis, focused on banks serving the credit needs of farmers, small town businesses and rural consumers. Two hours rec. and two hours lab. a week, including guest speakers. Pr.: ECON 110 and ACCTG 231 or AGECE 308 or AGECE 318.

**AGEC 420. Commodity Futures Markets.** (2) I, II. The evaluation, function, mechanics analysis, and application of the commodity futures markets are discussed. Topics include fundamental commodity price analysis; technical analysis, hedging, and forward pricing applications; options on futures contracts; and sources, uses, and interpretation of commodity market information. Two hours rec. a week. Pr.: AGECE 120 or ECON 120.

**AGEC 421. Livestock and Meat Marketing.** (2) 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. Two hours rec. a week. Pr.: AGECE 120 or ECON 120, and AGECE 420 or conc.

**AGEC 422. Grain Marketing.** (2) I. Economic study of grain trade organization, farm policy, grain grades, storage, international contracting and financing, farmer contracting, grain merchandising, trade policy and grain marketing of competing exporting countries. Pr.: AGECE 120 or ECON 120; and AGECE 420 or concurrent enrollment.

**AGEC 441. Agricultural Economics and Agribusiness Seminar.** (Var.) Seminars of special interest will be offered upon sufficient demand in selected areas relating to agricultural economics and agribusiness or competitive teams qualifying for academic credit.

**AGEC 445. Agribusiness Internship.** (1-3) I, II, S. Approved and supervised work-study programs in various areas of agribusiness. Project reports required. Pr.: Junior standing and prior departmental approval.

**AGEC 490. Computer Applications in Agricultural Economics and Agribusiness.** (2) I, II. Applications of microcomputers to problems in agricultural economics and agribusiness. Emphasis on budgeting, cash flow, record keeping, financial analysis, statistical analysis, linear programming, and data analysis. Two hours rec. a week. Pr.: AGECE 105, AGECE 120 or ECON 120, and MATH 100.

### Undergraduate and graduate credit in minor field

**AGEC 500. Production Economics.** (3) I, II. Application of economic principles to problems of agricultural production. Analysis of consumer demand for agricultural products, and input and output decisions of the agricultural firm. AGECE 505 is a continuation of this course and they are intended to be taken in consecutive semesters. Pr.: AGECE 120 or ECON 120; and MATH 205.

**AGEC 505. Agricultural Market Structures.** (3) I, II. 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 rec. a week. Pr.: ECON 110 and AGECE 500.

**AGEC 513. Agricultural Finance.** (3) I. Analysis of capital investments, interpretation of financial statements, capital structure considerations for agricultural firms, and farm real estate pricing. Three hours rec. a week. Pr.: AGECE 308 or AGECE 318 and ACCTG 231.

**AGEC 515. Agribusiness Marketing.** (3) I. A broad view of marketing; food markets and consumption; marketing functions and institutions; prices, competition, and marketing costs; functional and organizational issues; food marketing regulations; commodity marketing. Three hours rec. a week. Pr.: AGECE 120 or ECON 120.

**AGEC 525. Natural Resource and Environmental Economics.** (3) I. Emphasis on the application of demand, supply, and price concepts in the study of natural resource use, policies, and management. Interdependence between environmental quality and economic actions are examined through discussion of property rights, economic incentives, externalities and economic components of environmental policies. Pr.: ECON 120 or AGECE 120 and junior standing.

**AGEC 541. Agricultural Economics and Agribusiness Seminar.** (Var.) Seminars of special interest will be offered upon sufficient demand in selected areas relating to agricultural economics and agribusiness.

**AGEC 590. Agricultural Economics and Agribusiness Honors Problems.** (2) I, II, S. Problems course for College of Agriculture honors projects. Pr.: College of Agriculture honors program participant and consent of honors project advisor.

**AGEC 598. Farm Management Strategies.** (3) I. A study of management concepts, tools, and decision strategies applied to farm firms. Alternative measures of farm business performance, as well as planning and evaluation techniques for an uncertain environment, are examined. Pr.: AGECE 120, AGECE 308, AGECE 500 and AGECE 513.

**AGEC 599. Agribusiness Management Strategy.** (3) II. This course integrates the risk, production, marketing, and financial management strategies of agribusiness firms. Special attention is given to the application of economic theory and quantitative analysis to business decision-making processes. In addition to case studies, a variety of analytical techniques will focus on both markets and firms involved in the production and marketing of food commodities. Three hours lec. a week. Pr.: AGECE 318, AGECE 500, AGECE 513 or FINAN 450, AGECE 515.

### Undergraduate and graduate credit

**AGEC 605. Price Analysis and Forecasting.** (3) II. The analysis of selected agricultural prices; application of regression analysis to price analysis, the role of futures markets and market efficiency, optimal hedging strategies, commodity option pricing, and price forecasting. Three hours rec. a week. Pr.: STAT 330 or 351; AGECE 490, AGECE 505 or ECON 520.

**AGEC 610. Current Agricultural and Natural Resource Policy Issues.** (3) II. Current issues in agricultural and natural resource policy from divergent perspectives. Classroom discussion, debate, writing assignments, and student presentations. Current events are analyzed and synthesized from both economic and noneconomic perspectives. Topics may include environmental issues, international agricultural development, the politics of farm programs, and the relationship between technology, agriculture, and society. Pr.: AGECE 505 and either AGECE 525 or AGECE 410.

**AGEC 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 rec. a week. Pr.: ECON 110.

**AGEC 623. International Agricultural Trade.** (3) II. Applied economics of agricultural trade. Emphasis on why trade occurs, current agricultural trade patterns, the effects of agricultural policy on trade and the institutions of trade. Pr.: AGECE 505.

**AGEC 631. Principles of Transportation.** (3) II. Examines the transportation market from the shippers' point of view by examining the impact of transportation on business firm decisions such as location, markets, and prices. Also covers the costs, prices, and service characteristics of railroads, motor carriers, water carriers, oil pipelines, and airlines. The role and impact of government in the transport market is examined from both a promotion and regulation perspective. Pr.: ECON 120 or AGECE 120.

**AGEC 632. Agribusiness Logistics.** (3) I. Planning for efficient use of transportation, storage and processing facilities in the handling of raw materials and products for agribusiness firms, controlling shipments and inventory in coordination with warehouse and handling operations, and scientific selection of routes, schedules, and equipment. Pr.: ECON 110 and junior standing.

**AGEC 641. Agricultural Economics and Agribusiness Seminar.** (Var.) Seminars of special interest will be offered upon sufficient demand in selected areas relating to agricultural economics and agribusiness. Pr.: Junior standing and consent of the instructor.

**AGEC 710. Advanced Agribusiness Management.** (3) I. Application of quantitative long-range planning tools for agribusiness. Two hours rec. and two hours lab a week. Pr.: AGECE 318 or graduate standing.

**AGEC 712. Linear Programming Applications in Agricultural Economics.** (3) II. Application of linear programming and related topics for decision analysis in agricultural firms. Pr.: AGECE 500.

**AGEC 740. Seminar in Agricultural Economics Analysis.** (Var.) Seminar on methods of economic analysis will be offered upon sufficient demand. Pr.: Consent of instructor.

**AGEC 750. Agricultural Economics and Agribusiness Problems.** (Var.) I, II, S. Pr.: Junior standing and consent of the instructor.

# Agricultural Education

Advisors—Harbstreit, Parmley, and Welton

## Agricultural education

Bachelor of science in agriculture  
132 semester hours

Agricultural education involves the broad study of agriculture including a core of course work in agricultural economics, agronomy, animal science, agricultural technology management, and horticulture.

Agricultural education is designed for students who wish to meet requirements to teach agriculture in a public school setting. Graduates in this option meet Kansas State Board of Education certification requirements. An area of occupational emphasis in agribusiness, agricultural production, agricultural technology management, horticulture, or natural resources is available.

Ten weeks during the second semester of the senior year are devoted to full-time student teaching. On-campus courses meet during the first six weeks of the semester.

### Freshman

First semester		
SPCH 105	Public Speaking IA	2
ATM 151	Agricultural Mechanics Practices	2
EDSEC 300	Introduction to Agricultural Education	1
ENGL 100	Expository Writing I	3
MATH 100	College Algebra	3
KIN 101	Principles of Physical Fitness	1
Agricultural science/agricultural technology management electives		4
		<b>16</b>

### Second semester

CHM 110	General Chemistry	3
	<b>and</b>	
CHM 111	General Chemistry Lab	1
Social science elective		3
AGEC 120	Agricultural Economics and Agribusiness	3
HORT 201	Introductory Horticultural Science	4
	<b>or</b>	
AGRON 220	Crop Science	4
		<b>14</b>

### Sophomore

First semester		
ACCTG 231	Accounting for Business Operations	3
BIOL 198	Principles of Biology	4
CIS 110	Introduction to Personal Computing	3
	<b>or</b>	
CIS 200	Fundamentals of Computer Programming plus lab	4
	<b>or</b>	
STAT 320	Elements of Statistics	3
EDCEP 215	Educational Implications of Growth and Development	3
ASI 102	Principles of Animal Science	3
		<b>16-17</b>

### Second semester

AGRON 305	Soils	4
ATM 351	Engine and Tractor Power	3
ASI 300	Principles of Livestock Feeding	3
	<b>or</b>	
ASI 500	Genetics	3

EDSEC 400	Leadership and Personal Development	1
ENGL 200	Expository Writing II	3
Humanities electives		3
		<b>17</b>

### Junior

First semester		
AGEC 308	Farm and Ranch Management	3
EDCEP 315	Educational Psychology	3
EDSP 323	Exceptional Students in the Secondary School	2
EDSEC 376	Core Teaching Skills and Lab	3
EDSEC 505	Field Experience/Agricultural Education	1
EDSEC 620	Principles of Vocational Education	3
ANTH 200	Introduction to Cultural Anthropology	3
		<b>18</b>

### Second semester

AGEC 318	Agribusiness Management	3
Agronomy and/or horticulture course		3
Agricultural science/agricultural technology management elective		4
Humanities electives		2
Social science electives		3
Agricultural technology management courses		3
		<b>18</b>

### Senior

First semester		
EDSEC 477	Middle Level/Secondary Reading	2
EDSEC 420	Block II Lab	1
EDSEC 621	Program Planning in Vocational Education	3
EDSEC 615	Laboratory Techniques for Teaching Agriculture	3
EDETC 318	Instructional Media and Technology	2
Humanities electives		3
Agricultural science/agricultural technology management electives		3
		<b>17</b>

### Second semester

EDSEC 503	Teaching Adults Agriculture	1
EDCIP 455	Teaching in a Multicultural Society	1
EDCEP 525	Interpersonal Relations in the Schools	1
EDSEC 500	Methods of Teaching Agriculture	2
EDSEC 586	Teaching Participation in the Secondary School and Professional Development Seminar	10
		<b>15</b>

## Agricultural Technology Management

Faculty—Chung,\* Clark,\* Maghirang, Schrock,\* Slocombe,\* Smithey, Spillman,\* and Steichen.\*

### Agricultural technology management

Bachelor of science in agriculture  
127 semester hours

Agricultural technology management emphasizes the application and integration of agricultural/biological sciences, agricultural engineered systems, and business to manage human and natural resources in the production and processing of food and agricultural products. It prepares men and women for technical management positions in food and agricultural

industries that require an understanding of both technology and management. Agricultural technology management graduates are typically employed in technical sales, service, and management in agribusiness and food and feed processing industries.

Courses are designed to apply physical concepts and problem solving to food and agricultural systems. Supporting courses provide a foundation of mathematics, chemistry, business, and computer and communication skills. Technical electives are available to develop a degree program that meets personal career objectives.

The curriculum is administered by the Department of Biological and Agricultural Engineering and leads to the bachelor of science degree in agriculture with a major in agricultural technology management.

### Agricultural technology management curriculum

<b>General requirements</b>		<b>62</b>
ENGL 100	Expository Writing I	3
ENGL 200	Expository Writing II	3
SPCH 105	Public Speaking IA	2
KIN 101	Principles of Physical Fitness	1
GENAG 101	Ag. Orientation	1
ECON 110	Principles of Macroeconomics	3
MATH 100	College Algebra	3
MATH 150	Plane Trigonometry	3
MATH 205	General Calculus and Linear Algebra	3
CHM 110	General Chemistry	3
	<b>and</b>	
CHM 111	General Chemistry Lab	1
	<b>or</b>	
CHM 210	Chemistry I	4
ACCTG 231	Accounting for Business Operations	3
BIOL 198	Principles of Biology	4
	<b>or</b>	
BIOL 210	General Botany	4
PHYS 113	General Physics I	4
	<b>or</b>	
PHYS 115	Descriptive Physics	4
CIS 110	Introduction to Personal Computing	3
AGRON 305	Soils	4
ASI 305	Fundamentals of Food Processing	3
Biology elective*		3
Communication elective**		3
Humanities and/or social sciences electives**		9

\*Select one:

BIOL 303	Ecology of Environmental Problems	3
BIOL 455	General Microbiology	4
BIOL 500	Plant Physiology	4
BIOL 529	Fundamentals of Ecology	3
BIOL 612	Introductory Limnology	4
ASI 500	Genetics	3

\*\*Select from the approved list under general requirements for the College of Agriculture in the *KSU Undergraduate Catalog*.

### Agricultural technology management

<b>required courses</b>		<b>15</b>
ATM 020	Assembly	0
ATM 160	Introduction to Agricultural Systems and Technology	3
ATM 360	Energy and Power in Biological Systems	3
ATM 511	Agricultural Building Systems	3
ATM 571	Functional Components of Machines	3
ATM 558	Soil Erosion and Sediment Pollution Control	3
<b>Agricultural technology management electives</b>		<b>12</b>
ATM 330	Production Machinery Systems	3
ATM 335	Production Machinery Systems Laboratory	1

ATM 460	Internship in Agricultural Technology Management .....	1-3
ATM 520	Food Manufacturing Laboratory .....	2
ATM 540	Introduction to Food Engineering .....	3
ATM 541	Introduction to Food Engineering Laboratory .....	1
ATM 651	Grain and Forage Handling Systems ...	3
ATM 653	Irrigation Practices .....	
ATM 661	Water and Waste in the Environment ..	3
GRSC 610	Electricity and Control for Milling Processes .....	3
AGE 551	Hydrology .....	2

#### Business, economics, management, marketing, and statistics electives .....

ACCTG 241	Accounting for Investing and Financing .....	3
AGEC 120	Agricultural Economics and Agribusiness .....	3
AGEC 525	Natural Resource Economics .....	3
Any other agricultural economics course(s) 300 or above		
ECON 510	Intermediate Macroeconomics .....	3
ECON 530	Money and Banking .....	3
ECON 681	International Trade .....	3
FINAN 450	Business Finance .....	3
MANGT 390	Business Law .....	3
MANGT 420	Management Concepts .....	3
MKTG 400	Marketing .....	3
MKTG 450	Consumer Behavior .....	3
STAT 340	Biometrics I .....	3
<b>or</b>		
STAT 350	Business and Economic Statistics .....	3
GRSC 630	Management Applications in the Grain Processing Industries .....	3

#### Free electives .....

**Agricultural and food science electives .....** 18  
(Twelve hours, including two courses 400 and above, must be concentrated in one of the following three subject matter areas. Other courses may be selected with advisor's consent.)

#### Plant, natural resource, and environmental sciences

AGRON 220	Crop Science .....	4
AGRON 335	Environmental Quality .....	3
AGRON 330	Weed Management .....	3
AGRON 375	Soil Fertility .....	3
AGRON 385	Soil Fertility Lab .....	2
AGRON 501	Range Management .....	3
AGRON 520	Grain Production .....	3
AGRON 550	Forage Management and Utilization ...	3
AGRON 551	Forage Management and Utilization Lab .....	1
AGRON 630	Principles of Crop Improvement .....	3
AGRON 635	Soil Conservation and Management ...	3
PLPTH 500	Principles of Plant Pathology .....	3
GEOG 220	Environmental Geography I .....	4
GEOL 305	Earth Resources .....	3
GEOL 506	Environmental Studies .....	2
GEOL 520	Geomorphology .....	2
ENTOM 300	Economic Entomology .....	3

#### Animal science

ASI 102	Principles of Animal Science .....	3
ASI 300	Principles of Livestock Feeding .....	3
ASI 315	Livestock and Meat Evaluation .....	3
ASI 320	Principles of Feeding (cannot take 300 and 320) .....	3
ASI 400	Farm Animal Reproduction .....	4
ASI 422	Livestock Sales Management .....	1
ASI 450	Principles of Livestock Selection .....	2
ASI 470	Form and Function in Livestock .....	2
ASI 510	Animal Breeding Principles .....	3
ASI 512	Gestation of Farm Animals .....	2
ASI 515	Beef Science .....	3
ASI 521	Horse Science .....	3
ASI 524	Sheep Science .....	3
ASI 533	Anatomy and Physiology .....	4
ASI 534	Introduction to Pharmacology of Farm Animals .....	2
ASI 535	Swine Science .....	3
ASI 615	Range Livestock Nutrition and Management .....	2
ASI 620	Livestock Production and Management .....	2
ASI 655	Behavior of Domestic Animals .....	3

AGRON 501	Range Management .....	3
AGRON 550	Forage Management and Utilization ...	3
AGRON 551	Forage Management and Utilization Lab .....	1
BIOCH 265	Introduction to Organic and Biochemistry .....	5
ENTOM 305	Livestock Entomology .....	2
ENTOM 306	Livestock Entomology Lab .....	2

#### Food processing

ASI 302	Introduction to Food Science .....	3
ASI 350	Meat Science .....	3
ASI 361	Meat Processing .....	2
ASI 370	Principles of Meat Evaluation .....	2
ASI 395	Classification, Grading, and Selection of Meats .....	2
ASI 405	Fundamentals of Milk Processing .....	3
ASI 411	Introduction to Food Chemistry .....	3
<b>or</b>		
FN 501	Food Science .....	3
ASI 430	Food Products Evaluation .....	3
ASI 502	Principles of Dairy Food Processing ...	4
ASI 550	Dairy Bacteriology .....	4
ASI 605	Fresh Meat Operations .....	3
ASI 606	Instrumental Analysis of Food and Agricultural Products .....	2
ASI 607	Food Microbiology .....	4
ASI 610	Processed Meat Operations .....	2
ASI 694	Food Plant Management .....	2
ASI 695	Quality Assurance of Food Products ...	3
GRSC 100	Principles of Milling .....	3
GRSC 110	Flow Sheets .....	2
GRSC 305	Fundamentals of Food Processing .....	3
GRSC 500	Milling Technology I .....	3
GRSC 510	Feed Technology I .....	4
GRSC 520	Extrusion Processing in the Food and Feed Industries .....	4
GRSC 602	Cereal Science .....	3
GRSC 650	Concepts of Modern Feed Mill Design .....	3
GRSC 651	Food and Feed Plant Sanitation .....	4
GRSC 655	Cereal Food Plant Design and Construction .....	3

## Agricultural technology management courses

**ATM 020. Assembly.** (0) I, II. Presentation of professional problems and practices by students, faculty, and professionals associated with agricultural systems and technology. One hour LEC. a month.

### Undergraduate credit

**ATM 160. Introduction to Agricultural Systems and Technology.** (3) I, II. Introduction to basic engineering principles concerning agricultural buildings, food and fiber handling-processing-storage, machinery, soil and water conservation and irrigation; and the use of electricity when applied to circuits, controls, and motors. Three hours rec. a week. Pr.: One and one-half units of high school algebra and one unit of geometry.

**ATM 330. Production Machinery Systems.** (3) II. Machinery systems for tillage, planting, and harvesting crops; animal production; and food processing. Impact of these systems on the environment and natural resources. Three hours rec. a week. Pr.: ATM 160 or PHYS 113 or PHYS 115.

**ATM 335. Production Machinery Systems Lab.** (1). II. Laboratory exercises supplementing ATM 330. Two hours lab a week. Pr. or conc.: ATM 330.

**ATM 360. Energy and Power in Biological Systems.** (3). I. Basic cycles; power source types including IC engines, diesel, fluid turbines, electrical; energy sources and comparison of energy values including gasoline, diesel, alcohol, electric steam, etc.; economics of energy sources, and use of energy sources in biological systems. Two hours rec. and two hours lab a week. Pr.: ATM 160 or PHYS 113 or PHYS 115.

**ATM 460. Internship in Agricultural Technology Management.** (1-3) I. Intern programs in various areas of agricultural technology management. One hour of credit for each four weeks of supervised and evaluated off-campus work experience with cooperating employers. Written re-

port required. A maximum of 3 hours may be applied to a B.S. in agricultural technology management. Pr.: Junior standing.

### Undergraduate and graduate credit in a minor field

**ATM 511. Agricultural Building Systems.** (3) II. Concepts and fundamentals related to agricultural building systems including structural materials, beam and column strength, environmental control for plants and animals, farmstead layouts, crop storage, livestock and plant production facilities, and waste management. Three hours rec. a week. Pr.: ATM 160 or PHYS 113 or 115.

**ATM 515. Problems in Agricultural Technology Management.** (Var.) I, II, S. Problems in the application of technical principles to agricultural technology management. Pr.: Approval of instructor.

**ATM 520. Food Manufacturing Laboratory.** (2) I. Food manufacturing processes, quality and safety from raw materials to final packaged product. Three hours lab a week. Pr.: MATH 100 and ASI 305.

**ATM 540. Introduction to Food Engineering.** (3) I. Material and energy balances with application to food processing. Fluid flow and heat transfer in food processing. Thermodynamic properties and laws. Conc. enrollment in ATM 541 is urged. Three hours rec. a week. Pr.: PHYS 113 or 115, BIOCH 120 or CHM 190, MATH 210 or 205.

**ATM 541. Introduction to Food Engineering Laboratory Exercises.** (1) I. Laboratory experiments supplementing ATM 540. Three hours lab a week. Pr. or conc.: ATM 540.

**ATM 571. Functional Components of Machines.** (3) I. Machine components used to transmit power and perform functional operations in biological systems. Emphasis on fluid drive systems; gear, chain, belt, and power drives. Three hours rec. a week. Pr.: ATM 360.

**ATM 558. Soil Erosion and Sediment Pollution Control.** (3) II. Planning and analysis of production systems with respect to regulatory, environmental, and resource management. Water and wind erosion; estimating soil loss; estimating runoff rate and volume; laying out and checking terraces, waterways and farm ponds; agricultural surveying; and conservation planning. Two hours rec. and three hours lab a week. Pr.: AGRON 305.

**ATM 651. Grain and Forage Handling Systems.** (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.: ATM 160 or PHYS 113 or 115 and senior standing.

**ATM 653. Irrigation Practices.** (3) I. Principles and practices of irrigation involved in the setup and operation of various irrigation systems. Two hours rec. and three hours lab a week. Pr.: AGRON 305.

**ATM 661. Water and Waste in the Environment.** (3). II. Principles and practices surrounding: water source requirements; animal, processing plant, and human waste accumulation, handling, treatment and recycling; surface and groundwater contamination, protection and treatment. Three hours rec. a week. Pr.: CHM 110 or 210 and BIOL 198.

**ATM 703. Topics in Agricultural Technology Management.** (Var.). On sufficient demand. A course reserved for the study of current topics in agricultural systems and technology. Topics announced when offered. May be repeated to a maximum of nine credit hours. Pr.: Six credit hours of ATM courses.

## Agronomy

(Crops, soils, range, weed, water, and environmental sciences)

G. L. Posler,\* Head  
S. J. Thien,\* Assistant Head—Teaching  
D. A. Whitney,\* Extension State Leader

Professors Cox,\* Kilgore, Kirkham,\* Lamond,\* Liang,\* Maddux,\* Owensby,\* Paulsen,\* Posler,\* Regehr,\* Schapaugh,\* Sears,\* Shroyer,\* Skidmore,\* Stone,\* Swallow, Thien,\* Vanderlip,\* Welch,\* and Whitney;\* Associate Professors Armbrust,\* Bramel-Cox,\* Claassen, Devlin, Eberle, Ehler,\* Fick,\* Fjell, Havlin,\* Heer, Hickman, Janssen, Mikesell, Ohlenbusch, Peterson,\* Ransom,\* Rice,\* and Schwab;\* Assistant Professors Burchett, Duncan, Fritz,\* Gordon,\* Hagen,\* Ham,\* Horak,\* Kluitenberg,\* Kok, Marsh, Martin, Olson,\* Pierzynski,\* Skinner,\* Smail,\* and Thompson, Assistant Agronomist Roozeboom and Schaffer; Emeriti: Professors Barnett,\* Bidwell,\* Bieberly, Bohannon, Casady,\* Dicken, Edelblute, Heyne,\* Hobbs,\* Lyles,\* Mader,\* Russ,\* Smith,\* Sorenson,\* Wassom,\* Withee,\* and Woodruff;\* Associate Professors Atkinson, Overley, and Walter; Assistant Professors Lundquist and Moore; Instructor Dickerson.

## Agronomy

Bachelor of science in agriculture  
127 semester hours

Agronomy includes crop, soil, weed, range, and environmental sciences. Students in agronomy have diverse interests including crop production and physiology; crop breeding; soil management, fertility, and conservation; soil and water quality; physical and chemical properties of soils; forages; and range management.

### Requirements

Students majoring in agronomy are required to complete the following basic courses, plus those in the option that the student selects.

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 105	Public Speaking IA .....	2
GENAG 101	Ag Orientation .....	1
MATH 100	College Algebra .....	3
ECON 110	Principles of Macroeconomics .....	3
AGRON 220	Crop Science .....	4
AGRON 305	Soils .....	4
CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
Organic chemistry	.....	3-5
PHYS 115	Descriptive Physics .....	4
BIOL 198	Principles of Biology .....	4
	<b>or</b>	
BIOL 210	General Botany .....	4
ENTOM 300	Economic Entomology .....	3
AGRON 455	Computer Applications in Agronomy ....	3
KIN 101	Principles of Physical Fitness .....	1
Humanities and/or social sciences electives	.....	9
Communications elective	.....	2-3

### Options

Additional courses required for specific option:

#### Business and industry option

AGEC 120	Agricultural Economics and Agribusiness .....	3
	<b>or</b>	
ECON 120	Principles of Microeconomics .....	3
AGRON 330	Weed Management .....	3
AGRON 360	Crop Growth and Development .....	3
AGRON 375	Soil Fertility .....	3
AGRON 385	Soil Fertility Lab .....	2
Agronomy electives	.....	9

ASI 102	Principles of Animal Science .....	3
	<b>or</b>	
ASI 200	Fundamentals of Nutrition .....	3
STAT 350	Business and Economics Statistics I ....	3
Agricultural economics or business	.....	12
ACCTG 231	Accounting for Business Operations ...	3
PLPTH 500	Principles of Plant Pathology .....	3

One of the following:

BIOL 529	Fundamentals of Ecology .....	3
ASI 500	Genetics .....	3
AGRON 645	Soil Microbiology .....	4
BIOL 455	General Microbiology .....	4
BIOL 500	Plant Physiology .....	4

#### Crop consulting option

BIOL 529	Fundamentals of Ecology .....	3
AGRON 405	Internship in Agronomy .....	3
AGRON 716	Herbicide Interactions .....	3
	<b>or</b>	
AGRON 720	Weed Ecology .....	3
AGEC 120	Agricultural Economics/Agribusiness ...	3
	<b>or</b>	
ECON 120	Principles of Microeconomics .....	3
ENTOM 300	Economic Entomology .....	3
	<b>or</b>	
ENTOM 312	General Entomology .....	2
	<b>and</b>	
ENTOM 313	General Entomology Lab .....	1
ENTOM 612	Insect Pest Diagnosis .....	2
ENTOM 710	Insect Taxonomy .....	3
PLPTH 500	Principles of Plant Pathology .....	3
PLPTH 607	Plant Disease Diagnosis .....	2
PLPTH 613	Plant Disease Control .....	3
ATM 653	Irrigation Practices .....	3
Agricultural electives	.....	11-13
Business or economics elective	.....	2-3

#### Production option

AGRON 330	Weed Management .....	3
AGRON 360	Crop Growth and Development .....	3
AGRON 375	Soil Fertility .....	3
AGRON 385	Soil Fertility Lab .....	2
Agronomy electives	.....	9
ASI 500	Genetics .....	3
BIOL 500	Plant Physiology .....	4
STAT 340	Biometrics I .....	3
AGEC 120	Agricultural Economics and Agribusiness .....	3
	<b>or</b>	
ECON 120	Principles of Microeconomics .....	3
PLPTH 500	Principles of Plant Pathology .....	3
ACCTG 231	Accounting for Business Operations ....	3
	<b>or</b>	
AGEC 308	Farm and Ranch Management .....	3
ASI 102	Principles of Animal Science .....	3
	<b>or</b>	
ASI 200	Fundamentals of Nutrition .....	3
Agricultural technology management electives	.....	3-4

One of the following:

AGRON 645	Soil Microbiology .....	4
BIOL 455	General Microbiology .....	3
BIOL 529	Fundamentals of Ecology .....	3
GEOL 100	Introductory Geology .....	3

#### Range management option

MATH 150	Plane Trigonometry .....	3
PHYS 115	Descriptive Physics .....	4
	<b>or</b>	
PHYS 113	General Physics I .....	4
BIOL 500	Plant Physiology .....	4
BIOL 529	Fundamentals of Ecology .....	3
BIOL 551	Taxonomy of Flowering Plants .....	4
ENTOM 300	Economic Entomology .....	3
GEOL 100	Introductory Geology .....	3
POLSC 110	Introduction to Political Science .....	3
SOCIO 211	Introduction to Sociology .....	3
AGRON 501	Range Management .....	3
AGRON 515	Soil Genesis and Classification .....	3
AGRON 560	Field Identification of Range and Pasture Plants .....	1
AGRON 660	Range Research Techniques .....	3
AGRON 670	Range Management Problems .....	3
AGRON 681	Range Ecology .....	3

AGRON 790	Range Management Planning .....	3
ASI 102	Principles of Animal Science .....	3
ASI 515	Beef Science .....	3
AGEC 525	Natural Resource Environmental Economics .....	3

One of the following:

AGRON 762	Range Grasses .....	2
ASI 615	Range Livestock Management .....	2

#### Science option

AGEC 120	Agricultural Economics and Agribusiness .....	3
	<b>or</b>	
ECON 120	Principles of Microeconomics .....	3
AGRON 330	Weed Management .....	3
AGRON 360	Crop Growth and Development .....	3
AGRON 375	Soil Fertility .....	3
AGRON 385	Soil Fertility Lab .....	2
Agronomy electives	.....	9
PLPTH 500	Principles of Plant Pathology .....	3
BIOL 500	Plant Physiology .....	4
ASI 500	Genetics .....	3
	<b>or</b>	
GEOL 100	Introductory Geology .....	3
CHM 271	Chemical Analysis .....	4
STAT 340	Biometrics .....	3
MATH 150	Plane Trigonometry .....	3
MATH 220	Analytic Geometry and Calculus I .....	4
PHYS 113	General Physics I .....	4
PHYS 114	General Physics II .....	4

#### Soil and water science option

MATH 150	Plane Trigonometry .....	3
BIOL 303	Ecology/Environmental Problems .....	5
	<b>or</b>	
BIOL 500	Plant Physiology .....	4
BIOL 529	Fundamentals of Ecology .....	3
Mathematics or statistics elective	.....	3-4
GEOL 100	Introductory Geology .....	3
GEOL 130	Elementary Geology Laboratory .....	1
POLSC 110	Introduction to Political Science .....	3
AGEC 525	Natural Resources Environmental Economics .....	3
LAR 322	Environmental Ethics .....	3
AGRON 360	Crop Growth and Development .....	3
AGRON 375	Soil Fertility .....	3
AGRON 385	Soil Fertility Lab .....	2
AGRON 515	Soil Genesis and Classification .....	3
AGRON 635	Soil Conservation and Management .....	3
AGRON 645	Soil Microbiology .....	4
AGRON 746	Physical Properties of Soils .....	3
Humanities/social science elective	.....	3
Communications elective	.....	3

Two of the following:

CE/AGE 551	Hydrology .....	2
GEOL 520	Geomorphology .....	2
GEOG 705	Remote Sensing Environment .....	3
GEOG 725	Geog. Water Resources .....	3
PHYS 114	General Physics II .....	4

All students majoring in agronomy must take a minimum of 31 hours in agronomy, a portion of which can be tailored to their interests and career intentions.

Research center, laboratory, and greenhouse facilities are used by the Department of Agronomy for both research and instruction.

## Agronomy minor

Students enrolled in any primary undergraduate major will be admitted as a candidate for the agronomy minor program upon filing a notice of intent with the department's teaching office. Admission must be completed prior to enrollment in the course work identified in step #3 below to receive certification of the minor. Upon filing for admission, an agronomy advisor will be assigned to assist students in selecting course work.

To earn an undergraduate minor in agronomy, students are required to complete 16 or 17 credit hours consisting of the following courses:

1. AGRON 305 Soils (4).
2. AGRON 220 Crop Science (4) or AGRON 501 Range Management (3).
3. An additional 9 hours of agronomy courses numbered 300 or greater selected by the student in consultation with an agronomy advisor.

## Agronomy courses

### Undergraduate credit

**AGRON 220. Crop Science.** (4) I. Principles underlying practices used in the culture of corn, grain sorghum, wheat, and soybeans. A basic course for majors in agronomy and others interested in crop production. Three hours lec. and two hours lab a week. Not open to students with credit in HORT 201.

**AGRON 305. Soils.** (4) I, II. Fundamental chemical, physical, and biological properties of soils; their formation, fertility, and management. Three hours lec. and two hours lab a week. Pr.: CHM 210.

**AGRON 315. Properties of Soil.** (1) I, II. Soil development and classification and the nature of soil physical properties. Three hours lec. and two hours lab a week for first five weeks of the semester. Not open to agriculture majors.

**AGRON 330. Weed Management.** (3) I. For those interested in crop production, crop protection, and agricultural education. Considers the origin of weeds, their relations to crops, and control systems emphasizing cultural practices and herbicides. Includes weed identification. Two hours lec. and two hours lab a week.

**AGRON 335. Environmental Quality.** (3) I. An examination and survey of topics in environmental quality. Includes classification of soil, air, and water pollutants and their interaction with the environment, including the human food chain. Discussion of remediation techniques, risk assessment, and environmental legislation. Three lectures a week. Pr.: CHM 210.

**AGRON 340. Grain Grading.** (2) I. Procedures for grading grains, emphasizing soybeans, corn, wheat, and sorghum. Identification and evaluation of kernel damage and other conditions determining grades of these grains. Four hours lab a week.

**AGRON 350. Crop and Seed Quality.** (2) II. Identification of crops and weeds by seed and vegetative characteristics. Grain grading of soybeans, corn, sorghum, and wheat. Four hours lab a week.

**AGRON 360. Crop Growth and Development.** (3) I. Comparative growth and development of warm- and cool-season monocot and dicot crops. Environmental influences on growth and development processes and management techniques to minimize stresses. Three lec. a week. Pr.: AGRON 220 and 305.

**AGRON 375. Soil Fertility.** (3) II. Detailed information on the plant nutrition, soil fertility, and fertilizer management of the essential macro- and micronutrients. The influence of numerous soil biological, physical, and chemical properties on plant nutrient availability to crops will be emphasized. Three hours rec. a week. Pr.: AGRON 220 and 305.

**AGRON 385. Soil Fertility Laboratory.** (2) II. Detailed information on (1) the chemical methods utilized in routine soil testing and plant analysis, (2) field soil sampling techniques, (3) fertilizer recommendations, and (4) fertilizer response functions. Soil chemistry and computer laboratory exercises are designed to reinforce the theoretical principles presented in lectures. One hour lec. and two hours lab a week. Pr.: AGRON 375 or conc. enrollment.

**AGRON 400. Undergraduate Topics in Agronomy.** (1–3) I, II, S. Special topics in agronomy not completely treated in other courses. Pr.: Consent of instructor.

**AGRON 405. Internship in Agronomy.** (1–3) I. Intern programs in various areas of agronomy. One hour credit for each four weeks of supervised and evaluated work experience with cooperating employers. A maximum of 3 hours may be applied to a B.S. in agronomy. Pr.: AGRON 220 and 305.

**AGRON 415. Soils Judging.** (1) I. Techniques employed in writing descriptions of soil morphology and in classifying soils for intercollegiate soils judging. Six hours lab a week for the first half of the semester. Pr.: AGRON 305. May be repeated to a maximum of 2 hours.

**AGRON 420. Field Course in Weed Science.** (1) II. A laboratory and field course pertaining to weed identification, sprayer calibration, herbicide action, and herbicide performance. Pr.: AGRON 330 or equiv.

**AGRON 430. Tropical Agronomy.** (2) Intersession. A study of the soils and plant materials of tropical areas and the production of principal crops. Systems of agriculture and problems of agricultural production in tropical regions. Pr.: AGRON 220 or HORT 201 and AGRON 305.

**AGRON 455. Computer Applications in Agronomy.** (3) I, II. Application of computer technology to plant and soil science. Emphasis on use of current software in managing data and knowledge useful to crop production. Three hours lec. a week. Pr.: AGRON 220 and 305.

### Undergraduate and graduate credit in minor field

**AGRON 501. Range Management.** (3) I. Fundamental ecological principles of production, conservation, and use of grasslands. Application of these fundamental principles to range management. Three hours rec. a week.

**AGRON 515. Soil Genesis and Classification.** (3) II. Study of the factors and processes of soil formation, classification of soils according to soil taxonomy, and use of soil survey information. Required field trips. Two hours rec. and three hours lab a week. Pr.: GEOL 100 and AGRON 305 or consent of instructor.

**AGRON 520. Grain Production.** (3) II. An upper-level course for those interested in grain production in the Central Plains. Pest control, limiting factors, and planting factors will be considered in view of climatic conditions and crop plant growth habit. From this, a crop production strategy will be developed for each crop. Pr.: AGRON 220 and 375.

**AGRON 550. Forage Management and Utilization.** (3) II. Production and utilization of forage crops. Development of forage programs for livestock production, including pasture and stored forages. Three hours rec. a week. Pr.: AGRON 220 and junior standing.

**AGRON 551. Forage Management and Utilization Laboratory.** (1) II. Identification of forage species, techniques for estimating forage quality, forage physiology, and field trips. One two-hour lab a week. Pr.: Completion of or conc. enrollment in AGRON 550.

**AGRON 560. Field Identification of Range and Pasture Plants.** (1) I, in odd years. Identification of range pasture plants through exposure to them in their natural environment. Pr.: AGRON 220 or BIOL 210 or consent of instructor.

**AGRON 599. Agronomy—The Profession.** (1) II. An overview of opportunities, responsibilities, and challenges for the professional agronomist. Discussion of current topics and important issues in crops and soils, range management, and soil and water resources. Open only to seniors.

### Undergraduate and graduate credit

**AGRON 600. Crop Problems.** (Var.) I, II, S. Studies may be chosen in: genetics, crop improvement, forages, ecology, weed control, plant physiology, or crop production.

**AGRON 615. Soil Problems.** (Var.) I, II, S. Studies may be chosen in: chemistry, physics, conservation, fertility, genesis, morphology, or classification.

**AGRON 630. Principles of Crop Improvement.** (3) II. Basic plant breeding techniques used to genetically improve crops for use by man and procedures to increase, distribute, and maintain breeding stocks and varieties. Two lec. and one two-hour lab a week. Pr.: AGRON 220 and ASI 500.

**AGRON 635. Soil Conservation and Management.** (3) I. Principles, mechanics, and prediction of water and wind erosion. Influence of soil erosion on soil productivity and environmental quality. Conservation management technologies for erosion control and sustaining soil productivity. Legislation and land-use planning for soil conservation. Course requires microcomputer skills. Two hours rec. and 1 three-hour lab a week. Pr.: AGRON 305.

**AGRON 645. Soil Microbiology.** (4) I. The nature and function of soil microorganisms in the soil ecosystem. The role of soil microbial activity to soil organic matter, mineral transformations, plant nutrition, and environmental quality. Three hours rec. and two hours lab a week. Pr.: AGRON 305 or BIOL 455.

**AGRON 660. Range Research Techniques.** (3) I, in even years. Discussion of quantitative and qualitative procedures used to study vegetation. Includes application, advantages, and disadvantages of these methods. Use of statistical techniques for sampling, analysis, and presentation of data. Two hours rec. and one three-hour lab a week. Pr.: AGRON 501 and STAT 320.

**AGRON 670. Range Management Problems.** (Var.) I, II, S.

**AGRON 681. Range Ecology.** (3) II, in even years. Application of ecological principles to range ecosystem management. Study of plant-soil-animal interactions with rangelands, and discussion of plant succession, environmental influences, and ecological concepts. Two hours rec. a week and one lab credit consisting of field trips to representative range areas. Pr.: AGRON 501 and BIOL 529.

**AGRON 716. Herbicide Interactions.** (3) II, in even years. A study of systems and physiological processes in plants and soils as they affect herbicide fate and activity and are affected by herbicides. Research methodology and literature will also be discussed and evaluated. Pr.: AGRON 330 and BIOL 500 or equiv.

**AGRON 720. Weed Ecology.** (3) II, in odd years. A study of weed ecology topics including weed/crop interference, weed growth and development, herbicide resistance, biological control, and ecological approaches to weed management. Three lec. a week. Pr.: AGRON 330.

**AGRON 735. Plant Nutrient Sources.** (3) II. An examination and survey of plant nutrient sources. Includes the processes involved in the formulation of chemical fertilizers, the physical and chemical properties of various fertilizer materials, assessment of available nutrients in non-commercial fertilizer materials, and the relative environmental impacts of various plant nutrient sources. Three hours rec. a week plus two one-half day field trips. Pr.: AGRON 375.

**AGRON 746. Physical Properties of Soils.** (3) II. The properties of soils as affected by their physical environment, including water content, temperature, soil structure, and aeration. Two hours rec. and two hours lab a week. Pr.: AGRON 305.

**AGRON 762. Range Grasses.** (2) I, in even 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 or 210.

**AGRON 770. Plant Genetics.** (3) I. Concepts and application of basic genetic principles in higher plants. Probability, linkage, chromosome aberrations, aneuploidy analysis, gene transfer in wide crosses, tissue culture and crop improvement, and genetics of disease resistance. Three hours rec. a week. Pr.: ASI 500.

**AGRON 790. Range Management Planning.** (3) II, in odd years. Inventory and analysis of rangeland resources and development of detailed management plan. Emphasizes range management principles and practices useful in maximizing production from rangelands. Two hours rec. a week and one lab credit including field trips to ranch operations. Pr.: AGRON 501.

# Animal Sciences and Industry

Jack G. Riley,\* Head

Curtis L. Kastner,\* Research Coordinator

Larry R. Corah,\* State Leader Extension

Miles McKee, Teaching Coordinator

Professors Bolsen,\* Brazle,\* Brent,\* Call, Corah,\* Davis,\* Dikeman,\* Drake, Dunham, Fung,\* Harbers,\* Henderson, Hines,\* Hunt,\* Kastner,\* Kropf,\* Kuhl, McKee, Morrill,\* Nagaraja,\* Riley,\* Schafer, Schalles,\* Simms,\* Spaeth, Stevenson,\* and Zoellner; Associate Professors Brandt,\* Cochran,\* Jeon,\* Minton,\* Nelssen,\* Nichols, and Shirley; Assistant Professors Arns,\* Beyer, Blasi,\* Bolze, Boyle,\* Eck, Goodband,\* Grieger,\* Hancock,\* Hoover, Martin, Michaels, Phebus,\* Raub,\* Schaake, Schmidt,\* S. Smith,\* Swanson, Titgemeyer, Tokach,\* and Unruh;\* Instructors Jackson; Assistant Instructors Flaherty, Kayser, Krehbiel, and Scheele; Emeriti: Professors Adams, Bassette, Claydon, Craig, Cunningham, Farmer, Francis, Good, Kahrs, Koch, Moyer, Norton, Orwig, Richardson, Roberts, E. Smith, Ward, and Wheat.

## Animal sciences and industry

Bachelor of science in agriculture

127 semester hours

Courses in the department give instruction in selection, breeding, feeding, management, and marketing of beef and dairy cattle, horses, poultry, sheep, and swine, as well as instruction in the processing and use of the products these animals and birds provide. Options of study are available in animal products, business, communications, pre-veterinary/science, and production-management.

In addition to classrooms, office space, and laboratories located in Weber and Call Halls, the department maintains several animal and poultry units within easy access to the campus that house the beef and dairy cattle, horses, swine, sheep, and poultry used for teaching and research.

### General requirements

ENGL 100	Expository Writing I	3
ENGL 200	Expository Writing II	3
SPCH 105	Public Speaking IA	2
GENAG 101	Ag Orientation	1
MATH 100	College Algebra	3
ECON 110	Principles of Macroeconomics	3
CHM 210	Chemistry I	4
	or	
CHM 110	General Chemistry	3
	and	
CHM 111	General Chemistry Lab	1
KIN 101	Principles of Physical Fitness	1
BIOL 198	Principles of Biology	4
ASI 102	Principles of Animal Science	3
ASI 318	Fundamentals of Nutrition	3
ACCTG 231	Accounting for Business Operations	3
	or	
AGEC 308	Farm and Ranch Management*	3

Humanities and/or social sciences electives**	9
Communications elective**	3
ASI seminar elective**	1
*AGEC 308 may be substituted for ACCTG 231 in the production-management option only.	
**To be selected from the approved list in consultation with advisor.	

### Options

Additional courses required for specific options:

#### Animal products option

ASI 302	Introduction to Food Science	3
BIOL 455	Microbiology	4
CHM 230	Chemistry II	4
BIOCH 265	Introductory Organic and Biological Chemistry	5
Agriculture electives		4-8
Agricultural economics or business electives		6
Mathematics/statistics/computer science electives		6
ASI 103	Dairy Science	1
	or	
ASI 104	Poultry Science	1
	or	
ASI 105	Animal Sciences and Industry	1
ASI 411	Introductory Food Chemistry	3
ASI 607	Food Microbiology	4
ASI 725	Food Analysis	3

Select 20 hours from the following:

ASI 305	Fundamentals of Food Processing	3
ASI 315	Livestock and Meat Evaluation	3
ASI 350	Meat Science	3
ASI 361	Meat Processing	2
ASI 370	Principles of Meat Evaluation	2
ASI 395	Classification, Grading, and Selection of Meats	2
ASI 405	Fundamentals of Milk Processing	3
ASI 430	Food Products Evaluation	3
ASI 500	Genetics	3
ASI 502	Principles of Dairy Foods Processing	4
ASI 533	Anatomy and Physiology	4
ASI 599	Animal Science Internship	1-3
ASI 605	Fresh Meat Operations	3
ASI 610	Processed Meat Operations	2
ASI 630	Egg Science	2
ASI 635	Poultry Meat Technology	2
ASI 671	Meat Selection and Utilization	2
ASI 695	Quality Assurance of Food Products	3
ASI 777	Meat Technology	4
ATM 440	Introduction to Food Engineering Technology	3
ATM 441	Introduction to Food Engineering Technology Laboratory Exercises	1

Select one of the following:

ASI 515	Beef Science	3
ASI 524	Sheep Science	3
ASI 535	Swine Science	3
ASI 621	Dairy Cattle Management	3
ASI 645	Poultry Management	3
ASI 694	Food Plant Management	2

#### Business option

AGEC 120	Agricultural Economics and Agribusiness	3
ASI 500	Genetics	3
ASI 533	Anatomy and Physiology	4
ACCTG 241	Accounting for Investing and Financing	3

Agriculture electives

Business electives

Agricultural economics electives

Mathematics/statistics/computer science elective

ASI 103 Dairy Science

or

ASI 104 Poultry Science

or

ASI 105 Animal Sciences and Industry

ASI 320 Principles of Feeding

ASI 400 Farm Animal Reproduction

Select one of the following:

ASI 350 Meat Science

ASI 361 Meat Processing

ASI 601 Milk Secretion\*

ASI 630 Egg Science\*\*

Select one of the following:

ASI 315	Livestock and Meat Evaluation	3
ASI 405	Fundamentals of Milk Processing*	3
ASI 502	Fundamentals of Dairy Foods Processing*	4
ASI 550	Dairy Bacteriology*	4
ASI 635	Poultry Meat Technology**	2

Select two of the following:

ASI 515	Beef Science	3
ASI 521	Horse Science	3
ASI 524	Sheep Science	3
ASI 535	Swine Science	3
ASI 621	Dairy Cattle Management*	3
ASI 645	Poultry Management**	3

Required for dairy students\*:

ASI 396	Dairy Cattle Judging	2
ASI 510	Animal Breeding Principles	3
ASI 609	Dairy Cattle Nutrition	2

Required for poultry students\*\*:

ASI 310	Poultry Judging	2
ASI 614	Swine and Poultry Nutrition	2

#### Communications option

ASI 500	Genetics	3
ASI 533	Anatomy and Physiology	4
Agriculture electives		8-16
Agricultural economics or business elective		3
Mathematics/statistics/computer science elective		3
MC 235	Mass Communications in Society	3
MC 400	News and Feature Writing	3
MC 440	Editing and Design	3
MC 500	Advanced News and Feature Writing	3
MC 565	Law of Mass Communications	3
MC 305	Radio-Television and Society	3
Communications electives		6

ASI 103 Dairy Science

or

ASI 104 Poultry Science

or

ASI 105 Animal Sciences and Industry

ASI 300 Principles of Livestock Feeding

ASI 400 Farm Animal Reproduction

Select one of the following:

ASI 350	Meat Science	3
ASI 361	Meat Processing	2
ASI 601	Milk Secretion	3
ASI 630	Egg Science	2

Select one of the following:

ASI 315	Livestock and Meat Evaluation	3
ASI 405	Fundamentals of Milk Processing	3
ASI 550	Dairy Bacteriology	4
ASI 635	Poultry Meat Technology	2

Select one of the following:

ASI 510	Animal Breeding Principles	3
ASI 655	Behavior of Domestic Animals	3
ASI 735	Environmental Physiology of Farm Animals	3

Select two of the following:

ASI 515	Beef Science	3
ASI 521	Horse Science	3
ASI 524	Sheep Science	3
ASI 535	Swine Science	3
ASI 621	Dairy Cattle Management	3
ASI 645	Poultry Management	3

#### Pre-veterinary/science option

ASI 103	Dairy Science	1
ASI 104	Poultry Science	1
ASI 105	Animal Sciences and Industry	1
ASI 320	Principles of Feeding	3
ASI 400	Farm Animal Reproduction	4
Agriculture electives		9
Agricultural economics or business elective		3

Select 7 hours from the following:

ASI 500	Genetics	3
ASI 533	Anatomy and Physiology	4
BIOL 455	Microbiology	4
BIOL 510	Embryology	3
BIOL 511	Embryology Laboratory	1

Select 12 hours from the following:

CHM 230	Chemistry II .....	4
CHM 350	General Organic Chemistry .....	3
CHM 351	General Organic Chemistry Laboratory .....	2
BIOCH 365	Elementary Biochemistry .....	3
BIOCH 521	General Biochemistry .....	3
BIOCH 522	General Biochemistry Laboratory .....	2

Select two of the following:

PHYS 113	General Physics I .....	4
PHYS 114	General Physics II .....	4
STAT 340	Biometrics I .....	3
MATH 205	General Calculus and Linear Algebra ...	3
MATH 210	Technical Calculus I .....	3
MATH 220	Analytic Geometry and Calculus I .....	4

Select one of the following:

ASI 350	Meat Science .....	3
ASI 361	Meat Processing .....	2
ASI 601	Milk Secretion .....	3
ASI 630	Egg Science .....	2

Select one of the following:

ASI 315	Livestock and Meat Evaluation .....	3
ASI 405	Fundamentals of Milk Processing .....	3
ASI 550	Dairy Bacteriology .....	4
ASI 635	Poultry Meat Technology .....	2

Select one of the following:

ASI 510	Animal Breeding Principles .....	3
ASI 655	Behavior of Domestic Animals .....	3
ASI 735	Environmental Physiology of Farm Animals .....	3

Select two of the following:

ASI 515	Beef Science .....	3
ASI 521	Horse Science .....	3
ASI 524	Sheep Science .....	3
ASI 535	Swine Science .....	3
ASI 621	Dairy Cattle Management .....	3
ASI 645	Poultry Management .....	3

#### Production-management option

AGEC 120	Agricultural Economics and Agribusiness .....	3
ASI 500	Genetics .....	3
ASI 533	Anatomy and Physiology .....	4
BIOCH 265	Introductory Organic and Biological Chemistry .....	5
Agriculture electives	.....	6-12
Agricultural economics or business electives	.....	12
Mathematics/statistics/computer science elective	.....	3
ASI 103	Dairy Science .....	1
ASI 104	Poultry Science .....	1
ASI 105	Animal Sciences and Industry .....	1
ASI 320	Principles of Feeding .....	3
ASI 400	Farm Animal Reproduction .....	4
ASI 510	Animal Breeding Principles .....	3

Select one of the following:

ASI 350	Meat Science .....	3
ASI 361	Meat Processing .....	2
ASI 601	Milk Secretion* .....	3
ASI 630	Egg Science** .....	2

Select one of the following:

ASI 315	Livestock and Meat Evaluation .....	3
ASI 405	Fundamentals of Milk Processing* .....	3
ASI 502	Principles of Dairy Foods Processing* .....	4
ASI 550	Dairy Bacteriology* .....	4
ASI 635	Poultry Meat Technology** .....	2

Select three of the following:

ASI 515	Beef Science .....	3
ASI 521	Horse Science .....	3
ASI 524	Sheep Science .....	3
ASI 535	Swine Science .....	3
ASI 621	Dairy Cattle Management* .....	3
ASI 645	Poultry Management** .....	3
ASI 655	Behavior of Domestic Animals .....	3

Required for dairy students\*

ASI 396	Dairy Cattle Judging .....	2
ASI 609	Dairy Cattle Nutrition .....	2

Required for poultry students\*\*

ASI 310	Poultry Judging .....	2
ASI 614	Swine and Poultry Nutrition .....	2

\*For students pursuing dairy interest

\*\*For students pursuing poultry interest

## Animal sciences and industry minor

An academic minor in animal sciences and industry can be completed by completing a minimum of 15 hours of credit with the ASI designation. A minimum of two courses must be at the 300 level or above. An additional two courses must be at the 500 level or above. The courses that comprise the minor will be determined by an advisor in the Department of Animal Sciences and Industry and the student doing the work.

## Animal sciences and industry courses

### Undergraduate credit

**ASI 061. Concepts and Practices in Animal Science.** (1-3) I, II, S. Individual work in the various fields of study available in animal sciences and industry.

**ASI 102. Principles of Animal Science.** (3) I, II. Basic principles which apply to animal agriculture; survey of the industry; types, purposes, and products of livestock; principles of breeding, selection, nutrition, lactation, reproduction, management, and marketing. Three hours rec. a week. ASI 103, 104, and 105 are companion courses.

**ASI 103. Dairy Science.** (1) I, II. Application of basic principles of animal agriculture to dairying. Two hours lab a week. Pr.: ASI 102 or conc. enrollment.

**ASI 104. Poultry Science.** (1) I, II. Application of basic principles of animal agriculture to the poultry industry. Two hours lab a week. Pr.: ASI 102 or conc. enrollment.

**ASI 105. Animal Sciences 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 a week. Pr.: ASI 102 or conc. enrollment.

**ASI 110. Bovine Artificial Insemination.** (1) On sufficient demand. Designed to make student proficient in artificially inseminating the cow.

**ASI 201. History and Attitudes of Animal Use.** (3) II. An introduction to the heritage of the livestock industry; the symbiotic bond between humans and animals; the contributions from animals of food, fiber, work, and recreation; animal well being; the interaction of livestock production and the environment; and raising issues about the ethics of using animals for research, food, and recreation. Three hours of lec./rec. per week. Interactive discussion will be emphasized. No prerequisites.

**ASI 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 ASI majors other than communication option. Student cannot apply credit for both ASI 300 and 320 toward a B.S. degree. Pr.: CHM 110 and CHM 111 or equiv.

**ASI 301. Farrier Science.** (2) I. Application of farrier's principles and practices. The anatomy and physiology of the lower leg and hoof are thoroughly studied and basic static and dynamic biomechanics of the horse are addressed. Corrective, therapeutic and performance, and specific shoeing and trimming techniques are practiced. One hour lecture and four hours lab a week. Pr.: Consent of instructor.

**ASI 302. Introduction to Food Science.** (3) I, II. This course is the beginning course in food science designed to acquaint the student with the breadth and scope of the food industry and the role of science in the preservation, processing, and utilization of foods. Three hours lec. a week.

**ASI 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. Food science and industry majors should take before the senior year. Taught in cooperation with the Departments of Horticulture, and Grain Science and Industry. Pr.: A course in chemistry.

**ASI 310. Poultry and Poultry Product Evaluation.** (2) I, in even years. Apply knowledge of physical and anatomical characteristics for evaluating poultry for egg and meat production. Evaluation of ready-to-cook poultry products as well as eggs on their exterior, interior, and broken-out appearance according to the latest USDA standards. Two two-hour labs a week. Pr.: ASI 104.

**ASI 315. Livestock and Meat Evaluation.** (3) I, II. Evaluation of slaughter livestock and their carcasses as related to economically efficient production of red meat. Evaluation of breeding livestock on visual appraisal and performance records. A study of growth and the effects of nutrition, environment, and hormones on growth patterns. Breeds of livestock and performance programs will be studied. One hour lec. and four hours lab a week. Pr.: ASI 102 and 105; or consent of instructor.

**ASI 318. Fundamentals of Nutrition.** (3) I, II. Elementary principles of comparative nutrition of farm animals. Three hours rec. a week. Pr.: BIOCH 120 or CHM 350.

**ASI 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.: ASI 318.

**ASI 325. Conformation and Performance Appraisal of Horses.** (2) II. Evaluation of conformation and athletic performance of horses. The use of records in selection and the influence of heredity, environment, and training on conformation and performance is addressed. Students will learn to give an oral justification of their evaluations. Four hours lab a week.

**ASI 340. Principles of Meat Science.** (2) I, II, S. An overview of the meat industry for off-campus students using a videotaped format. Food science and animal science majors cannot substitute this course for ASI 350. Pr.: A course in biology is recommended.

**ASI 345. Beginning Horse Training and Management.** (2) I. Inherited and learned behavior of the horse. Development of methods to communicate with the horse. Emphasis on handling and safety techniques. Opportunities to observe and practice advanced training techniques used in saddling and riding. Four hours lab a week.

**ASI 350. Meat Science.** (3) I, II. An introduction to the red meat industry relating the fundamental properties of muscle structure, chemistry, and physiology to meat quality, composition, processing, nutritional value, and marketing. The laboratory will demonstrate the conversion of animals to meat and by-products, and meat processing technology. Two hours lec. and two hours lab a week. Pr.: BIOL 198.

**ASI 361. Meat Processing.** (2) I, II. A student participation course in processing live animals into meat and by-products. Interrelates all phases of modern slaughter techniques, inspection, and related operations. Pr.: ASI 350.

**ASI 370. Principles of Meat Evaluation.** (2) I. The use of subjective and objective standards to evaluate beef, lamb, and pork carcasses and wholesale cuts for both quality and yield of edible portion as they relate to value and consumer acceptance.

**ASI 385. Wool Grading and Evaluation.** (1) I. A study of factors determining the commercial grades of wool and the desired fleece qualities of sheep, practice in judging and grading wool. Three hours lab a week. Pr.: ASI 102.

**ASI 395. Classification, Grading, and Selection of Meats.** (2) 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.: ASI 370.

**ASI 396. Dairy Cattle Judging.** (2) II. An introduction to the principles of evaluating dairy cattle on the basis of their physical characteristics. Interpretation of the official dairy cow unified score card. Training includes preparation and

presentation of oral defense on one's placing of four cow classes. Pr.: ASI 102 and 103.

**ASI 399. ASI Quadrathlon.** (1) II. Active participation in the ASI Quadrathlon involving oral presentations, written exams, practical application of animal knowledge, and a quiz bowl. Fifteen hours for presentations will be designated each spring. No more than 2 credits earned in this course may apply towards graduation.

**ASI 400. Farm Animal Reproduction.** (4) I. Basic reproductive anatomy and physiology of cattle, horses, pigs, poultry, and sheep during the first half of the semester provides a solid basis for reproduction management topics which occupy the second half of the course. Three hours rec. and three hours lab a week. Pr.: ASI 102.

**ASI 405. Fundamentals of Milk Processing.** (3) II, in odd years. A study of fundamentals of processing, quality assurance, inspection, and marketing of fluid milk and related products in a modern market milk enterprise. Two hours lec. and one three-hour lab a week. Pr.: One course in microbiology.

**ASI 411. Introductory Food Chemistry.** (3) II. Chemical structures of major food components and the chemical reactions occurring during storage and processing. Two hours lec. and three hours lab a week. Pr.: CHM 350 and BIOCH 521.

**ASI 420. Advanced Dairy Cattle Judging.** (1) I. Three hours lab a week. Pr.: ASI 396.

**ASI 422. Livestock Sales Management.** (1) On sufficient demand. Hands-on experience in the planning, promotion, and production of a purebred livestock sale. Pr.: Junior standing.

**ASI 430. Food Products Evaluation.** (3) II. Fundamentals of sensory evaluation of dairy, poultry products, meat, and other agricultural food products. Study of taste, smell, texture, visual appearance, and other senses related to organoleptic examination and its application to the food processing industry. Introduction to sensory testing methods, including sampling techniques and test forms. Two hours lec. and two hours lab a week. Pr.: ASI 302.

**ASI 445. Advanced Horse Training and Management.** (2) II. Students will further develop skills acquired in ASI 345. Students will learn how to utilize advanced training practices and applications to enhance the training and performance of horses. Four hours lab a week. Pr.: ASI 345.

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

**ASI 470. Form and Function in Livestock.** (2) I. A detailed study of animal form and type; influence of type upon function; special training in presenting orally the relative merits of animals of all breeds. Pr.: ASI 450.

**ASI 490. Microcomputer Applications in Animal Sciences and Industry.** (3), I, II. Applications of microcomputer techniques to the solutions of problems in animal science and related food industries. Includes use of existing software packages for breakeven analysis, animal identification and health records, feed ration analysis, farm/ranch accounting, and electronic communication with agriculture computer services. Current trends in farm computer use (hardware and software) will also be covered. Two hours lec. and two hours lab a week. Pr.: Junior standing.

### Undergraduate and graduate credit in minor field

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

**ASI 502. Principles of Dairy Foods Processing.** (4) II, in even years. 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. Three hours lec. and one three-hour lab a week. Pr.: A course in microbiology and ASI 411.

**ASI 503. Topics in Comparative Pathology.** (1–3) I, II, S. Selected topics in diseases of laboratory animals, wildlife, and fish for non-veterinary students. Pr.: BIOL 198. Same as AP 500.

**ASI 504. Equine Reproduction Management.** (2) II. Theory and practice in reproductive management and breeding techniques of the horse. Includes basic reproductive physiology of the stallion and mare, demonstration and practice in semen collection and processing, teasing systems, natural and artificial breeding techniques, management, and record keeping. Six hours lab a week. Pr.: ASI 400 and senior standing.

**ASI 510. Animal Breeding Principles.** (3) I, II. The genetic principles in evaluation, selection, and mating systems used in beef, dairy, sheep, swine, poultry, and horse breeding. Intended for ASI majors. Three hours lec. a week. Pr.: ASI 500.

**ASI 512. Gestation of Farm Animals.** (2) I. A detailed study of gestation using the bovine as a model. Lecture covers factors affecting the physiological events of gestation and management of the pregnant animal. The laboratory provides practical training in following the development of the bovine fetus in utero. Pr.: Senior standing and consent of instructor.

**ASI 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, risk management, merchandising, and related areas. Special emphasis on management systems of raising, growing, and finishing beef cattle. Pr.: Senior standing.

**ASI 521. Horse Science.** (3) II. 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.: Junior standing.

**ASI 524. Sheep Science.** (3) I. Application of scientific management principles to the sheep industry. Breeding, reproduction, nutrition, health, facilities, and economic aspects as related to sheep production. Two hours lec. and two hours lab a week. Pr.: Junior standing.

**ASI 533. Anatomy and Physiology.** (4) II. General anatomy and physiology of the domestic animals. Three hours rec. and three hours lab a week. Same as AP 530.

**ASI 534. Introduction to Pharmacology of Farm Animals.** (2) II, in even years. The study of the basic principles of pharmacology as related to the proper and safe use of drugs and chemicals by the livestock industry. Same as AP 531.

**ASI 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 management of swine production units of varying sizes. Two hours lec. and two hours lab a week. Pr.: Senior standing.

**ASI 540. 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.: ASI 533. Same as SM 540.

**ASI 550. Dairy Bacteriology.** (4) I. 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 a week. Pr.: BIOCH 265 or equiv.

**ASI 580. Animal Sciences and Industry Seminar.** (1) I. Open only to senior students majoring in animal sciences and industry. One hour rec. a week.

**ASI 581. Dairy Seminar.** (1) II. Study of dairy periodicals, bulletins, literature, and current research. Written and oral presentation of information on a dairy topic will be required of all students. One hour rec. a week. Pr.: Junior standing in dairy production.

**ASI 599. Animal Science Internship.** (1–6) I, S. Industry work-study experiences in beef cattle, sheep, dairy cattle, swine, horse, or poultry production operations or in animal food products plants. Pr.: Permission of supervising faculty member.

### Undergraduate and graduate credit

**ASI 601. Milk Secretion.** (3) I. Anatomy and histology of the mammary gland. Physiology of lactation, milk constituents, and management practices that alter quality and quantity. Contemporary milking practices and mastitis control. Two hours lec. and two hours lab a week. Pr.: ASI 103, 318, and 533.

**ASI 605. Fresh Meat Operations.** (3) I. Provides information and exposure to fresh meat operations, including: fabrication, yields, costs, quality assurance, packaging, marketing of fresh meat and by-products. Two hours lec. and three hours lab a week. Pr.: ASI 350.

**ASI 606. Instrumental Analysis of Food and Agricultural Products.** (2) Spring intersession. A two-week course presenting modern instrumental methods currently available for analysis of food and agricultural products. Pr.: PHYS 115 and BIOCH 201.

**ASI 607. Food Microbiology.** (4) I. This course deals with the identification, enumeration, and characterization of bacteria, yeast, and mold associated with foods and food processing. Effects of physical and chemical agents on microorganisms will be studied. Microbiological problems in food spoilage, food preservation, food fermentation, and food-borne diseases will be discussed. Two hours lec. and two two-hour labs a week. Pr.: BIOL 455.

**ASI 609. Dairy Cattle Nutrition.** (2) I. Application of principles of nutrition to feeding dairy cattle; least cost formulation of balanced rations; discussion of current dairy cattle nutrition research. One hour lec. and two hours lab a week. Pr.: ASI 320.

**ASI 610. Processed Meat Operations.** (2) II. An intensive course in processed meats, relating the science, technology, and quality control of curing, smoking, and sausage manufacture. One hour rec. and two hours lab a week. Pr.: ASI 350.

**ASI 611. Beef Cattle and Sheep Nutrition.** (2) II. A detailed study of the nutrient requirements of beef cattle and sheep for various stages of growth, reproduction, and lactation. Emphasis will be given to interrelationships between nutrition, disease, management, and environment. Diets will be formulated using a wide range of feed ingredients to produce optimum production at minimum cost. Current beef cattle and sheep nutrition research will also be reviewed. One hour lec. and two hours lab a week. Pr.: ASI 320.

**ASI 612. Horse Nutrition.** (2) I. A detailed study of the nutrient requirements of horses for various stages of growth, work, reproduction, and lactation. Ration formulation using various feed ingredients. Relationships among nutrition, feed-related diseases, environment, and management. Review of current horse nutrition research. One hour lec. and two hours lab a week. Pr.: ASI 320.

**ASI 614. Swine and Poultry Nutrition.** (2) I. A detailed study of nutrient requirements of swine and poultry, for various stages of production. Lectures will include interrelationships between nutrition and other factors (environment, management, and disease) that affect performance. Labs will emphasize evaluation of feed ingredients, diets, premixes, and base mixes. One hour lec. and two hours lab a week. Pr.: ASI 320.

**ASI 615. Range Livestock Nutrition and Management.** (2) II. A detailed study of nutritional management concepts relevant to range livestock production. Emphasis will be directed toward discussion of range forage quality, range forage intake, nutrient requirements of range livestock, supplementation systems, grazing systems, computer-aided management procedures, stocking rates, and reproductive management. Two hours lec. a week. Pr.: ASI 320.

**ASI 620. Livestock Production and Management.** (2) II. Student involvement in laboratory exercises related to practical livestock production and management. One hour rec. and four hours lab a week. Pr.: Appropriate ASI course (515, 521, 525, or 535).

**ASI 621. Dairy Cattle Management.** (3) II. Integration of agronomic, biologic, and economic aspects of dairying with dairy farm layout, planning, operation, and analysis. A field study trip and a dairy farm analysis report are required. Two hours rec. and two hours lab a week. Pr.: ASI 102 and 103 and senior standing.

**ASI 630. Egg Science.** (2) I, in even years. Emphasis on the technical problems in processing and distribution of shell eggs and egg products. This course covers the chemistry and microbiology of shell eggs and egg products. Processing operations and basic principles of quality assurance are covered. Importance of new product development is discussed. Pr.: ASI 104 and 302.

**ASI 635. Poultry Meat Technology.** (2) II, in odd years. Emphasis on the many technical problems that exist between production and consumption during the processing and marketing of poultry meat and poultry meat products. Two hours lec. a week. Pr.: ASI 104 and 302.

**ASI 645. Poultry Management.** (3) II, in odd years. A detailed study of the production and management practices involved in commercial poultry and game bird enterprises. Two hours rec. and one three-hour lab a week. Pr.: ASI 102, 104, and junior standing.

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

**ASI 661. Animal Sciences and Industry Problems.** (1-3) I, II, S. Work offered in: animal breeding, animal nutrition, beef cattle production, dairy production, horse production, livestock evaluation, meats, poultry, sheep production, swine production. Pr.: Consent of instructor.

**ASI 671. Meat Selection and Utilization.** (2) I. Emphasis on meat cut selection criteria and identification, grades, fabricated meat, institutional cuts, specification writing, preservation, and meat preparation. One hour lec.-rec. and two hours lab a week. Pr.: CHM110 and CHM 111.

**ASI 694. Food Plant Management.** (2) I. 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. Pr.: Junior standing.

**ASI 695. Quality Assurance of 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. Two hours rec. and one three-hour lab a week. Pr.: One course in bacteriology.

**ASI 702. Animal Nutrition and Diet Formulation.** (2) I. Application of basic nutrition principles, diet formulation, and diet adequacy for livestock, poultry, pets, and exotic animals. Includes practical feeding problems encountered by producers and veterinarians. Pr.: ASI 318 and first-year standing in the College of Veterinary Medicine.

**ASI 710. Physiology of Reproduction in Farm Animals.** (3) I. This course offers an in-depth study of the physiological aspects of reproduction in farm animals including endocrine interrelationships controlling reproductive cycles and gamete production. Periodic demonstrations deal with specialized reproductive anatomy of farm animals, experimental techniques used in animal reproduction, and contemporary animal production practices. Three hours lec. a week. Pr.: ASI 400.

**ASI 713. Rapid Methods and Automation in Microbiology.** (2) Spring intersession. Rapid methods and automation is a dynamic area in applied microbiology dealing with the study of improved methods in the isolation, detection, characterization, and enumeration of microorganisms and their products in clinical, food, industrial, and environmental samples. The knowledge and techniques of this course are useful for students interested in medical, food, industrial, and environmental microbiology for early detection of beneficial as well as harmful microorganisms in their work.

**ASI 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.: BIOCH 521, 522.

**ASI 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.: BIOCH 521, 522.

**ASI 720. Anaerobic Bacteriology.** (2) II, in even years. Study of anaerobic bacteria, anaerobiosis, description of anaerobic techniques, and physiology and biochemistry of anaerobes of natural environment including gastrointestinal tract, and of veterinary, medical, and industrial importance. Two hours lec. a week. Same as BIOL 720. Pr.: BIOL 455.

**ASI 725. Food Analysis.** (3) I. Principles, methods, and techniques necessary for quantitative, physical, and chemical analyses of food and food products. The analyses will be related to standards and regulations for food processing. Two hours lec. and three hours lab a week. Pr.: ASI 411.

**ASI 730. Silage Technology.** (2) I. A study of silage fermentation, nutrient conservation, aerobic deterioration process, factors affecting silage quality, and chemical analysis used to evaluate silage. Discussion of techniques used in silage research and assigned readings within the silage literature. Two hours lec. a week. Pr.: ASI 320.

**ASI 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. a week with frequent laboratory demonstrations. Pr.: AP 530.

**ASI 749. Advanced Animal Breeding.** (3) II. Application of genetic principles to livestock improvement, selection methods, mating systems, heritability estimates, and methods of analyzing genetic data. Three hours lec. a week. Pr.: ASI 500 and three hours in statistics.

**ASI 750. Poultry Seminar.** (1) I, in even years. Required of all students majoring in poultry science. Also required of graduate students. One hour rec. or conference a week. Pr.: ASI 102 and 104.

**ASI 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.: ASI 350 and 361; senior or graduate standing.

**ASI 799. Graduate Internship in Animal Sciences and Industry.** (1-4) I, S. In-depth work-study experiences in beef cattle, sheep, dairy cattle, swine, horse, or poultry production operations or in animal food products plants. Pr.: Permission of supervising faculty member.

## Communications

R. R. Furbee, Head

Professors Brandsberg, Sullins and Titus; Associate Professors Atkinson, Baker, Buchanan, Frank, Furbee, Jorgensen, McGlashon, Terry, Ward and Wright; Instructors Ballou and Ransom; Emeriti Professors Burke, Graham, Medlin, Thomas, Unruh and Warner; Associate Professors Dexter and Peck; Assistant Professors Kuehn, Nelson and Tennant.

### Agricultural journalism

Bachelor of science in agriculture  
127 semester hours

The agricultural journalism major prepares students for various communications positions in newspaper, magazine, radio-television, public relations and agricultural information. Students in agricultural journalism have access to the Associated Press wire service, FM radio facilities, desktop publishing equipment, television studio and portable equipment, and photographic equipment and laboratory.

Enrollment in all skills courses in the A.Q. Miller School of Journalism and Mass Communications requires a minimum of 2.5 GPA based on completion of at least 30 hours at the 100 level or above.

Students majoring in the curriculum take the following courses:

#### General requirements

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing I .....	3
SPCH 105	Public Speaking 1A .....	2
GENAG 101	Ag Orientation .....	1
MATH 100	College Algebra .....	3
ECON 110	Principles of Macroeconomics .....	3
CHM 210	Chemistry I .....	4
	or	
CHM 110	General Chemistry .....	3
	and	
CHM 111	General Chemistry Lab .....	1
KIN 101	Principles of Physical Fitness .....	1
	Humanities and/or social sciences .....	12

#### Departmental requirements

Students must complete a total of 30 credit hours in agricultural courses. Area requirements are:

##### Agriculture core

Select any four courses from the following:

AGRON 305	Soils .....	4
HORT 201	Introductory Horticultural Science .....	4
	or	
AGRON 220	Crop Science .....	4
ASI 102	Principles of Animal Science .....	3
AGEC 120	Agricultural Economics and Agribusiness .....	3
	Any course in agricultural engineering	
ENTOM 300	Economic Entomology .....	3
	or	
ENTOM 305	Livestock Entomology .....	2
	or	
ENTOM 320	Horticultural Entomology .....	3
PLPTH 500	Principles of Plant Pathology .....	3
FOR 375	Introduction to Natural Resource Management .....	3
ASI 302	Introduction to Food Science .....	3

##### Biological sciences

Required:

BIOL 198	Principles of Biology .....	4
	or	
BIOL 210	General Botany .....	4

One of the following:

ASI 500	Genetics .....	3
BIOL 201	Organismic Biology .....	3
BIOL 220	Bacteriology and Man .....	3
BIOL 303	Ecology of Environmental Problems .....	3

##### Statistics and computer science

Select one of the following:

CIS 110	Introduction to Personal Computing .....	3
CIS 200	Fundamentals of Computer Programming .....	2
	and	
	Computer language lab (200 level) .....	2
STAT 340	Biometrics I .....	3
STAT 350	Business and Economic Statistics I .....	3
	or	
STAT 330	Elementary Statistics for the Social Sciences .....	3

##### Physical science

Select one course from the following:

BIOCH 265	Introductory Organic and Biological Chemistry .....	5
BIOCH 201	Elementary Biochemistry .....	3
BIOCH 521	General Biochemistry .....	3
CHM 230	Chemistry II .....	4
CHM 350	General Organic Chemistry .....	3

CHM 531	Organic Chemistry 1 .....	3
GEOL 100	Introductory Geology .....	3
GEOG 220	Environmental Geography 1 .....	4

<b>Business administration and agricultural economics</b>		
Required:		
ACCTG 231	Accounting for Business Operations .....	3

One of the following:		
ACCTG 241	Accounting for Investing and Financing .....	3
AGEC 318	Agribusiness Management .....	3
ECON 530	Money and Banking .....	3
ECON 631	Principles of Transportation .....	3
MANGT 390	Business Law 1 .....	3
MANGT 420	Management Concepts .....	3
MKTG 400	Marketing .....	3
MKTG 542	Sales Management .....	3
All other courses in AGECE with a 300 or higher course number.		

**Agricultural specialization**  
In consultation with the advisor, the student will decide to study one area of agriculture in depth. The student will take two courses above the introductory level (advanced courses are defined as those with a prerequisite in that agriculture department).

**Agricultural electives**  
Students may choose any other courses in the College of Agriculture to complete the 30 hours of agriculture.

**Journalism**  
Students must complete a minimum of 30 hours in journalism and mass communications courses. Maximum journalism hours allowed is 36.

**Journalism core**  
These 18 hours are required of all students. Enrollment in all skills courses requires a minimum of 2.5 GPA based on completion of at least 30 hours at the 100 level or above.

MC 235	Mass Communication in Society
MC 400	News and Feature Writing
MC 440	Editing and Design
MC 500	Advanced News and Feature Writing
MC 565	Law of Mass Communications
MC 710	History of Journalism
or	
MC 720	Ethics in Mass Communications

**Journalism electives**  
The remaining 12 to 18 hours in journalism may be chosen by the students in consultation with the faculty advisor.

# Entomology

C. Michael Smith, Head

Professors Bauernfeind, Beeman,\* Blocker,\* Broce,\* Brooks, Cress,\* Elzinga,\* Harvey,\* Hatchett,\* Hopkins,\* McGaughey,\* Mock,\* Reese,\* Sloderbeck, and Wilde;\* Associate Professors Buschman,\* Hagstrum,\* Higgins,\* Lippert, Margolies,\* and Nechols;\* Assistant Professors Charlton,\* Dover,\* Dowdy,\* Flinn,\* Kambhampati,\* and Loudon; Emeriti: Professors Gates, DePew, Horber, Mills, and Thompson.

Entomology is the study of insects and related arthropods. Applied entomology stresses their relations to plants and animals, including humans. Courses fall into two groups: broad, general courses suitable for any student; and professional courses that provide training for research, teaching, and administration in colleges, experiment stations, health services, government agencies, industry, foundations, and private practice.

Students majoring in other fields may have a special interest in entomology as part of their curriculum. Courses 300 or 312 and 313 or 314 or 305 are recommended.

## Entomology minors

The Department of entomology offers an undergraduate academic minor in entomology. This minor enables students to diversify their educational experience and provides a group of core courses that complement other academic programs, especially those in related agricultural disciplines such as horticulture, animal science, grain science, and agronomy, or in biology. To pursue a minor in entomology students must: 1) file a declaration of intent to pursue the minor and 2) consult an entomology advisor prior to taking the last three courses used to satisfy the minor requirements. Advisors not only ensure that requirements of the minor are met but also tailor course work to the interests, educational aims, and employment goals of the individual student.

**General requirements**  
At least 15 credit hours as outlined below.

The following courses are required:		
ENTOM 710	Insect Taxonomy .....	3
ENTOM 312	General Entomology .....	2
and		
ENTOM 313	General Entomology Lab .....	1
or		
ENTOM 300	Economic Entomology .....	3
or		
ENTOM 320	Horticultural Entomology .....	3
or		
ENTOM 305	Livestock Entomology .....	2
and		
ENTOM 306	Livestock Entomology Lab .....	1
		6

At least 9 credit hours from Block A and/or Block B are also required. Courses offered outside the Department of Entomology (Block B) can count toward the minor if they are requirements/electives of specific curricula or if prior approval is obtained from the minor advisor.

Block A: Entomology courses		
ENTOM 620	Insecticides: Propert. and Law .....	2
ENTOM 692	Insect Ecology .....	2
ENTOM 667	Insect Pest Management .....	3
ENTOM 706	External Insect Morphology .....	3
ENTOM 799	Problems in Entomology: .....	1-3
	Insect Behavior .....	3
	Insect Ecology .....	3
	Insect Genetics .....	3
	Insect Physiology .....	3
	Biological Control .....	3
	Insect Control by Host	
	Plant Resistance .....	3
	Insects of Stored Products .....	3
	Seminar: Special Topics .....	1

**Block B: Courses offered by other departments**  
The following, or other minor advisor-approved courses may count toward the minor.

BIOL 455	General Microbiology .....	4
BIOL 529	Fundamentals of Ecology .....	3
BIOL 612	Introductory Limnology .....	4
BIOL 625	Animal Parasitology .....	4
BIOL 697B	Behavioral Ecology .....	3
GRSC 651	Food and Feed Plant Sanitation .....	4
HORT 582	Horticultural Pest Management .....	3
PLPATH 500	Principles of Plant Pathology .....	3
PLPATH 607	Plant Disease Diagnosis .....	2

**Entomology minors**  
A minor in entomology can be obtained in conjunction with any major field of study and students are encouraged to do so. The following degree programs, however, lend themselves particularly well to an entomology minor.

<b>Animal sciences and industry</b>		
<i>Entomology minor</i>		
In addition to fulfilling the requirements for undergraduate students majoring in animal sciences and industry, students receiving a minor in entomology must take the following courses:		
ENTOM 305	Livestock Entomology .....	2
ENTOM 306	Livestock Entomology Lab .....	1
ENTOM 300	Economic Entomology .....	3
or		
ENTOM 312	General Entomology .....	2
and		
ENTOM 313	General Entomology Lab .....	1
BIOL 625	Animal Parasitology* .....	4
* Replaces ENTOM 710		10

At least 5 hours of approved electives from the courses listed below:		
BIOL 455	General Microbiology .....	4
ENTOM 620	Insecticides: Properties & Law .....	2
ENTOM 692	Insect Ecology .....	2
ENTOM 710	Insect Taxonomy .....	3
ENTOM 799*	Problems in Entomology: .....	1-3

\* See under General Requirements for complete course listing.

<b>Crop consulting option in agronomy</b>		
<i>Entomology minor</i>		
In addition to fulfilling the requirements for undergraduate students in the Crop Consulting Option of Agronomy, students receiving a minor in Entomology must take the following courses:		
ENTOM 312	General Entomology .....	2
ENTOM 313	General Entomology Lab .....	1
ENTOM 612	Insect Pest Diagnosis .....	3
ENTOM 710	Insect Taxonomy .....	3
		9

At least 6 hours of approved electives from the courses listed below:		
ENTOM 667	Insect Pest Management .....	3
ENTOM 692	Insect Ecology .....	2
ENTOM 706	External Insect Morphology .....	3
ENTOM 799*	Problems in Entomology: .....	1-3

\* See under General Requirements for complete course listing.

Grain science and industry		
<i>Entomology minor</i>		
In addition to fulfilling the requirements for undergraduate students majoring in grain science and industry, students receiving a minor in entomology must take the following courses:		
ENTOM 312	General Entomology .....	2
ENTOM 313	General Entomology Lab .....	1
ENTOM 710	Insect Taxonomy .....	3
ENTOM 799	Problems in Entomology:	
	Insects of Stored Products .....	3
GRSC 651	Food and Feed Plant Sanitation .....	4
		13

At least 2 hours of approved electives from the courses listed below:		
ENTOM 667	Insect Pest Management .....	3
ENTOM 692	Insect Ecology .....	2
ENTOM 706	External Insect Morphology .....	3
ENTOM 799*	Problems in Entomology .....	1-3

\* See under General Requirements for complete course listing.

**Horticulture degree****Entomology**

In addition to fulfilling the requirements for undergraduate students majoring in Horticulture, students receiving a minor in Entomology must take the following courses:

ENTOM 320	Horticultural Entomology .....	3
	<b>or</b>	
ENTOM 312	General Entomology .....	2
	<b>and</b>	
ENTOM 313	General Entomology Lab .....	1
ENTOM 710	Insect Taxonomy .....	3
PLPATH 500	Principles of Plant Pathology .....	3
		<b>9</b>

At least 4 hours of approved electives from the courses listed below:

PLPATH 607	Plant Disease Diagnosis .....	2
ENTOM 667	Insect Pest Management .....	3
ENTOM 692	Insect Ecology .....	2
ENTOM 706	External Insect Morphology .....	3
ENTOM 799*	Problems in Entomology .....	1-3

\* See general requirements for complete course listing.

**Entomology courses****Undergraduate credit**

**ENTOM 300. Economic Entomology.** (3) 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.

**ENTOM 305. Livestock Entomology.** (2) I. 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, and pre-veterinary medicine, as well as other agricultural curricula. Two hours lecture-demonstration a week.

**ENTOM 306. Livestock Entomology Laboratory.** (1) I. One two-hour lab a week.

**ENTOM 312. General Entomology.** (2) I, II. 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.

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

**ENTOM 314. Insect and Arachnid Identification.** (3) I. Even years. (Not open to entomology science option majors in pest science and management curriculum.) Identification of common insects and arachnids. Two three-hour labs a week. Pr.: ENTOM 312 or conc. enrollment.

**ENTOM 320. Horticultural Entomology.** (3) I. Biological principles and management considerations for insect and related arthropods affecting horticulture. Practical application of classification and life history information for accurate recognition, monitoring, and pest management decisions. Control tactics, and conservation of beneficial species. Two hours lec. and two hours lab a week.

**Undergraduate and graduate credit**

**ENTOM 612. Insect Pest Diagnosis.** (2) I. Odd years. Diagnosis of plant damage by insects and mites, recognition of harmful insects and mites and beneficial insects. Emphasis on field crop pests but pests of other crops will be considered if there is sufficient interest. One hour lec. and two hours lab a week. Pr.: ENTOM 314 or 710.

**ENTOM 620. Insecticides: Properties and Laws.** (2) II. Ecological properties of insecticides. Formulations, use, safety, environmental impact, and federal and state laws regulating pesticides. Two hours lec. a week. Pr.: CHM 190.

**ENTOM 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 2 credits may be applied towards a B.S. in pest science and management. Credit is allowed only for approved work-study programs. Pr.: Junior standing in pest science and management curriculum; or AGRON 330, ENTOM 312, and PLPTH 500.

**ENTOM 652. Seminar in Crop Protection.** (1) II. A discussion of modern developments in the use of integrated pest management. Pr.: AGRON 330, ENTOM 312, and PLPTH 500. One hour discussion a week.

**ENTOM 692. Insect Ecology** (2) I. Even years. Abiotic and biotic factors that affect the abundance and distribution of insects and how to measure them. How these factors affect population processes and community structure, especially in agricultural systems. Emphasis on basic concepts, experiments, and methods. One hour lecture and two hours lab per week. Pr.: BIOL 430 or ENTOM 312.

**ENTOM 706. External Insect Morphology.** (3) I. Even years. 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.

**ENTOM 710. Insect Taxonomy.** (3) II. Offered 1993 and alternate years. Laboratory study of insect order and family-group identification. Proper preparation and maintenance of adult insect collections. Lecture stresses the principles of systematics, legal principles of nomenclature, and the phylogeny of insects and their near relatives. For beginning graduate and advanced undergraduate students. One hour lec. and six hours lab a week. Pr.: ENTOM 300 or 312 and 313; ENTOM 706 recommended but not required; insect collection desirable.

**ENTOM 767. Insect Pest Management.** (3) I. A presentation of the items necessary to consider in order to develop a sound pest management program, from identification of a problem to recommendations made to growers for dealing with a pest. Two hours lec. and one lab a week. Pr.: ENTOM 300 or ENTOM 312.

**ENTOM 799. Problems in Entomology.** (Var.) I, II, S. For nonthesis or nondissertation studies. Work in various fields of entomology. Pr.: Consent of instructor.

**Food Science and Industry**

Advisors: Dikeman, Fung, Harbers, Hunt, Jeon, Kastner, Kropf, Phebus, Smith, and Unruh, Animal Sciences and Industry; Faubion, Klopfenstein, and Walker, Grain Sciences and Industry.

**Food science and industry**

Bachelor of science in food science and industry  
127 semester hours

This curriculum deals with all aspects of the food industry—both theoretical and practical—from producing raw materials through processing and packaging to marketing finished foods. The curriculum balances fundamental principles and practical applications of food science within a flexible program that permits students to tailor education to personal career goals. The program is certified by the Institute of Food Technologists.

Graduates are needed to manage and supervise sophisticated food manufacturing industries that produce poultry, fresh and processed meat, dairy products, bakery goods, frozen and canned fruits and vegetables, confections, and snack foods.

Imaginative and well-trained people are needed in research and product development to create new and innovative products and processes. Some graduates work with produc-

ers to improve the quality of raw materials. Persons trained in microbiology, quality assurance, and sensory analysis are needed to help food processors meet more stringent consumer and government requirements. Others are involved in selling, merchandising, advertising, or managing food operations.

Government regulatory agencies also hire food scientists to assure public health, nutrition, and food labeling. Some food science graduates work in international food agencies.

The curriculum includes four options: science, processing, business, and processing technology. All options are built around a science-based core curriculum.

The science option prepares students for product development, technical service, food safety, and quality assurance by giving students background in mathematics, chemistry, microbiology, computer science, as well as food science.

The processing option emphasizes processing techniques and involves experiences in the commodity areas of bakery and cereal science; dairy, meat, and poultry products; and fruit and vegetable processing.

The business option prepares students for management through courses in accounting, business law, marketing, business finance, management, personnel, labor relations, consumer behavior, and sales, in addition to food science courses.

The processing technology option emphasizes food engineering systems, materials, circuitry, graphics, and data processing, as well as food science.

Scholarships are available through the Institute of Food Technologists and the College of Agriculture.

**General requirements**

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 105	Public Speaking IA .....	2
KIN 101	Principles of Physical Fitness .....	1
ECON 110	Principles of Macroeconomics .....	3
MATH 100	College Algebra .....	3
MATH 205	General Calculus and Linear Algebra ...	3
	<b>or</b>	
MATH 210	Technical Calculus I .....	3
STAT 320	Elements of Statistics .....	3
	<b>or</b>	
STAT 340	Biometrics I .....	3
	<b>or</b>	
STAT 350	Business Economics Statistics I .....	3
BIOL 198	Principles of Biology .....	4
BIOL 455	General Microbiology .....	5
CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	

**Core food science courses**

ASI 305	Fundamentals of Food Processing .....	3
ASI 411	Introductory Food Chemistry .....	3
	<b>or</b>	
FN 501	Food Science .....	3
ASI 615	Food Analysis .....	3
	<b>or</b>	
FN 790	Food Research Techniques .....	3
ASI 607	Food Microbiology .....	4
ATM 440	Introduction to Food Engineering Technology .....	3

ATM 441	Food Engineering Technology Laboratory .....	1
FN 400	Human Nutrition .....	3
Two listed processing electives .....		4-9
Social sciences/humanities electives.....		9

### Options

Additional courses required for specific options:

#### Business option

PHYS 115	Descriptive Physics .....	4
CHM 350	General Organic Chemistry .....	3
	and	
CHM 351	General Organic Chemistry Lab .....	2
BIOCH 521	General Biochemistry .....	3
ACCTG 231	Accounting for Business Operations ...	3
ACCTG 241	Accounting for Investing and Financing .....	3
MKTG 400	Marketing .....	3
MANGT 420	Management Concepts .....	3
Professional electives .....		15
Business electives (besides ACCTG 231 and 241, MKTG 400, and MANGT 420) .....		12
Free electives .....		3-8

Total hours from the College of Business Administration cannot exceed 27.

#### Processing option

PHYS 115	Descriptive Physics .....	4
	or	
PHYS 113	General Physics I .....	4
CHM 350	General Organic Chemistry .....	3
	and	
CHM 351	General Organic Chemistry Lab .....	2
BIOCH 521	General Biochemistry .....	3
	and	
BIOCH 522	General Biochemistry Lab .....	2
Professional electives .....		13
Processing and/or technology electives .....		24
Free electives .....		0-5

#### Science option

PSYCH 110	General Psychology* .....	3
PHYS 113	General Physics I .....	4
CHM 350	General Organic Chemistry .....	3
	and	
CHM 351	General Organic Chemistry Lab .....	2
BIOCH 521	General Biochemistry .....	3
	and	
BIOCH 522	General Biochemistry Lab .....	2
Professional electives .....		30
Free electives .....		7-12

\*Satisfies 3 of the 9 hours of social science electives.

#### Processing technology option

MATH 150	Plane Trigonometry .....	3
MATH 211	Technical Calculus II .....	3
PHYS 113	General Physics I .....	4
PHYS 114	General Physics II .....	4
CHM 350	General Organic Chemistry .....	3
	and	
CHM 351	General Organic Chemistry Lab .....	2
BIOCHM 521	General Biochemistry .....	3
	and	
BIOCHM 522	General Biochemistry Lab .....	2
Professional electives .....		3
Processing and/or technology electives .....		24
Free electives .....		0-5

### Electives

#### Business electives

ACCTG 231	Accounting for Business Operations .....	3
ACCTG 241	Accounting for Investing and Finance ..	3
AGEC 120	Agricultural Economics and Agribusiness .....	3
AGEC 318	Agribusiness Management .....	3
AGEC 410	Agricultural Policy .....	3
AGEC 420	Commodity Futures Markets .....	2
AGEC 421	Livestock and Meat Marketing .....	2
AGEC 422	Grain Marketing .....	2
AGEC 505	Agricultural Market Structures .....	3
AGEC 515	Agribusiness Marketing .....	3
ASI 694	Food Plant Management .....	2

CIS 200	Fundamentals of Computer Programming .....	3
Computer language lab (200 level) .....		1
ECON 120	Principles of Microeconomics .....	3
FINAN 450	Business Finance .....	3
MANGT 202	Small Business Operations .....	3
MANGT 390	Business Law I .....	3
MANGT 420	Management Concepts .....	3
MANGT 530	Labor Legislation .....	3
MANGT 531	Personnel and Wage Administration .....	3
MKTG 400	Marketing .....	3
MKTG 450	Consumer Behavior .....	3
MKTG 541	Retailing .....	3
MKTG 542	Sales Management .....	3
MKTG 640	Marketing Research .....	3
MKTG 545	Marketing Channels .....	3

Other professional electives can be substituted as appropriate.

#### Food science electives

ASI 302	Introduction to Food Science .....	3
ASI 430	Food Products Evaluation .....	3
ASI 606	Instrumental Analysis of Food and Agricultural Products .....	2
ASI 630	Egg Science .....	2
ASI 635	Poultry Meat Technology .....	2
ASI 694	Food Plant Management .....	2
ASI 695	Quality Assurance of Food Products .....	3
ASI 713	Rapid Methods and Automation in Microbiology .....	2
FN 301	Food Trends, Legislation, and Regulations .....	3
FN 616	Principles of Food Demonstration .....	3
FN 701	Sensory Analysis of Foods .....	3
FN 705	Food Product Development .....	3
FN 720	Food Systems .....	3
FN 750	Nutritional Aspects of Food Processing and Preparation .....	3
GENAG 630	Food Science Problems .....	V
GRSC 120	Introduction to Bakery Technology .....	2
GRSC 602	Cereal Science .....	3
GRSC 651	Food and Feed Plant Sanitation .....	4
GRSC 661	Qualities of Feed and Food Ingredients ..	3
HORT 725	Postharvest Technology and Physiology of Horticultural Crops .....	3

#### Nutrition electives

FN 500	Public Health Nutrition .....	3
FN 503	Maternal and Child Nutrition .....	3
FN 610	Life Span Nutrition .....	3
FN 635	Nutrition and Exercise .....	3
FN 702	Nutrition in Developing Countries .....	3
FN 710	Bionutrition .....	3
FN 712	Diet Therapy .....	3
FN 750	Nutritional Aspects of Food Processing and Preparation .....	2-3
GRSC 705	Nutritional Properties of Cereals and Legumes .....	3

#### Processing electives

All courses must have labs.

ASI 350	Meat Science .....	3
ASI 361	Meat Processing .....	2
ASI 405	Fundamentals of Milk Processing .....	3
ASI 502	Principles of Dairy Food Processing .....	4
ASI 605	Fresh Meat Operations .....	3
ASI 610	Processed Meats Operations .....	2
ASI 671	Meat Selection and Utilization .....	2
ASI 725	Meat Packing Plant Operations .....	2-3
ASI 777	Meat Technology .....	4
FN 300	Science of Food .....	4
GRSC 100	Principles of Milling .....	3
GRSC 625	Flour and Dough Testing .....	3
GRSC 635	Baking Science I .....	2
	and	
GRSC 636	Baking Science I Lab .....	2
GRSC 737	Baking Science II .....	2
	and	
GRSC 738	Baking Science II Lab .....	1

#### Technology electives

ATM 450	Functional Components of Machinery ..	3
ATM 526	Agricultural and Industrial Hydraulics ..	3
ATM 563	Electrical Systems and Controls .....	3
AGE 500	Properties of Biological Materials .....	2
AGE 520	Energy Use and Control in Ag Systems .....	1

AGE 635	Food Plant Design .....	3
IE 372	Computers and Data Processing .....	2
GRSC 610	Electricity and Control for Milling Processing .....	3
ME 212	Engineering Graphics I .....	2
ME 560	Engineering Economics .....	3

## General Agriculture

David J. Mugler,\* Associate Dean and  
Director of Academic Programs  
Lawrence H. Erpelding, Associate Director  
John B. Riley,\* Assistant Director

### General agriculture courses

#### Undergraduate credit

**GENAG 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.

**GENAG 200. Topics in Agriculture.** (0-3) On sufficient demand. Selected issues in agriculture. May be repeated with change in topics.

**GENAG 390. Agricultural Employment.** (1) I, II. Assists the agriculture student in developing a career blueprint; understanding job markets and techniques to obtain employment including recruitment/placement services, resume construction, personal interviewing, and job offer evaluation and analysis; and monitoring involved in career planning.

**GENAG 410. Agricultural Student Magazine.** (I-5) I, II. Planning, interviewing, and preparing stories, headlines, layouts, and editing, for the *Kansas State Agriculturist* published by students in the College of Agriculture. Pr.: MC 400.

#### Undergraduate and graduate credit

**GENAG 500. Food Science Seminar.** (1) I. Review of recent developments in the food science industry and in food science research. Food science literature and intradepartmental research will provide source material. Required of all food science undergraduates in agriculture.

**GENAG 505. Comparative Agriculture.** (1-4) Intersession. A travel-study program which is intended to acquaint students with agriculture of other countries and other parts of the U.S. and how it differs from Midwest-Great Plains agriculture relative to climate, crops, soils, livestock practices, marketing, and cultural attitudes toward agriculture. Pr.: Consent of instructor.

**GENAG 515. Honors Presentation.** (1) I, II, S. Presentation of completed teaching or extension activity, research project, or demonstration project. Pr.: Successfully completed honors proposal and permission of honors advisor.

**GENAG 550. Internship in Agricultural Communications.** (1-3) I, II, S. The intern works in a professional capacity in areas such as print journalism, electronic media, advertising, photography, and public relations. Student is supervised by a professional and a faculty member. One hour of credit for each four weeks of supervised work. Internship report and presentation required. Pr.: Junior standing and departmental approval.

**GENAG 582. Natural Resources/Environmental Sciences Project (NRES).** (3) I, II. A comprehensive project in NRES. Requires integration of information and understanding acquired in NRES secondary major courses. Students must prepare and present written and oral reports. Three hours rec. a week. Pr.: All writing and oral communications courses required for major. Pr. or conc.: 15 hours of approved courses in NRES secondary major. Cross-listed with DAS 582 and DEN 582.

**GENAG 630. Food Science Problems.** (1-3) I, II, S. Research or related work with others, or a literature search. Written reports are required. Any field of food science for which the student has adequate background. Pr.: ASI 302 and junior standing.

**GENAG 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.: MC 500 and consent of supervising instructor.

**GENAG 780. Current Topics in Agriculture.** (1-3) On sufficient demand. Selected topics studied to provide an in-depth understanding of current agricultural issues. May be repeated with change in topics. Pr.: Completion of baccalaureate degree.

## Grain Science and Industry

Richard Hahn,\* Head

Professors Behnke,\* Deyoe,\* Eustace,\* Hahn, Hosene,\* Pedersen,\* Ponte,\* Seib,\* Walker,\* and Wetzels,\* Adjunct Professors Hoover, Chung,\* Lookhart, and Vetter,\* Associate Professors Faubion,\* Haque\* (temporary), and Klopfenstein,\* Adjunct Associate Professors Seitz,\* Assistant Professors Acasio (temporary), Curran, and Herrman; Adjunct Assistant Professors Bennett, Rogers, and I.Y. Zayas; Instructor Gwirtz; Instructors (temporary) Pudden, and Reddy; Emeriti: Professors Balding,\* Farrell,\* McElhiney,\* Schoeff,\* Ward,\* and Wilcox,\* Associate Professor Wingfield.\*

The Department of Grain Science and Industry offers three curricula: a bachelor of science in bakery science and management; a bachelor of science in feed science and management; and a bachelor of science in milling science and management. In the baking science and milling science curricula, an option may be selected in administration, chemistry, or operations. The feed science curriculum has specialization electives emphasizing administration or engineering. This department also participates in the food science and industry curriculum.

## Bakery science and management

Bachelor of science in bakery science and management

130 semester hours

### Freshman

Fall semester	
GENAG 101	Ag Orientation ..... 1
GRSC 100	Principles of Milling ..... 3
CHM 210	Chemistry I ..... 4
ENGL 100	Expository Writing I ..... 3
MATH 100	College Algebra ..... 3
KIN 101	Principles of Physical Fitness ..... 1
<b>15</b>	

### Spring semester

CHM 230	Chemistry II ..... 4
ECON 110	Principles of Macroeconomics ..... 3
Social science electives	..... 3
MATH 150	Plane Trigonometry ..... 3
GRSC 120	Introduction to Bakery Technology ..... 2
<b>15</b>	

### Sophomore

Fall semester	
SPCH 105	Public Speaking IA ..... 2
BIOL 198	Principles of Biology ..... 4
ENGL 200	Expository Writing II ..... 3
Option A, B, or C electives	..... 7
<b>16</b>	

### Spring semester

BIOL 455	General Microbiology ..... 4
Social science electives	..... 6
STAT 320	Elements of Statistics ..... 3
Option A, B, or C electives	..... 4
<b>17</b>	

### Junior

Fall semester	
GRSC 591	Commercial Feed and Food Manufacturing Internship ..... 2
GRSC 635	Baking Science I ..... 2
GRSC 636	Baking Science I Lab ..... 2
ASI 607	Food Microbiology ..... 4
Option A, B, or C electives	..... 7
<b>17</b>	

### Spring semester

GRSC 737	Baking Science II ..... 2
GRSC 738	Baking Science II Lab ..... 1
GRSC 602	Cereal Science ..... 3
Option A, B, or C electives	..... 10
<b>16</b>	

### Senior

Fall semester	
GRSC 670	Bakery Layout ..... 1
ATM 440	Introduction to Food Engineering Technology ..... 3
Option A, B, or C electives	..... 13
<b>17</b>	

### Spring semester

GRSC 625	Flour and Dough Testing ..... 3
GRSC 651	Food and Feed Plant Sanitation ..... 4
GRSC 701	Practicum Baking Techniques ..... 1
Option A, B, or C electives	..... 9
<b>17</b>	

### Options

Administration option (A)	
GRSC 505	Cereal and Feed Analysis ..... 3
BIOCH 265	Introduction to Organic and Biological Chemistry ..... 4
ECON 120	Principles of Macroeconomics ..... 3
MATH 205	General Calculus and Linear Algebra ..... 3
PHYS 113	General Physics I ..... 4
PHYS 114	General Physics II ..... 4
CIS 110	Introduction to Personal Computing ..... 3
ACCTG 231	Accounting for Business Operations ..... 3
ACCTG 241	Accounting for Investment and Finance ..... 3
GRSC 630	Management Applications in the Grain Processing Industries ..... 3
MKTG 400	Marketing ..... 3
FINAN 450	Business Finance ..... 3
Electives	..... 5

And 6 hours from the following:

ECON 530	Money and Banking ..... 3
ECON 620	Labor Economics ..... 3
ACCTG 312	Cost Accounting ..... 3
MANGT 530	Industrial and Labor Relations ..... 3
MANGT 531	Personnel and Human Resource Management ..... 3
MKTG 450	Consumer Behavior ..... 3
MKTG 542	Sales Management ..... 3
MANGT 630	Labor Relations Law ..... 3
FINAN 650	Capital Budgeting ..... 3
IE 501	Industrial Management ..... 3

### Chemistry option (B)

GRSC 505	Cereal and Feed Analysis ..... 3
BIOCH 521	General Biochemistry ..... 3
BIOCH 522	General Biochemistry Lab ..... 2
CHM 271	Chemical Analysis ..... 4
CHM 500	Descriptive Physical Chemistry ..... 3
CHM 531	Organic Chemistry I ..... 3

CHM 532	Organic Chemistry I Lab ..... 2
CHM 550	Organic Chemistry II ..... 3
CHM 551	Organic Chemistry II Lab ..... 2
MATH 220	Analytic Geometry and Calculus I ..... 4
MATH 221	Analytic Geometry and Calculus II ..... 4
PHYS 213	Engineering Physics I ..... 5
PHYS 214	Engineering Physics II ..... 5
Electives	..... 7

### Operations option (C)

BIOCH 265	Introduction to Organic and Biological Chemistry ..... 5
MATH 220	Analytic Geometry and Calculus I ..... 4
MATH 221	Analytic Geometry and Calculus II ..... 4
MATH 222	Analytic Geometry and Calculus III ..... 4
GRSC 610	Electricity and Control for Milling Processes ..... 3
ME 212	Engineering Graphics I ..... 2
PHYS 213	Engineering Physics I ..... 5
PHYS 214	Engineering Physics II ..... 5
CE 231	Statics A ..... 3
CE 331	Strength of Materials A ..... 3
GRSC 630	Management Applications in the Grain Processing Industries ..... 3
ME 513	Thermodynamics I ..... 3
Electives	..... 6

## Feed science and management

Bachelor of science in feed science and management

127 semester hours

### Freshman

Fall semester	
GENAG 101	Ag Orientation ..... 1
GRSC 100	Principles of Milling ..... 3
CHM 210	Chemistry I ..... 4
ENGL 100	Expository Writing I ..... 3
MATH 100	College Algebra ..... 3
KIN 101	Principles of Physical Fitness ..... 1
<b>15</b>	

### Spring semester

CHM 230	Chemistry II ..... 4
MATH 150	Plane Trigonometry ..... 3
SPCH 105	Public Speaking IA ..... 2
Required courses*	..... 6
<b>15</b>	

### Sophomore

Fall semester	
GRSC 110	Flow Sheets ..... 2
BIOL 198	Principles of Biology ..... 4
ECON 110	Principles of Macroeconomics ..... 3
ENGL 200	Expository Writing II ..... 3
Required courses*	..... 4
<b>16</b>	

### Spring semester

ASI 318	Fundamentals of Nutrition ..... 3
ENTOM 312	General Entomology ..... 2
ENTOM 313	General Entomology Lab ..... 1
Social science electives	..... 6
Required courses*	..... 5
<b>17</b>	

### Junior

Fall semester	
GRSC 510	Feed Technology I ..... 4
GRSC 661	Qualities of Feed and Food Ingredients ..... 3
Required courses*	..... 9
<b>16</b>	

### Spring semester

GRSC 651	Feed Plant Sanitation ..... 4
GRSC 750	Feed Technology II ..... 4
Required courses*	..... 8
<b>16</b>	

**Senior****Fall semester**

GRSC 650	Concepts of Modern Feed Mill Design .....	3
Required courses*		13
		<b>16</b>

**Spring semester**

GRSC 505	Cereal and Feed Analysis .....	3
GRSC 610	Electricity and Control for Milling Processes .....	3
GRSC 630	Management Applications .....	3
Required courses*		7
		<b>16</b>

\*Including specialization electives

**Required courses**

AGEC 420	Commodity Futures Marketing .....	2
AGEC 422	Grain Marketing .....	2
BIOCH 265	Introduction to Organic and Biological Chemistry .....	5
MATH 205	General Calculus and Linear Algebra ...	3
PHYS 113	General Physics I .....	4
PHYS 114	General Physics II .....	4
STAT 320	Elements of Statistics .....	3
CIS 110	Introduction to Personal Computing .....	3
ACCTG 231	Accounting for Business Operations .....	3
ENGL 516	Written Communication for the Sciences .....	3

**Specialization electives**

GENAG 390	Agricultural Employment .....	1
GRSC 520	Extrusion Processing in the Food and Feed Industries .....	4
GRSC 591	Commercial Feed and Food Manufacturing Internship .....	2
GRSC 655	Cereal Food Plant Design and Construction .....	3
GRSC 751	Air Handling in Grain Processing .....	3
GRSC 790	Grain Science Problems .....	2
ECON 530	Money and Banking .....	3
MATH 220	Analytic Geometry and Calculus I .....	4
MATH 221	Analytic Geometry and Calculus II .....	4
ACCTG 241	Accounting for Investment and Finance .....	3
ACCTG 312	Cost Accounting .....	3
FINAN 450	Business Finance .....	3
MANGT 390	Business Law I .....	3
MANGT 530	Industrial and Labor Relations .....	3
MANGT 531	Personnel and Human Resource Management .....	3
MANGT 630	Labor Relations Law .....	3
MKTG 542	Sales Management .....	3
IE 501	Industrial Management .....	3
Free electives		6

**Milling science and management**

Bachelor of science in milling science and management

130 semester hours

**Freshman****Fall semester**

GENAG 101	Ag Orientation .....	1
GRSC 100	Principles of Milling .....	3
CHM 210	Chemistry I .....	4
ENGL 100	Expository Writing I .....	3
MATH 100	College Algebra .....	3
KIN 101	Principles of Physical Fitness .....	1
		<b>15</b>

**Spring semester**

CHM 230	Chemistry II .....	4
MATH 150	Plane Trigonometry .....	3
SPCH 105	Public Speaking IA .....	2
ECON 110	Principles of Macroeconomics .....	3
Social science elective		3
Option A, B, or C electives		2
		<b>17</b>

**Sophomore****Fall semester**

GRSC 110	Flow Sheets .....	2
BIOL 198	Principles of Biology .....	4
CIS 110	Introduction to Personal Computing or equivalent .....	3
ENGL 200	Expository Writing II .....	3
Option A, B, or C electives		4
		<b>16</b>

**Spring semester**

GRSC 500	Milling Technology I .....	4
BIOL 455	General Microbiology .....	4
GRSC 505	Cereal and Feed Analysis .....	3
Social science electives		3
Option A, B, or C electives		3
		<b>17</b>

**Junior****Fall semester**

AGRON 340	Market Grading Cereals .....	2
Social science electives		3
Option A, B, or C electives		12
		<b>17</b>

**Spring semester**

GRSC 602	Cereal Science .....	3
STAT 320	Elements of Statistics .....	3
GRSC 651	Food and Feed Plant Sanitation .....	4
Option A, B, or C electives		6
		<b>17</b>

**Senior****Fall semester**

GRSC 635	Baking Science I .....	2
GRSC 636	Baking Science I Lab .....	2
Option A, B, or C electives		12
		<b>17</b>

**Spring semester**

Option A, B, or C electives		16
		<b>16</b>

**Options****Management option (A)**

ACCTG 231	Accounting for Business Operations .....	3
ACCTG 241	Accounting for Investment and Financing .....	3
AGEC 120	Agricultural Economics and Agribusiness .....	3
AGEC 318	Agribusiness Management .....	3
AGEC 420	Commodity Futures .....	2
AGEC 422	Grain Marketing .....	2
BIOCH 265	Introduction to Organic and Biological Chemistry .....	5
GRSC 625	Flour and Dough Testing .....	3
GRSC 630	Management Applications in the Grain Processing Industries .....	3
GRSC 730	Milling Technology II .....	2
MATH 205	General Calculus and Linear Algebra ...	3
PHYS 115	Descriptive Physics .....	4
SPCH 311	Business and Professional Speaking .....	3
Free electives		7

Select 9 hours from the following:

ACCTG 331	Accounting Processes and Controls .....	3
AGEC 513	Agricultural Finance .....	3
AGEC 515	Agribusiness Marketing .....	3
AGEC 632	Agricultural Business Logic .....	3
AGEC 710	Advanced Agribusiness Management ...	3
ENGL 516	Written Communication for the Sciences .....	3
GENAG 390	Agricultural Employment .....	1
MANGT 390	Business Law I .....	3
MANGT 420	Management Concepts .....	3
MANGT 530	Industrial and Labor Relations .....	3
MANGT 531	Personnel and Human Resources Management .....	3
MANGT 630	Labor Relations Law .....	3

**Chemistry option (B)**

ME 212	Engineering Graphics .....	2
GRSC 625	Flour and Dough Testing .....	3
BIOCH 521	General Biochemistry .....	3
BIOCH 522	General Biochemistry Lab .....	2
CHM 271	Chemical Analysis .....	4

CHM 500	Descriptive Physical Chemistry .....	3
CHM 531	Organic Chemistry I .....	3
CHM 532	Organic Chemistry I Lab .....	2
CHM 550	Organic Chemistry II .....	3
CHM 551	Organic Chemistry II Lab .....	2
MATH 220	Analytic Geometry and Calculus I .....	4
MATH 221	Analytic Geometry and Calculus II .....	4
PHYS 213	Engineering Physics I .....	5
PHYS 214	Engineering Physics II .....	5
Electives		10

**Operations option (C)**

GRSC 610	Electricity and Control for Milling Processes .....	3
GRSC 630	Management Applications for the Grain Processing Industries .....	3
GRSC 640	Advanced Flow Sheets .....	2
GRSC 655	Cereal Food Plant Design and Construction .....	3
GRSC 730	Milling Technology II .....	2
GRSC 731	Milling Technology II Lab .....	2
GRSC 785	Advanced Flour and Feed Technology .....	3
BIOCH 265	Introduction to Organic and Biological Chemistry .....	5
MATH 210	Technical Calculus I .....	3
MATH 211	Technical Calculus II .....	3
PHYS 213	Engineering Physics I .....	5
PHYS 214	Engineering Physics II .....	5
CE 231	Statics A .....	3
ATM 440	Introduction to Food Engineering Techniques .....	3
ME 210	Engineering Graphics I .....	2
Free electives		8

**Grain science and industry minors**

A grain science minor implies a knowledge of certain aspects of grain processing and utilization. We have structured our minors to include a minimum basic understanding of a specialization.

**Bakery science minor**

GRSC 100	Principles of Milling .....	3
GRSC 602	Cereal Science .....	3
GRSC 625	Flour and Dough Testing .....	3
GRSC 635	Baking Science I .....	2
GRSC 636	Baking Science I Lab .....	2
GRSC 737	Baking Science II .....	2
GRSC 738	Baking Science II Lab .....	1
		<b>16</b>

Grain science majors cannot use courses required in their major as part of a bakery science minor.

**Feed science minor**

GRSC 100	Principles of Milling .....	3
GRSC 110	Flow Sheets .....	2
GRSC 510	Feed Tech I .....	4
GRSC 650	Concepts of Modern Feed Mill Design .....	3
GRSC 750	Feed Tech II .....	4
		<b>16</b>

Grain science majors cannot use courses required in their major as part of a feed science minor.

**Cereal chemistry minor**

GRSC 100	Principles of Milling .....	3
GRSC 505	Cereal and Feed Analysis .....	3
GRSC 602	Cereal Science .....	3
GRSC 625	Flour and Dough Testing .....	3

plus 3 to 4 hours from the following:

GRSC 635/636	Baking Science I and Lab (lecture and lab) .....	4
GRSC 711	Vibrational Spectroscopy Analysis ....	1-2
GRSC 712	Contemporary Chromatograph Analysis of Food .....	1
GRSC 720	Extrusion Processing .....	4
GRSC 790	Special Topics .....	var.

Grain science majors cannot use courses required in their major as part of a cereal chemistry minor.

## International Grains Program

C. W. Deyoe, Director

The International Grains Program promotes the marketing of wheat, corn, soybeans, sorghum, and other U.S. grains. As part of the effort to expand existing markets and to develop new ones for those agricultural commodities, program participants are trained in the processing and handling of U.S. food and feed grains, instructed in the use of the end products, and given a thorough understanding of the workings of the U.S. grain marketing system.

## Grain science and industry courses

### Undergraduate credit

**GRSC 100. Principles of Milling.** (3) I, II. Introduction to flour and feed milling processes. Two hours lec. and three hours lab a week. Pr.: One and one-half units of high school algebra.

**GRSC 110. Flow Sheets.** (2) I, II. The construction and assembling of a flow sheet. Six hours lab a week. Pr.: GRSC 100, ME 212.

**GRSC 120. Introductory Bakery Technology.** (2) II. 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, doughnuts, 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.

**GRSC 121. Introductory Bakery Technology Laboratory.** (1) II. This course provides experience in the production of various types of bakery foods, including: breads, white and dark; layer cakes; foam cakes; danish pastry; puff pastry; pies; and doughnuts. Formulations and functions of ingredients used to make these products will be discussed. Processing equipment designed to efficiently produce bakery foods will be studied and operated by the students. Three hours lab a week. Pr.: GRSC 120 or conc. enrollment.

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

### Undergraduate and graduate credit in minor field

**GRSC 500. Milling Technology I.** (4) II. Principles and practices of wheat flour milling with full-scale equipment including grain storage, blending, cleaning, conditioning plant, and a modern pneumatic 240 hundred weight flour mill, with instrumentation and air conditioning, etc. Two hours lec. and six hours lab a week. Pr.: GRSC 100 and 110.

**GRSC 505. 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.: CHM 230 and BIOCH 120.

**GRSC 510. Feed Technology I.** (4) I. Introduction to the engineering 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.: ASI 318 and GRSC 110.

**GRSC 591. Commercial Feed and Food Manufacturing Internship.** (2) I. A practical application of feed and food manufacturing technology during an eight-week summer internship with an active commercial feed and food manufacturing company. The course will stress applied aspects

of commercial feed and food manufacturing, which can include, but not be limited to, plant operations, maintenance, personnel and labor relations, business management, warehousing, ingredient procurement, quality assurance, and fleet management. Pr.: GRSC 510 or 500 or 635.

**GRSC 720. Extrusion Processing in the Food and Feed Industries.** (4) II. The course is designed to provide the student with an understanding of extrusion technology and the ability to apply it to product development and production through a "hands-on" approach. Major emphasis is on laboratory exercises in which students will operate pilot scale extrusion equipment to produce readily-recognizable commercial products such as cheese curls, breakfast cereals, pasta, pet food, etc. Emphasis will also be placed on process and product development, analysis and problem solving techniques. Three hours of lec. plus one three-hour lab. a week. Pr.: STAT 320 and GRSC 602.

### Undergraduate and graduate credit

**GRSC 602. Cereal Science.** (3) I, II. The characteristics of cereals, legumes, and their products. Three hours lec. a week. Pr.: BIOCH 120.

**GRSC 610. Electricity and Control for Milling Processes.** (3) II. Major emphasis will be given to application of electricity to machinery for grain processing and electrical code. Two hour lec., two hour lab. Pr.: Either GRSC 500, 510, or 635.

**GRSC 625. Flour and Dough Testing.** (3) II. Physical and chemical methods used in evaluating wheat flour and dough. One hour lec. and six hours lab a week. Pr.: GRSC 602.

**GRSC 630. Management Applications in the Grain Processing Industries.** (3) II. This course deals with management principles and their specific application to the processing industries. Industry and allied trade personnel in management positions will give a number of lectures in their field of expertise. Special emphasis is placed on grain industry organizations, labor contracts, supervision, scheduling and planning, regulatory agencies, and cost control. Three hours lec. a week. Pr.: ECON I and either GRSC 510, GRSC 500, GRSC 120, or consent of instructor. Junior standing.

**GRSC 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.: BIOCH 120.

**GRSC 636. Baking Science I Laboratory.** (2) I, II. Laboratory exercises in theory and production of yeast-leavened baked products. Six hours lab a week. Pr.: GRSC 635 or conc. enrollment.

**GRSC 640. Advanced Flow Sheets.** (2) II. Design of flow diagrams for dry milling processes. Uses a combination of methods that lead to practical applications and analytical techniques. Six hours lab a week. Pr.: GRSC 500 or 510.

**GRSC 650. Concepts of Modern Feed Mill Design.** (3) I. Principles of modern feed mill design, feasibility, and equipment selection for plant improvements and new plant construction. Emphasis is placed on the effects of design on plant operating efficiency, product quality, and manufacturing costs. Pr.: GRSC 510, junior standing.

**GRSC 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.

**GRSC 655. Cereal Food Plant Design and Construction.** (3) I. Drawing assignments relative to the building, or modification, of food plants. Emphasis is also given to practical information regarding plant construction project design and management. Power transmission systems design and sheet metal pattern layouts, relative to cereal foods plants, are covered through problem assignments and CAD software programs. Two hours lec. and three hours lab. a week. Pr.: ME 212, senior status in grain science, either GRSC 500 or 730.

**GRSC 661. Qualities of Feed and Food Ingredients.** (3) I. 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.: BIOCH 120.

**GRSC 670. Bakery Layout.** (1) I. Equipment used to produce bakery foods is studied, and the students prepare a bakery layout. Two-hour lab. Pr.: PHYS 113, and GRSC 635 and GRSC 636.

**GRSC 701. Practicum in Bakery Technology.** (1) A one-week intensive course during the January intersession. Lectures and hands-on laboratory experience with commercial production scale baking equipment for breads and rolls, cookies and crackers, and cakes and sweet doughs. Restricted to upper class bakery science and management majors.

**GRSC 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.: GRSC 602 or 661.

**GRSC 712. Vibrational Spectroscopic Analysis and Chemometrics.** (1–2) II. Infrared and particularly modern near-infrared spectroscopic "as is" analysis of foods, natural products, and synthetic substances is accomplished with direct sampling and the use of multivariate statistics. This course is intended to enable the student to understand the principles and successfully apply this technology to practical analytical problems with emphasis upon food. Method development will be taught using specific analytes in selected products. Theoretical background, working of modern instrumentation and associated software is presented in support of achieving practical competence. Pr.: BIOCHEM 265, CHEM 271 or consent of instructor.

**GRSC 713. Contemporary Chromatographic Analysis of Food.** (1) II. High performance liquid chromatography is the primary focus of this course. This will be supported by including treatment of topics in contemporary gas chromatography and supercritical fluid chromatography and extraction. Optimizing chromatographic conditions through knowledge of the column chemistry will be covered in addition to detector options, instrumentation and sample preparation. Pr.: BIOCHEM 265, or CHEM 271 or consent of instructor.

**GRSC 725. 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, MATH 150, and ASI 318.

**GRSC 730. Milling Technology II.** (2) I. Advanced studies of the entire gradual reduction system of wheat flour milling and the many unit process systems that constitute the milling system. The theory and practices of wheat conditioning, drying, and aeration are elaborated upon. Two hours lec. a week. Pr.: GRSC 500.

**GRSC 731. Milling Technology II Laboratory.** (2) I. The processes for milling other grains such as corn, oats, sorghum, different classes of wheat, and rye are studied in theory and by practice on small-scale laboratory milling units. Six hours lab a week. Pr. GRSC 730 or conc. enrollment.

**GRSC 734. Milling Processing Technology Management.** (3) II. A capstone course for milling science and management students. The objective is to familiarize students with the structure of the U.S. flour milling industry, the managerial and processing operations involved in the management of a flour mill, modeling simulation techniques for flour milling operations, engineering economic parameters used in management operations, investment projects and evaluation of new milling technologies. Two hours lecture and three hours of lab per week. Pr.: GRSC 730.

**GRSC 737. 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.: GRSC 635.

**GRSC 738. Baking Science II Laboratory.** (1) II. A laboratory course to accompany GRSC 737. Three hours lab a week. Pr.: GRSC 737 or conc. enrollment.

**GRSC 750. 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.: GRSC 510, PHYS 114 or PHYS 214, and one course each in statistics and computer programming.

**GRSC 785. Advanced Flour and Feed Technology.** (3) II. Design and use of exhaust systems, pneumatic conveying systems, bins and hoppers, and the practical applications of electrical interlocking, instrumentation, and microprocessors to automatic mill control. Also other subjects such as sound measurement and explosion detection and prevention are covered. Two hours lec. and three hours lab a week. Pr.: GRSC 730 or 750.

**GRSC 790. Grain Science Problem.** (Var.) I, II, S. Pr.: Consent of staff.

## Horticulture, Forestry, and Recreation Resources

Thomas D. Warner, Head  
Raymond Aslin, State Forester  
Frank Morrison, Horticulture Extension  
Program Leader  
Mary Lewnes Albrecht, Undergraduate  
Program Coordinator

Professors Albrecht,\* Aslin, Geyer,\* Jennings,\* Leuthold, Loucks, Marr,\* Mattson,\* Morrison,\* Naughton, Nighswonger, Pair,\* Pinkerton, Strickler, van der Hoeven and Warner; Associate Professors Cable,\* Hellman,\* Lamont,\* Khatamian,\* Kimmins, Long,\* Lynch, Morgan, Rajashekar,\* Rowland and Wiest\*; Assistant Professors Bruckerhoff, Fry,\* Gast,\* Kunkel, LeDuc, Marcum,\* Stevens, Stevenson, and Strine; Instructors Lavis, Reid; Foresters Atchison, Bruton, Rassman, Skinner, and Wischer; Emeriti Professors Campbell, Clayberg, Greig, and Keen.

The Department of Horticulture, Forestry, and Recreation Resources is a multi-disciplinary department offering undergraduate programs in horticulture, horticulture science, horticultural therapy, park resource management, and recreation and park administration. Departmental faculty participate in research, extension, and academic programs in these diverse fields which have a positive impact on the quality of life and enhancing the environment. Individual students may have opportunities working with faculty on research or extension programs.

### Horticulture programs

K-State offers four-year curricula in horticulture and horticultural therapy. The Department of Horticulture, Forestry, and Recreation Resources also participates in an interdepartmental program in food science and industry.

Horticulture is the science and art of growing plants for environmental improvement, aesthetic value, intensive food production, or social-therapeutic effects. Students, in consulta-

tion with faculty advisors, may select courses of study in horticulture or horticulture science. The horticulture program is designed for those seeking to move into the production or service sectors of horticulture. Students completing this program also meet requirements for entrance into graduate programs across the United States and can meet the education requirements for certification by the American Registry of Certified Professionals in Agronomy, Crops, and Soils. The horticulture science program provides a stronger foundation in basic sciences for graduate studies. Students interested in pursuing careers in industry research or extension can also follow this program.

All students are required to take a core of general courses in addition to the agricultural, horticultural, and business courses. Students in the horticulture program will specialize and take additional courses to gain expertise in the areas of fruit and vegetable production, greenhouse management, landscape design and management, nursery management, or turf management. After the sophomore year, students are required to complete a three- or six-month internship at an approved site.

Career opportunities for students graduating with a degree in horticulture exist in various arenas, including production, landscape design and management, interiorscape design and management, floral design, botanic gardens and arboreta, garden center operation, athletic grounds management, and golf course operations. Opportunities exist with the various support industries in the area of sales of fertilizers, chemicals, plant material, seeds, containers, and various other supplies; product development; breeding and seed production companies; and trade magazines. Horticulture majors obtaining a minor in plant pathology or entomology will also find opportunities in horticultural pest diagnosis and consulting. Students considering a career in extension should consider pursuing a master of science degree.

### Horticulture

Bachelor of science in agriculture  
130 semester hours

Advisors: Albrecht, Fry, Hellman, Jennings, Khatamian, Kimmins, Lamont, LeDuc, Long, Marcum, and Rajashekar

#### Communications requirements

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 105	Public Speaking 1A .....	2
Communications elective .....		3
		<b>11</b>

#### General electives

Humanities .....	9
Social Sciences .....	9
	<b>18</b>

#### Math/chemical sciences requirements

MATH 100	College Algebra* .....	3
CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
Organic Chemistry <sup>1</sup> .....		3-5

Math/Stat/Comp. Science** .....	3
	<b>17-19</b>

\*Students in Horticulture Science take MATH 210 Technical Calculus, 3, not MATH 100 College Algebra.

\*\*Students in Horticulture Science take STAT 340 Biometrics I, 3, not a math/stat/comp. science elective.

#### Agricultural/biological sciences requirements

GENAG 101	Agricultural Orientation .....	1
BIOL 210	General Botany .....	4
HORT 201	Introductory Horticultural Science .....	4
AGRON 305	Soils .....	4
BIOL 500	Plant Physiology <sup>2</sup> .....	4
PLPTH 500	Principles of Plant Pathology .....	3
ASI 500	Genetics .....	3
Entomology elective .....		3
		<b>26</b>

#### Horticulture requirements

HORT 350	Plant Propagation .....	3
HORT 582	Horticultural Pest Management <sup>3</sup> .....	3
HORT 590	Horticulture Internship .....	3
HORT 520	Fruit Production .....	3
	or	
HORT 560	Vegetable Crop Production .....	3
Select 2 from the following:		
HORT 256	Human Dimensions of Horticulture .....	3
HORT 515	Turf Management .....	3
HORT 570	Greenhouse Operations Management.....	3
HORT 575	Nursery and Garden Center Operations .....	3
		<b>18</b>

#### Horticulture specialization electives

Select an area of horticulture specialization and complete 15 to 18 hours of specialization courses. Open specialization courses are chosen in consultation with the advisor.

##### Fruit/vegetable production

HORT 520	Fruit Production .....	3
	or	
HORT 560	Vegetable Crop Production .....	3
Specialization electives .....		12
		<b>15</b>

##### Greenhouse management

HORT 376	Herbaceous Ornamental Plants .....	3
HORT 377	Plants in the Interior Environment .....	3
HORT 625	Floral Crop Production and Handling ...	4
Specialization electives .....		5
		<b>15</b>

##### Nursery management

HORT 374	Woody Plant Materials I .....	3
HORT 375	Woody Plant Materials II .....	3
AGRON 375	Weed Management .....	3
Specialization electives .....		6
		<b>15</b>

##### Turf management

HORT 374	Woody Plant Materials I .....	3
	or	
HORT 375	Woody Plant Materials II .....	3
HORT 376	Herbaceous Ornamental Plants .....	3
HORT 517	Golf Course Operations .....	3
	or	
HORT 706	Turfgrass Science .....	3
AGRON 375	Soil Fertility .....	3
Specialization electives .....		3
		<b>15</b>

##### Landscape design and management

HORT 374	Woody Plant Materials I .....	3
HORT 375	Woody Plant Materials II .....	3
HORT 450	Horticultural Design .....	3
HORT 508	Landscape Maintenance .....	3
HORT 551	Landscape Contracting and Construction .....	3
Graphics elective <sup>4</sup> .....		3
		<b>18</b>

<sup>1</sup>Landscape Design/Management students have a surveying elective.

<sup>2</sup>Landscape Design/Management students have a biology elective.

\*Landscape Design/Management students with a design emphasis take HORT 376 Herbaceous Ornamental Plants in lieu of HORT 582 Horticulture Pest Management.

\*Landscape Design/Management students have 4 to 6 hours free electives.

#### Health/physical fitness requirement

KIN 101	Principles of Physical Fitness .....	1
		<b>1</b>

#### Agricultural economics/business electives

ECON 110	Principles of Macroeconomics .....	3
ACCTG 231	Accounting for Business Operations .....	3
	Agricultural economics/business electives .....	9
		<b>15</b>

<b>Free electives</b> .....	<b>4-9</b>
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## Horticulture science

Bachelor of science in agriculture  
127 semester hours

The horticulture science program has the same communications, general electives, math/chemical sciences, and agriculture/biological sciences requirements as listed above with the following modifications (modifications are given in *italics*) and additions.

<i>MATH 210</i>	<i>Technical Calculus*</i> .....	3
<i>STAT 340</i>	<i>Biometrics**</i> .....	3
Biology elective .....		3-4
PHYS 115	Descriptive Physics .....	4
BIOCH 521	General Biochemistry .....	3
BIOCH 522	General Biochemistry Lab .....	2

\*Horticulture science requires MATH 210 in lieu of MATH 100 College Algebra

\*\*Horticulture science requires STAT 340 Biometrics in lieu of a math/stat/computer science elective.

#### Horticulture requirements

HORT 350	Plant Propagation .....	3
HORT 520	Fruit Production .....	3
	<b>or</b>	
HORT 560	Vegetable Crop Production .....	3
HORT 570	Greenhouse Operations Management ....	3
	<b>or</b>	
HORT 575	Nursery and Garden Center Operations .....	3
HORT 590	Horticulture Internship .....	3
		<b>12</b>

<b>Horticulture specialization electives</b> .....	<b>15</b>
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<b>Free electives</b> .....	<b>7-10</b>
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#### Business requirements

ECON 110	Principles of Macroeconomics .....	3
ACCTG 231	Accounting for Business Operations ....	3
		<b>6</b>

#### Health/physical fitness requirement

KIN 101	Principles of Physical Fitness .....	1
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## Transferring into horticulture

Many students transfer into horticulture or horticulture science from other institutions. Students considering completing course work at a community college or other four-year institution should select, from the list below, the equivalent courses prior to coming to Kansas State University. Most of the courses listed are available at some, but not all, of the community colleges and other four-year institutions in Kansas. If you are uncertain whether a course will transfer, it is advisable to check with the Kansas State University's Office of Admissions or the Office of Academic Programs in the College of Agriculture before enrolling in a course. To earn a bachelor of

science degree from K-State, a maximum of 63 or 65 credit hours from a community college can be applied towards the horticulture science program or the horticulture program, respectively.

#### Communications requirements

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 105	Public Speaking 1A .....	2
	Communications elective .....	3
		<b>11</b>

#### General electives

Humanities .....	9
Social Sciences .....	9
	<b>18</b>

#### Math/chemical sciences requirements

MATH 100	College Algebra*	3
CHM 210	Chemistry I	4
CHM 230	Chemistry II	4
Organic Chemistry		3-5
Math/Stat/Comp. Science**		3
		<b>17-19</b>

\*Students in horticulture science take MATH 210 Technical Calculus, 3

\*\*Students in horticulture science take STAT 340 Biometrics I not a math/stat/comp. science elective.

#### Agriculture/biological sciences requirements

GENAG 101	Agriculture Orientation .....	1
BIOL 210	General Botany .....	4

#### Agricultural economics/business electives

ECON 110	Principles of Macroeconomics .....	3
ACCTG 231	Accounting for Business Operations ....	3

## Horticultural therapy

Bachelor of science in agriculture  
127 semester hours

Advisors: Kimmins, Mattson

Courses are required in general education, horticulture, agriculture, horticultural therapy, and humanities and/or social sciences. Specialization electives may be selected in community-based programs, corrections, gerontology, education, developmental disabilities, or mental health. Clinical internships are required during the senior year at approved psychiatric hospitals, rehabilitation centers, veterans administration hospitals, correctional agencies, geriatric and retirement centers, community-based agencies, or other approved sites.

#### General education requirements

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 105	Public Speaking 1A .....	2
GENAG 101	Ag. Orientation .....	1
MATH 100	College Algebra .....	3
ECON 110	Principles of Macroeconomics .....	3
CHM 110	General Chemistry .....	3
CHM 111	General Chemistry Lab .....	1
BIOL 210	General Botany .....	4
KIN 101	Principles of Physical Fitness .....	1
KIN 275	First Aid-Multi/CPR .....	1
	STAT or CIS elective .....	3-4

#### Horticulture and agriculture requirements

HORT 201	Introductory Horticultural Science .....	4
HORT 210	Concepts of Floral Design .....	3
HORT 256	Human Dimensions of Horticulture .....	3
HORT 374	Woody Plant Material I .....	3
HORT 377	Herbaceous Ornamental Plants .....	3
HORT 400	Plant Propagation .....	3
	Ornamental horticulture elective .....	3-4
HORT 520	Fruit Production .....	3

HORT 525	Horticulture for Special Populations .....	3
HORT 530	Horticultural Therapy Seminar .....	1
HORT 535	Horticultural Therapy Field Techniques .....	3
HORT 560	Vegetable Crop Production .....	3
HORT 570	Greenhouse Operations Management ....	3
AGRON 305	Soils .....	4
PLPTH 500	Principles of Plant Pathology .....	3
	Entomology elective .....	3

#### Humanities and/or social science requirements

EDCEP 215	Educational Implications of Growth and Development .....	3
PSYCH 110	General Psychology .....	3
PSYCH 505	Abnormal Psychology .....	3
SOCIO 211	Introduction to Sociology .....	3
	Group methods elective .....	3
	Art elective .....	2
	Specialization electives .....	15

#### Internship requirement

HORT 540	Horticultural Therapy Field Experiences .....	12
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Free electives .....	6-8
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## Transferring into horticultural therapy

Many students transfer into horticultural therapy from other institutions. Students considering completing course work at a community college or other four-year institution should select from the list below the equivalent courses prior to coming to Kansas State University. Most of the courses listed are available at some, but not all, of the community colleges and other four-year institutions in Kansas. If you are uncertain whether a course will transfer, it is advisable to check with the K-State University's Office of Admissions or the Office of Academic Programs in the College of Agriculture before enrolling in a course. To earn a bachelor of science degree from Kansas State, a maximum of 63 credit hours from a community college can be applied towards the horticultural therapy program.

#### General education requirements

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 105	Public Speaking 1A .....	2
GENAG 101	Ag Orientation .....	1
MATH 100	College Algebra .....	3
ECON 110	Principles of Macroeconomics .....	3
CHM 110	General Chemistry .....	3
CHM 111	General Chemistry Lab .....	1
BIOL 210	General Botany .....	4
KIN 101	Principles of Physical Fitness .....	1
KIN 275	First Aid-Multi/CPR .....	1
	STAT or CIS elective .....	3-4

#### Humanities and/or social science requirements

EDCEP 215	Educational Implications of Growth and Development .....	3
PSYCH 110	General Psychology .....	3
PSYCH 505	Abnormal Psychology .....	3
SOCIO 211	Introduction to Sociology .....	3
	Group methods elective .....	3
	Art elective .....	2
	Specialization electives .....	15

## Horticulture minor

A minor in horticulture will consist of 16 credit hours, which will provide the student with a breadth of knowledge in horticulture.

#### Required

HORT 201	Introductory Horticultural Sciences .....	4
HORT 350	Plant Propagation .....	3

Select three courses from the following:

HORT 256	Human Dimensions in Horticulture .....	3
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HORT 374	Woody Plant Materials I .....	3
HORT 375	Woody Plant Materials II .....	3
HORT 376	Herbaceous Ornamental Plants .....	3
HORT 515	Turf Management .....	3
HORT 520	Fruit Production .....	3
HORT 560	Vegetable Production .....	3
HORT 570	Greenhouse Operations .....	3
	Management .....	3
HORT 575	Nursery and Garden Center .....	3
	Management .....	3

## Recreation resources

Society faces a future of making potentially infinite demands upon finite natural resources. Appropriate management of America's natural and recreation resources will require the best efforts of dedicated, trained professional managers. A basic objective of recreation resource managers is to provide essential goods and services while maintaining the highest environmental standards. A primary focus of recreation and park professionals is the supply of quality leisure opportunities that lead to an enhanced "quality of life." Two four-year programs are offered: (1) park resource management and (2) recreation and park administration leading to a bachelor of science degree.

Advisors: Cable, Lynch, Morgan, and Stevenson

## Park resource management

Bachelor of science in agriculture  
130 semester hours

### Freshman

<b>Fall semester</b>		
GENAG 101	Ag Orientation .....	1
ENGL 100	Expository Writing I .....	3
MATH 100	College Algebra .....	3
RRES 210	Introduction to the Park and Recreation Profession .....	2
CHEM 110	General Chemistry .....	3
CHEM 111	General Chemistry Lab .....	1
SPCH 106	Public Speaking I .....	3
		<b>16</b>

### Spring semester

RRES 440	Use of Natural Resources for Leisure ...	3
SOCIO 211	Introduction to Sociology .....	3
PSYCH 110	General Psychology .....	3
FOR 385	Computer Applications in Natural Resource Management .....	3
	<b>or</b>	
CIS 110	Introduction to Personal Computing .....	3
KIN 101	Principles of Physical Fitness .....	1
		<b>13</b>

### Sophomore

<b>Fall semester</b>		
ENGL 200	Expository Writing II .....	3
ECON 120	Principles of Microeconomics .....	3
FOR 330	Dendrology I .....	2
GEOL 100	Introductory Geology .....	3
FOR 375	Introduction to Natural Resource Management .....	3
	<b>or</b>	
FOR 285	Introduction to Forestry .....	3
Electives .....		3
		<b>17</b>

### Spring semester

AGRON 305	Soils .....	4
BIOL 210	General Botany .....	4
	<b>or</b>	
BIOL 201	Organismic Biology .....	5
FOR 340	Dendrology II .....	2

PHYS 115	Descriptive Physics .....	4
Western civilization or U.S. history course .....		3
		<b>17-18</b>

### Summer

RRES 350	Parks and Recreation Practicum .....	2
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### Junior

<b>Fall semester</b>		
RRES 490	Parks and Recreation Administration I ..	3
STAT 330	Elementary Statistics for the Social Sciences .....	3
	<b>or</b>	
STAT 340	Biometrics I .....	3
RRES 320	Recreation Group Dynamics .....	3
Arts/humanities course .....		3
Electives .....		3
		<b>15</b>

### Spring semester

BIOL 433	Wildlife Conservation .....	3
RRES 635	Methods of Environmental Interpretation .....	3
RRES 520	Research Methods in Parks and Recreation .....	3
RRES 489	Recreation Programming .....	3
MC 325	Fundamentals of Public Relations .....	3
		<b>15</b>

### Senior

<b>Fall semester</b>		
RRES 590	Park Operations and Facilities Management .....	4
BIOL 529	Fundamentals of Ecology .....	3
Professional/free electives .....		8-9
		<b>15-16</b>

### Spring semester

POLSC 520	State and Local Government .....	3
RRES 675	Dimensions of Recreational Behavior ...	3
Cultural diversity course .....		3
Professional/free electives .....		6
		<b>15</b>

### Internship

RRES 492	Internship in Parks and Recreation .....	3
The internship work experience is required after the junior year.		

### Park manager/ranger emphasis

Select three of the following:		
HORT 508	Landscape Maintenance .....	3
LAR 756	Design of Parks and Recreation Areas ..	3
RRES 575	Management of Water Resources for Leisure .....	3
HORT 585	Arboriculture .....	3
GEOG 705	Remote Sensing of the Environment .....	3
AGEC 525	Natural Resource Economics .....	3
PLPTH 500	Principles of Plant Pathology .....	3
ENTOM 312	General Entomology .....	2
ENTOM 313	General Entomology Lab .....	1
HORT 515	Turf Management .....	3
FOR 210	Forestry Graphics .....	2
FOR 311	Forestry Instruments .....	2
HORT 374	Woody Plant Materials I .....	3
HORT 375	Woody Plant Materials II .....	3

### Park interpreter emphasis

Select three of the following:		
MC 235	Mass Communication in Society .....	3
RRES 640	Advanced Environmental Interpretation .....	3
BIOL 542	Ichthyology .....	3
BIOL 543	Ornithology .....	3
BIOL 547	Herpetology .....	2
BIOL 612	Introductory Limnology .....	4
ENTOM 312	General Entomology .....	2
ENTOM 313	General Entomology Lab .....	1
GEOG 705	Remote Sensing of the Environment .....	3
FOR 210	Forestry Graphics .....	2
BIOL 551	Taxonomy of Flowering Plants .....	4
BIOL 544	Mammalogy .....	3

## Recreation and park administration

Bachelor of science in agriculture  
130 semester hours

### Freshman

<b>Fall semester</b>		
GENAG 101	Ag Orientation .....	1
ENGL 100	Expository Writing I .....	3
MATH 100	College Algebra .....	3
RRES 210	Introduction to the Park and Recreation Profession .....	2
CHEM 110	General Chemistry .....	3
CHEM 111	General Chemistry Lab .....	1
SPCH 106	Public Speaking I .....	3
		<b>16</b>

### Spring semester

PSYCH 110	General Psychology .....	3
KIN 101	Principles of Physical Fitness .....	1
FOR 385	Computer Applications in Natural Resource Management .....	3
	<b>or</b>	
CIS 110	Introduction to Personal Computing .....	3
RRES 440	Use of Natural Resources for Leisure ...	3
ECON 120	Principles of Microeconomics .....	3
		<b>13</b>

### Sophomore

<b>Fall semester</b>		
MKTG 400	Marketing .....	3
ENGL 200	Expository Writing II .....	3
GEOL 100	Introductory Geology .....	3
SOCIO 211	Introduction to Sociology .....	3
RRES 320	Recreation Dynamics .....	3
		<b>15</b>

### Spring semester

BIOL 210	General Botany .....	4
	<b>or</b>	
BIOL 201	Organismic Biology .....	5
GENBA 391	Administrative Communications .....	3
Cultural diversity course .....		3
Western civilization/U.S. history course .....		3
Arts/humanities course .....		3
		<b>16-17</b>

### Summer

RRES 350	Parks and Recreation Practicum .....	2
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### Junior

<b>Fall semester</b>		
PHYS 115	Descriptive Physics .....	4
MANGT 420	Management Concepts .....	3
RRES 490	Parks and Recreation Administration I ..	3
STAT 330	Elementary Statistics for the Social Sciences .....	3
	<b>or</b>	
STAT 340	Biometrics I .....	3
Electives .....		3
		<b>16</b>

### Spring semester

MC 325	Fundamentals of Public Relations .....	3
RRES 489	Recreation Programming .....	3
RRES 635	Methods of Environmental Interpretation .....	3
Electives .....		6
		<b>15</b>

### Senior

<b>Fall semester</b>		
MANGT 520	Organizational Behavior .....	3
RRES 520	Research Methods in Parks and Recreation .....	3
RRES 590	Park Operations and Facilities Management .....	4
LAR 756	Design of Recreation and Park Areas ...	3
Electives .....		3
		<b>15-16</b>

**Spring semester**

POLSC 520	State and Local Government .....	3
POLSC 737	Public Budgeting Techniques .....	3
RRES 675	Dimensions of Recreational Behavior ...	3
RRES 699	Parks and Recreation Administration II .....	3
Free electives*	.....	4-5
		<b>16-17</b>

**Internship**

RRES 492	Internship in Parks and Recreation .....	3
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The internship work experience is required after the junior year.

\*Select two of the following:

PLAN 315	Introduction to Planning .....	3
FOR 510	Urban Forestry .....	3
FOR 520	Urban Forestry Administration .....	3
AGEC 525	Natural Resource Economics .....	3

**Transferring into recreation resources**

Many students transfer into park resource management or recreation and park administration from other institutions. Students considering completing course work at a community college or other four-year institution should select from the list below the equivalent courses prior to coming to Kansas State University. Most of the courses listed are available at some, but not all, of the community colleges and other four-year institutions in Kansas. If you are uncertain whether a course will transfer, it is advisable to check with the Kansas State University's Office of Admissions or the Office of Academic Programs in the College of Agriculture before enrolling in a course. To earn a bachelor of science degree from Kansas State University, a maximum of 63 credit hours from a community college can be applied towards the recreation resources programs.

**Communications**

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 106	Public Speaking .....	3
MC 325	Fundamentals of Public Relations .....	3
		<b>12</b>

**Humanities/social sciences**

SOCIO 211	Introduction to Sociology .....	3
PSYCH 110	General Psychology .....	3
Western Civilization/U.S. History	.....	3
		<b>9</b>

**Math/chemical/physical sciences**

MATH 100	College Algebra .....	3
CHM 110	General Chemistry .....	3
CHM 111	General Chemistry Lab .....	1
PHYS 115	Descriptive Physics .....	4
GEOL 100	Introductory Geology .....	3
STAT 330	Elementary Statistics for Social Sciences .....	3
	or	
STAT 340	Biometrics I .....	3
		<b>17</b>

**Agriculture/biological sciences**

GENAG 101	Ag. Orientation .....	1
BIOL 210	General Botany .....	4
	or	
BIOL 201	Organismic Biology .....	5
AGRON 305	Soils .....	4
ENTOM 312	General Entomology .....	2
ENTOM 313	General Entomology Lab .....	1
		<b>16</b>

**Economics**

ECON 120	Principles of Microeconomics .....	3
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**Horticulture courses****Undergraduate credit**

**HORT 201. Introductory Horticultural Science.** (4) II. An introduction to the principles and practices of horticultural plant systems. Plant structure and function will be discussed along with the effects of environmental facets on plant growth. General cultural practices will be described including pest control, mineral nutrition, propagation. Three hours lec. and two hours lab a week. Pr.: High school biology/botany or concurrent enrollment in BIOL 210.

**HORT 210. Concepts of Floral Design.** (3) I. An introduction to the use of flowers and related products with emphasis on fundamentals of design. Two hours rec. and three hours studio a week. For majors or nonmajors.

**HORT 256. Human Dimensions of Horticulture.** (3) I, II. Introduction to horticulture applied in schools, psychiatric and medical hospitals, corrections, vocational rehabilitation centers, elderly programs, and consumer horticulture settings. Networking the art and science of horticulture with architecture, business, social sciences, health care, horticulture, and education. Two hours lec. and one hour rec. a week.

**HORT 350. Plant Propagation.** (3) I. Designed to develop proficiency in 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 two hours lab a week. Pr.: HORT 201.

**HORT 374. Woody Plant Materials I.** (3) I. Identification, ornamental characters, site requirements, and use of woody ornamental deciduous trees and shrubs with special emphasis on the cultivated varieties. Weekly labs consist of lengthy walking campus tours to identify plant specimens. Two hours lec. and two hours lab a week. Pr.: BIOL 198, BIOL 210, or HORT 201.

**HORT 375. Woody Plant Materials II.** (3) II. Identification, ornamental characters, site requirements, and use of woody ornamental conifers, broadleaf evergreens, vines, ground covers, deciduous flowering shrubs, and small-to-medium-size flowering trees. Weekly labs consist of lengthy walking campus tours to identify plant specimens. Two hours lec. and two hours lab a week. Pr.: BIOL 198, BIOL 210 or HORT 201; and HORT 374.

**HORT 376. Herbaceous Ornamental Plants.** (3) I. Identification, ornamental characters, culture, propagation, and use of herbaceous annuals and perennials. Two hours rec. and two hours lab. a week. Pr.: BIOL 210 and HORT 201.

**HORT 377. Plants in the Interior Environment.** (3) II. Identification, ornamental characters, culture, propagation, and use of foliage plants in the interior environment. Two hours lec. and two hours lab. a week. Pr.: BIOL 210 and HORT 201.

**HORT 390. Horticulture Topics.** (Var.) I, II, S. Lectures and discussion of topics of importance to undergraduate majors. Pr.: Consent of instructor.

**HORT 450. Horticultural Design.** (3) I. The selection, location and arrangement of plants and other permanent features of the landscape around homes and other similar areas. Two hours lec. and two hours lab a week. Pr.: HORT 374, 375 and 376.

**Undergraduate and graduate credit in minor field**

**HORT 508. Landscape Maintenance.** (3) II. Fundamental principles of maintaining ornamental plantings of trees, shrubs, perennials, and turf in the nursery, home grounds, parks, and similar areas. Three hours rec. a week. Pr.: HORT 374 and/or 375.

**HORT 515. Turfgrass Management.** (3) I. Turfgrass identification and adaptation; establishment and maintenance of lawn and recreational turf areas; turfgrass pests and their control. Two hours rec. and two hours lab each week. Pr.: HORT 201 and AGRON 305.

**HORT 517. Golf Course Operations.** (3) II, in odd years. Strategies involved in golf course operation, including de-

velopment of cultural practices, adherence to environmental regulations, personnel management, and budgeting. Two hours lec. and two hours lab. a week. Pr.: HORT 515.

**HORT 520. Fruit Production.** (3) I. Principles and practices of cultivating fruit and nut crops commercially. Laboratory offers experiences in pomological practices. Two hours rec. and two hours lab a week. Pr.: HORT 201 and HORT 350.

**HORT 525. Horticulture For Special Populations.** (3) I. An intensive study of the concepts and methods of using plants and gardening as therapeutic activities with developmentally disabled, geriatric, economically and socially disadvantaged, emotionally disturbed, or educationally deprived clients. Two hours rec. and two hours lab a week. Pr.: BIOL 210 or HORT 201.

**HORT 530. Horticultural Therapy Seminar.** (1) II. Guest lecturer and student presentations of topics relating to professionalism, current issues, or goals of horticultural therapy. The course is intended to help students focus expectations and assumptions about a professional career in horticultural therapy and to give them practice in articulating their understanding of the field. One hour rec. a week. Pr.: HORT 256 and 525.

**HORT 535. Horticultural Therapy Field Techniques.** (3) I, II. Students under supervision will plan, conduct, and evaluate horticultural therapy activities at Manhattan institutional sites selected according to student's interest. A weekly discussion session addresses evaluation and issues of professionalism. Two hours rec. and two hours lab a week. Pr.: HORT 525.

**HORT 540. Horticultural Therapy Field Experiences.** (12) I, II. Supervised training at institutions with horticultural therapy programs to gain experience in the application and use of horticultural activities for special populations. Six months intensive training provided within student's specialization. Pr.: HORT 535.

**HORT 551. Landscape Contracting and Construction.** (3) II. The use, interpretation, and development of planting plans (including contracting, construction, and specifications) as applied to landscape horticulture. Two hours rec. and two hours lab a week. Pr.: HORT 450.

**HORT 560. Vegetable Crop Production.** (3) II. Study of production principles and cultural practices involved in the growing of vegetable crops. Two hours lec. and two hours lab or field trips a week. Pr.: HORT 201.

**HORT 570. Greenhouse Operations Management.** (3) I. Greenhouse systems operations and management including greenhouse layout; structures; glazing materials; heating, ventilation, irrigation, lighting, benching, growing medium handling, and fertilization systems; traffic flow; crop handling, processing and shipping. Two hours rec. and two hours lab a week. Pr.: HORT 201.

**HORT 575. Nursery and Garden Center Operations.** (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. Garden center layout, pricing, mark-up, inventory, plant maintenance, and financing will be discussed. Two hours rec. and three hours lab a week. Pr.: BIOL 210, HORT 350 and AGRON 305.

**HORT 582. Horticultural Pest Management.** (3) II. Strategies involved in horticultural pest management including types, calibration and operation of application equipment, pesticides, legal and safety issues, and non-pesticide control methods. Two hours lec. and three hours lab. a week. Pr.: HORT 201 or BIOL 210, MATH 100, and an entomology, plant pathology, or weed science course.

**HORT 585. Arboriculture.** (3) I. Principles and practices of maintaining shade and ornamental trees under urban environments. Two hours rec. and two hours lab a week. Pr.: HORT 201 and HORT 374 or FOR 330.

**HORT 590. Horticulture Internship.** (3 or 6) I, II, S. Principles of commercial or public horticulture activity including exposure to multiple phases of the working horticulture operation. Students will be placed according to specific interest. Required for horticulture majors after having completed 60 hours. Pr.: HORT 201, plus one 500-level horticulture commodity course.

**Undergraduate and graduate credit**

**HORT 625. Floral Crops Production and Handling.** (4) II. In odd years. The principles and commercial practices for producing floral crops emphasizing the physical responses of plants to their environment. Aspects of postharvest physiology are also covered. Three hours lec. and three hours lab a week. One Saturday field trip will be taken. Pr.: BIOL 500, HORT 350 and 570.

**HORT 640. Horticulture Problems.** (Var.) I, II, S. Problems and reports in floriculture, olericulture, ornamental horticulture, pomology, turfgrass, and horticultural therapy. Pr.: Consent of instructor.

**HORT 706. Turfgrass Science.** (3) II, in even years. Water, temperature, light, soil, and management stresses affecting turfgrass growth; cultural practices that reduce injury. Three hours lec. a week. Pr.: HORT 515.

**HORT 725. Postharvest Technology and Physiology of Horticultural Crops.** (3) I, in even years. A study of the principles and practices involved in the harvesting, handling and storage of horticultural products. The relationship of plant structure and physiology will be emphasized in discussing effects of postharvest handling and storage to maximize quality and shelf life of products. Three hours lec. a week. Pr.: One horticulture commodity course and BIOL 500.

**HORT 751. Human Issues in Horticultural Therapy.** (3) I. New developments and applications of gardening or horticultural activities for special populations will be emphasized. Procedures for management of horticultural therapy programs, designing therapeutic or rehabilitation activities, and evaluation methods will be discussed. Reading of selected research publications relating to horticultural therapy will be assigned. Three hours rec. a week. Pr.: HORT 525 and a course in statistics.

**HORT 780. Topics in Horticulture.** (Var.) I, II, S. Discussion and lectures of important papers and contributions in this field. Pr.: Consent of instructor.

**Forestry courses****Undergraduate credit**

**FOR 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 per week.

**FOR 285. Introduction to Forestry.** (3) I. An introduction to American forestry including: forestry heritage in the U.S., importance of forests, multiple-use concepts, management practices, utilization, protection, policy, and the profession of forestry.

**FOR 311. Forestry Instruments.** (2) I. Introduction to the use of instruments and applied measurements used in forestry and related resources. One hour lec. and three hours lab a week.

**FOR 321. Forestry Resource Topics.** (1) I. Student presentation of ideas, practices, and concepts in forestry or related areas. One hour rec. a week.

**FOR 330. Dendrology I.** (2) I. Identification, classification, silvical characteristics, distribution, and economic significance of North American angiosperm trees. One hour rec. and three hours lab a week. Pr.: BIOL 210 or equiv.

**FOR 340. Dendrology II.** (2) II. Identification, classification, silvical characteristics, distribution, and economic significance of North American gymnosperm trees. One hour rec. and three hours lab a week. Pr.: BIOL 210 or equiv.

**FOR 375. Introduction to Natural Resource Management.** (3) I. A survey of historic and present-day uses, problems, and basic management approaches associated with our renewable and nonrenewable natural resources. The impact of society, economics, law, politics, and philosophy on the management and use of our natural resources will also be examined.

**FOR 385. Microcomputer Applications in Natural Resource Management.** (3) II. A microcomputer course designed to develop basic skills needed by natural resource management professionals. The course will emphasize use of the microcomputer for communication of written and graphic information, record keeping, decision making, bud-

geting, and investment analysis. Two hours lec. and two hours lab a week. Pr.: FOR 285 or 375.

**Undergraduate and graduate credit in minor field**

**FOR 510. Urban Forestry.** (3) I. A study of the urban forest ecosystem, with an emphasis on its management aspects. The course provides an indepth study of the theory and practical application of integrated management of the urban forest resource. The following areas will be emphasized: the role environment plays in management, watershed protection, water conservation, and research. Three hours lec. a week. Pr.: BIOL 210 or HORT 201 and either FOR 330 and FOR 340 or HORT 374 and HORT 375.

**FOR 520. Urban Forest Administration.** (3) II. This course is a study of urban and community forest administration. It considers the urban forest ecosystem involving an in-depth look at ownerships, composition, distribution, benefits, values, and administrative operation. The policies and politics of successful administration will be emphasized. Three hours lec. a week. Pr.: FOR 510.

**Undergraduate and graduate credit**

**FOR 641. Forestry Problems.** (1–3) I, II, S. Work is offered in various fields of forestry. Pr.: Consent of instructor.

**FOR 643. Agroforestry Systems.** (2) II. Study of the woody and non-woody components of the land use management systems used in much of the world. Topics will include international agriculture and forestry covering the interaction of crops, livestock, and woody plants. The agroforestry concept, classification of systems, practices used worldwide, and the contribution of agroforestry to local economies of lesser developed countries will be examined. Two hours lec. a week. Field trip required. Pr.: BIOL 201 or BIOL 210 or HORT 201.

**Recreation resources courses****Undergraduate credit**

**RRES 210. Introduction to the Park and Recreation Profession.** (2) I. Coverage of the parks and recreation profession to include, federal, state, county, and local agencies and positions. Private sector careers will also be examined. Two hours lec. a week.

**RRES 320. Recreation Group Dynamics.** (3) I. Principles and methods of organizing and directing individual and group leisure activities and experiences. A mixture of lecture and experiential education. Field trips required. Two hours lec. and one and one-half hours lab a week.

**RRES 350. Parks and Recreation Practicum.** (2) I, II, S. Required professional employment (240 hrs., 6 weeks): 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 resource management.

**RRES 440. Use of Natural Resources for Leisure.** (3) II. A survey of the concepts, history, present status, and goals of outdoor recreation for leisure. Three hours lec. a week.

**RRES 489. Recreation Programming.** (3) II. A study of the design, supply, and marketing of recreation programs by a variety of public, private, and commercial recreation and park agencies. Three hours lec. a week.

**RRES 490. Parks and Recreation Administration I.** (3) I. A focus on basic skills specific to the management of public recreation and park agencies. Includes special emphasis on finance and budgeting, organizational structure, risk management, and an introduction to policy formulation. Three hours lec. a week.

**RRES 492. Internship in Parks and Recreation.** (3) I, II, S. An intensive, paid practical experience with an approved agency, extending over a 10-week, 400-hour span. For seniors only.

**Undergraduate and graduate credit in minor field**

**RRES 520. Research Methods in Parks and Recreation.** (3) I. A study of basic research techniques and the application of specific methodologies in the analyses of recreation and park problems. Three hours lec. per week. Pr.: STAT 330 or 340.

**RRES 575. Management of Water Resources for Leisure.** (3) II. A study of the management of water resources for leisure time uses. The course investigates the use of rivers, lakes, reservoirs, and marine resources. Management considerations, including agency policy formation, legal rights, use conflicts, and use valuation are covered.

**RRES 590. Park Operations and Facilities Management.** (4) I. Planning, execution, and supervision of field maintenance, operations, and facilities management to include: job planning, budgeting, equipment selection and maintenance, and personnel practices. Three hours lec. and two hours lab a week. Pr.: Junior standing, RRES 440 and 489.

**Undergraduate and graduate credit**

**RRES 635. Methods of Environmental Interpretation.** (3) II. This course focuses on principles and techniques necessary to communicate environmental and cultural values to visitors in park areas. The philosophy, theory, design, and application of interpretive media to communicate information about the environment is studied. Two hours rec. and three hours lab a week. Field trips required. Pr.: FOR 375 and RRES 440.

**RRES 640. Advanced Environmental Interpretation.** (3) II. This course builds on the principles and interpretive techniques which are introduced in RRES 635. Specifically, labs emphasize development of personal interpretive skills and students are introduced to interpretive media not covered in RRES 635 (e.g., video equipment, computers, etc.) The lecture and readings focus on the philosophy of interpretation and the theoretical framework for designing and evaluating interpretive strategies. One hour lec. and four hours lab a week. Field trips required. Pr.: RRES 635.

**RRES 675. Dimensions of Recreational Behavior.** (3) II. A case study of the motivational factors and trends affecting recreational visitation patterns, including: attitudes, preferences, and satisfaction measurements. Three hours lec. a week. Pr.: RRES 490.

**RRES 699. Parks and Recreation Administration II.** (3) II. A focus on personnel management, liability and political issues and funding options for park or recreation agencies. Three hours rec. a week. Field trips required. Pr.: RRES 490.

**RRES 705. Parks and Recreation Theory and Policy.** (3) I, II. On sufficient demand. An analysis of the values, principles, theories, and processes of public policy development as it applies to the park and recreation profession. Three hours lec. a week. Pr.: RRES 489.

**RRES 799. Problems in Parks and Recreation.** (Var. 1–3) I, II, S. A special investigation of a problem in parks and recreation normally requiring a combination of experiential work, research, and writing. Pr.: RRES 520 or 590.

**Plant Pathology**

Fred W. Schwenk,\* Head

Professors Bockus,\* Claflin,\* Gill,\* Hetrick,\* Johnson,\* Schwenk,\* and Stuteville;\* Associate Professors Jardine,\* Leach,\* Leslie,\* Pfender,\* Tisserat,\* and White;\* Assistant Professors Bowden,\* Heaton,\* and Hulbert;\* Instructors O'Mara and Todd;\* Adjunct Associate Professor Eversmeyer;\* Adjunct Assistant Professors Appel, Sauer,\* and Sim; Emeriti: Professors King and Willis;\* Adjunct Associate Professor Browder.\*

Plant pathology is the study of plant diseases, their causes, effects, nature, and control. Opportunities for graduates in plant pathology include basic and applied research, development, and teaching.

## Plant pathology minor

Students interested in the study of plant diseases should consider the plant pathology minor. The minors program in plant pathology requires a minimum of 15 semester hours.

### Required courses (8 hours):

PLPTH 500	Principles of Plant Pathology .....	3
PLPTH 607	Plant Disease Diagnosis .....	2
PLPTH 613	Plant Disease Control .....	3

### At least 7 additional hours from the following:

PLPTH 650	Plant Nematology .....	3
PLPTH 735	Plant Virology .....	3
PLPTH 740	Plant Pathogenic Bacteria .....	3
PLPTH 745	Plant Pathogenic Fungi .....	3
Any other course in plant pathology		
AGRON 645	Soil Microbiology .....	3
BIOL 455	General Microbiology .....	4
BIOL 604	Biology of the Fungi .....	3
ENTOM 300	Economic Entomology .....	3
or		
ENTOM 312	General Entomology .....	2
and		
ENTOM 313	General Entomology Lab .....	1

## Plant pathology courses

### Undergraduate and graduate credit in minor field

**PLPTH 500. Principles of Plant Pathology.** (3) II. An introductory class in the nature of plant pathogens and the cause, effect, and control of plant diseases. Diseases of field and horticultural crops will be addressed. Two hours lec., one two-hour lab a week. Not open to students with credit for PLPTH 510 or 520. Pr.: BIOL 198, 210 or equiv., and junior standing.

### Undergraduate and graduate credit

**PLPTH 607. Plant Disease Diagnosis.** (2) I. Theory and principles, with laboratory and practical experience in diagnosing diseases of field crops and horticultural plants. Two hours lec. and four hours lab a week. To meet first 10 weeks of semester. Pr.: PLPTH 500.

**PLPTH 613. Plant Disease Control.** (3) I. Disease control strategies are developed in a practical manner. Control economics and practices are considered in relation to principles and current research. Biological, cultural, physical, chemical, and regulatory methods are discussed. Two hours lec., one two-hour lab a week. Pr.: PLPTH 500.

**PLPTH 650. Plant Nematology.** (3) II, in even years. An introduction to the morphology, taxonomy, and ecology of phytoparasitic and free-living nematodes found in plants, soil, and fresh water. Emphasis is on the identification and control of plant parasitic nematodes and on lab techniques used in their study. Two hours lec., one two-hour lab a week. Pr.: An introductory course in plant pathology.

**PLPTH 735. Plant Virology.** (3) I, in odd years. A study of the classification, etiology, epidemiology, molecular biology, genetics, and evolution of plant-infecting viruses, with emphasis on viruses and viral diseases of importance to Kansas. The laboratory will emphasize general research techniques and equipment usage, particularly transmission, symptomatology, serology, centrifugation, nucleic acid extraction, and electrophoresis of plant viruses. Two hours lec., one four-hour lab a week. Pr.: Genetics, General Biochemistry and lab, and an introductory course in plant pathology; or consent of instructor.

**PLPTH 740. Plant Pathogenic Bacteria.** (3) II, in odd years. The etiology, epidemiology, dissemination and survival, taxonomy, mechanisms of pathogenicity, serology, host-parasite relations, control measures, and principles and methods of identifying plant pathogenic bacteria. Lab sessions will be devoted to use of general lab equipment and research techniques. Six hours combined lec./lab a week. Pr.: General Biochemistry, introductory course in plant pathology. Enrollment limited to 12 students.

**PLPTH 745. Plant Pathogenic Fungi.** (3) I, in even years. The isolation, handling, storage, inoculation, terminology, and taxonomy of fungal pathogens of plants. Particular attention will be given to techniques used to study fungi and to the genus and species concepts for important plant pathogenic fungal genera. Two hours lec., one three-hour lab a week. Pr.: PLPTH 500 and BIOL 640.

**PLPTH 750. Problems in Plant Pathology.** (1-3) I, II, S. Work is offered in general plant pathology, plant virology, plant nematology, disease physiology, epidemiology, and disease diagnosis. Pr.: Background of courses needed for the problem undertaken.

**PLPTH 760. Plant Pathology Methods.** (3) I, in even years. Practical lab methods in manipulating plant pathogens with emphasis on the isolation, culture, identification, inoculation, and preservation of plant pathogenic bacteria and fungi. One hour lec. and five hours lab a week. Pr.: PLPTH 500 or equiv. Enrollment limited to 12 students.

# Architecture and Design

Lane L. Marshall,\* Dean  
Ray Weisenburger,\* Associate Dean  
Lynn Ewanow, Assistant Dean

115 Seaton Hall  
532-5950

The College of Architecture and Design offers opportunities for professional study in architecture, interior architecture, landscape architecture, and regional and community planning.

The college consists of three academic departments: architecture, interior architecture, and landscape architecture/regional and community planning.

The curriculum in architecture is accredited by the National Architectural Accrediting Board (NAAB). The interior architecture curriculum is accredited by the Foundation for Interior Design Education and Research (FIDER). The landscape architecture curricula are accredited by the Landscape Architectural Accreditation Board (LAAB). The planning curriculum is accredited by the American Planning Association (APA) in cooperation with the Association of Collegiate Schools of Planning (ACSP).

Bachelor's degrees are offered in architecture, interior architecture, and landscape architecture. Graduate degrees are offered in architecture, landscape architecture, and regional and community planning.

## General Requirements

### 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. Additional information concerning acceptable electives is available at the dean's office or departmental offices.

### Student projects

All programs involve extensive project work. Students are advised to budget sufficient funds to cover the cost of materials and supplies. Material costs will be higher than those published for nonstudio curricula.

Student projects, assignments, presentations, and models may be retained by the various departments. Students are advised to assemble

photographic files of their work for their portfolios.

### Transfer students

In addition to credit for general studies courses, transfer credit for professional courses equivalent to those offered by the College of Architecture and Design will be accepted if earned in environmental design programs accredited by NAAB, FIDER, or LAAB. Students who have questions concerning the transfer of specific courses should contact the dean's office.

## Options

### Design Discovery Program

The Design Discovery Program is an intensive design experience for students who are curious about the environmental design fields of architecture, interior architecture, landscape architecture, or regional and community planning. The program is offered in early summer for high school, community college, and other students not currently enrolled in the College of Architecture and Design.

Participants are offered an opportunity to learn about the challenges and rewards of a career in environmental design through direct interaction with professional designers.

Students explore their interests and abilities through a series of design exercises. Students who find the challenge of environmental design satisfying are given assistance in planning future courses of study.

### Concurrent degree program

The nature of the environmental design professions makes concurrent study toward a degree in a variety of other fields an attractive and logical decision for some students. Early development of such academic plans will allow the student sufficient time to coordinate courses and to plan enrollments. Interested students should contact the dean's office.

### Secondary majors

Certain departmental courses have been approved for credit toward the secondary major in gerontology, international studies, and women's studies. A listing of the approved courses may be found in the Secondary Majors section of this catalog.

### Admission to the college

Enrollment in the College of Architecture and Design is limited. Students are admitted twice a year into the fall and spring semester studio

classes of Environmental Design Studies (ENVD). Those entering in the spring semester may be required to complete the first-year course during the summer school terms.

High school applicants and college transfer students who seek admission to the College of Architecture and Design, must file both (a) an application for university admission and (b) a freshman or transfer student self-report form for review by the Office of Admissions. These two forms can be mailed to the Office of Admissions at any time.

Admission decisions are made on a rolling basis. Students who are in the top 25 percent of their class are encouraged to apply in the fall semester of their senior year. Other students should complete their applications immediately after the 7th-semester high school transcripts are available.

Admission application forms and self-report forms may be obtained by contacting the dean's office or the Office of Admissions.

## Center for Planning and Design Innovation

Richard Forsyth, Director

The Center for Planning and Design Innovation coordinates the applied research and service activities of the college's three departments. CPDI has three objectives: to assist faculty in their efforts to develop new knowledge and methods to solve problems related to the planning, design, and management of the built and natural environment; to provide advisory support to planning and design practitioners, business/industry personnel, public agency staff, and special user groups in solving complex planning and design problems; and to assemble and disseminate new knowledge in these areas.

## Environmental Design Studies

All students in the first-year undergraduate programs of the College of Architecture and Design are enrolled in the Environmental Design Studies Program. In the first year students are introduced to the knowledge, concerns, attitudes, methods, and skills common to the environmental design professions of architecture, interior architecture, interior design, landscape architecture, and regional and

community planning. After successful completion of these course requirements students undertake the professional curricula in the degree-granting departments.

Courses in the Environmental Design Studies curriculum, which carry a DSFN designator, are offered in a joint venture for students in the design programs from two colleges, Architecture and Design, and Human Ecology. The three DSFN-designated courses form part of a common foundation of the environmental design fields.

Participation in environmental design studies courses, together with a close working relationship with faculty advisors, helps students make informed career choices within, and sometimes outside, the fields of study represented.

Transfer students are welcome into the Environmental Design Studies Program for both the fall and spring terms and will be placed in the program according to the college-level work which they have already completed. It is sometimes possible to complete the basic ENVD requirements in one semester and a summer.

## Environmental design studies

### 100 ENVD

The curriculum for the first year forms the foundation of the five-year accredited professional programs in architecture, interior architecture, and landscape architecture.

Total hours required for ENVD curriculum ..... 31 minimum

#### First semester

DSFN 201	Environmental Design Studio I .....	4
MATH 100	College Algebra .....	3
ENVD 250	History of the Designed Environment I .....	3
DSFN 203	Survey of the Design Professions .....	1
ENGL 100	Expository Writing I .....	3
KIN 101	Principles of Physical Fitness .....	1
		<b>15</b>

#### Second semester

DSFN 202	Environmental Design Studio II .....	4
PHYS 113	General Physics* .....	4
<b>or</b>		
PHYS 115	Descriptive Physics*	
ENVD 251	History of the Designed Environment II .....	3
ENGL 120	Expository Writing II .....	3
SPCH 105	Public Speaking IA .....	2
		<b>16</b>

\*Which physics course is selected depends upon the satisfactory completion of appropriate prerequisites.

High school mathematics prerequisites: Entering freshman or transfer students should have fulfilled the minimum prerequisites of: algebra I (one unit); plane geometry (one unit); algebra II (one unit); and trigonometry (one-half unit) before entering the College of Architecture and Design. The prerequisites may be fulfilled at K-State, or elsewhere, with the exception of geometry, which is not taught at K-State.

After satisfactory completion of the environmental design studies, students are eligible to apply for admission to the Department of Architecture, the Department of Interior Architecture, the Department of Landscape Architecture/Regional and Community Planning, or the Department of Interior Design in the College of Human Ecology.

## Environmental design studies courses

### Undergraduate credit

**DSFN 201 and 202. Environmental Design Studio I and II.** (4 each). Foundation studies introducing principles, processes, and vocabularies of environmental design. Instruction in two and three dimensional visualization of objects and spaces. Instruction in the use of instrument-aided drawing, freehand drawing, and model building to represent and communicate design ideas at different scales of observation. Pr.: Admission to the College of Architecture and Design, the College of Human Ecology, or permission of the dean of either college.

**DSFN 203. Survey of the Design Professions.** (1) I. Overview of the design professions. Comparative study of the working methods, and societal and occupational roles of the architect, interior architect, landscape architect, and planner.

**ENVD 205. Graphics I.** (2) I, II, S. Instruction in instrument-aided drawing as a basic tool for communicating information about environmental subjects. Four hours of studio a week. Pr.: Permission of the College of Architecture and Design.

**ENVD 206. Graphics II.** (2) I, II, S. Instruction in the principles and methods of perspective drawing. Perspective drawing is used as a basic tool for communicating information about design components and properties. Four hours of studio a week. Pr. ENVD 205.

**ENVD 220. Theory of Environmental Design I.** (2) An introduction to the social, cultural, and behavioral factors in environmental design. Two hours lec. a week.

**ENVD 222. Theory of Environmental Design II.** (2) And introduction to the relationship of the natural environment to the life within it and as a factor in environmental design. Two hours lec. a week. Pr.: ENVD 220.

**ENVD 224. Theory of Environmental Design III.** (2) An introduction to elements of design; visual and aesthetic factors relating the designed environment to human needs. Two hours lec. a week. Pr.: ENVD 222.

**ENVD 226. Theory of Environmental Design IV.** (2) An introduction to the relationship of science and technology to the designed environment. Two hours lec. a week. Pr.: ENVD 224.

**ENVD 250 and 251. History of the Designed Environment I and II.** (3 each) A chronological survey of the built and designed environment in the context of the socio-cultural, artistic, technological, economic, and political factors. Three hours lecture per week.

**ENVD 250. History of the Designed Environment I.** (3) I. The history of the designed environment from ancient times to the 12th century.

**ENVD 251. History of the Designed Environment II.** (3) II. The history of the designed environment from the 12th century to the mid-18th century. Pr.: ENVD 250 or permission of instructor.

**ENVD 299. Problems in Basic Design.** (Var.) I, II, S. A study of specified problems in elementary environmental design under the guidance of a member of the staff. Pr.: Approval of department head.

## Architecture

Eugene Kremer,\* Head

Susanne Siepl-Coates,\* Associate Head

Professors Coates,\* DeVilbiss, Garvin, Hoag,\* Jahnke,\* Kremer,\* Norris-Baker,\* Seamon,\* Stotesbury,\* and D. Watts;\* Associate Professors Charney,\* Condia,\* Jones, McNamara,\* Owens-Wilson,\* Sachs,\* Selfridge,\* Siepl-Coates,\* Streeter, C. Watts,\* and Wendt; Assistant Professors Arens, Clarke,\* Closet, Hagood Lowe, Knox,

Krstic,\* J. Lowe,\* Ornelas, Pecar, and Simon; Instructor: Anderson; Adjunct Professors Barucchieri and Seligson; Emeriti: Professors Chang,\* Christensen,\* Ernst,\* Fischer,\* Foerster,\* Heintzelman,\* Krider,\* Sanner,\* and Slack.

One of the few certainties the future holds is change. For this reason, the professional program in architecture emphasizes principles, analytical processes, and communication in addition to development of technical skills and knowledge. The program consists of interrelated groups of professional courses in design, history and theory, planning and programming, environmental analysis and technology, and professional practice, as well as an elective group. The design studio sequence synthesizes information introduced in other courses and explores design issues and processes.

Optional study experiences are available through study in Italy, Denmark, Japan, Kansas City, or a 30-week internship program. The internship offers experience in professional offices, industry, or governmental agencies where students consolidate their academic experience before undertaking the final year of undergraduate study.

To become an architect, almost every state requires an accredited professional degree. Two types of degrees are accredited by the National Architectural Accrediting Board (NAAB): the master of architecture, which requires a minimum of three years following an unrelated bachelor's degree or two years following a related preprofessional bachelor's degree; and the bachelor of architecture, which requires a minimum of five years of study. These professional degrees are structured to educate architects. Those who aspire to registration and licensure should consider a program of this type. Four-year preprofessional degrees are not accredited by NAAB. Such degrees provide students with less extensive study of architecture than do professional degrees.

A preprofessional degree is useful for those who wish a strong foundation in the field of architecture. It will prepare those who wish to continue their architectural education in a professional program, or to seek employment options in related areas.

The bachelor of architecture degree offered by Kansas State University is the NAAB accredited professional degree.

## Architecture program

### 115 AR

Total hours required for graduation ..... 163

This curriculum is subject to regular revision. Students should obtain a copy of the current curriculum when they enter the architecture curriculum.

For the curriculum requirements for the first two semesters, see Environmental Design Studies earlier in this section.

**Third semester**

ARCH 302	Architectural Design Studio I .....	4
	or	
ARCH 303**	Architectural Design Studio IA .....	6
ARCH 248	Building Science .....	3
ARCH 348	Structural Systems in Architecture I .....	3
ARCH 350	History of the Designed Environment III .....	3
CIS 110	Introduction to Personal Computing .....	3
		<b>16</b>

**Fourth semester**

ARCH 304	Architectural Design Studio II .....	4
ARCH 449	Structural Systems in Architecture II ....	3
ARCH 325	Environmental Design and Society .....	3
ARCH 413	Environmental Systems in Architecture I .....	4
Electives*	.....	3
		<b>17</b>

**Fifth semester**

ARCH 403	Architectural Design Studio III .....	5
ARCH 452	Structural Systems in Architecture III ...	3
LAR 500	Site Planning and Design .....	3
Electives*	.....	6
		<b>17</b>

**Sixth semester**

ARCH 404	Architectural Design Studio IV .....	5
ARCH 433	Building Construction Systems in Architecture I .....	3
ARCH 453	Structural Systems in Architecture IV ...	3
ARCH 514	Environmental Systems in Architecture II .....	3
Electives*	.....	3
		<b>17</b>

**Seventh semester**

ARCH 605	Architectural Design Studio V .....	5
ARCH 434	Building Construction Systems in Architecture II .....	3
ARCH 515	Environmental Systems in Architecture III .....	3
ARCH 650	Architectural Programming .....	3
ARCH 720	Environment and Behavior .....	3
		<b>17</b>

**Eighth semester**

ARCH 606	Architectural Design Studio VI .....	5
Electives*	.....	10
		<b>15</b>
	or	
ARCH 505	Architectural Internship Part A .....	12
ARCH 506	Architectural Internship Part B .....	3
		<b>15</b>

**Ninth semester**

ARCH 706	Architectural Design Studio VII .....	5
ARCH 705	Project Programming .....	2
ARCH 753	Professional Practice .....	3
Electives*	.....	6
		<b>16</b>

**Tenth semester**

ARCH 707	Architectural Design Studio VIII .....	5
ARCH 680	Development Analysis .....	3
Electives*	.....	9
		<b>17</b>

\*A minimum of 15 general elective credits, of which at least 6 must be in courses numbered 300-level or above, must be completed in sciences, social sciences, and/or humanities offered outside the College of Architecture and Design. A minimum of 22 professional support electives must be completed, of which 9 credit hours must be taken in architectural history (3), architectural theory (3) and planning (3) offered by the College of Architecture and Design.

\*\*For transfer students only.

## Architecture courses

### Undergraduate credit

**ARCH 248. Building Science.** (3) I. Instruction in the materials of building and landscape design; sources, character-

istics and uses in design and construction; emphasis on evaluation and selection. Two lectures and one recitation per week. Pr.: Second-year standing and PHYS 113.

**ARCH 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, landscape architecture, or interior architecture curricula.

**ARCH 302. Architectural Design Studio I.** (4) I. Instruction in architectural design focusing on the application of elements and principles of form and space in design. Instruction in the use of techniques for visually representing design ideas. Pr.: Admission to the architecture program and DSFN 102.

**ARCH 303. Architectural Design Studio 1A.** (6) I. This course integrates material from Environmental Design Studio I and II with ADS I. Twelve hours of studio a week. Pr.: For transfer students: 9 or more credit hours of graphics, design, and freehand drawing and enrollment in the Department of Architecture.

**ARCH 304. Architectural Design Studio II.** (4) II. Instruction in architectural design focusing on the synthesis of basic social, functional, technical, and aesthetic factors in design. Continued instruction in techniques for visually representing design ideas. Pr.: ARCH 302.

**ARCH 325. Environmental Design and Society.** (3) II. Instruction in behavioral, cultural, and ecological factors that contribute to successful environmental design; considers how the design process is affected by a conceptual point of view. Case studies from architecture, landscape architecture, interior architecture, and interior design. Three hours lecture a week. Pr.: Second-year standing or permission of instructor.

**ARCH 348. Structural Systems in Architecture I.** (3) I. Introduction to statics; force analysis and the study of forces in equilibrium; principles of statics as applied to the study of simple elemental structures; the origin, the nature, and the action of loads on structural systems. Instruction in the use of statics in the preliminary stages of building design. Three hours lecture, two hours recitation a week. Pr.: PHYS 113, MATH 100.

**ARCH 350. History of the Designed Environment III.** (3) I. The history of the designed environment from the mid-18th century through present. Pr.: ENVD 251 or permission of instructor.

**ARCH 403 and ARCH 404. Architectural Design Studio III and IV.** Relation of structures to their environment; client and community restraint; development of building programs; synthesis of functional, technical, and aesthetic considerations in the design of structures for human use. Twelve hours studio a week.

**ARCH 403. Architectural Design Studio III.** (5) I. Pr.: ARCH 402 and not more than one D in an architectural design course.

**ARCH 404. Architectural Design Studio IV.** (5) II, S. Pr.: ARCH 403 and not more than one D in an architectural design course.

**ARCH 413. Environmental Systems in Architecture I.** (4) II. Instruction in bioclimatic and ecological design principles as a basis for architectural and landscape design. Emphasis on passive solar heating and cooling and daylighting. Three hours lecture and one hour recitation a week. Pr.: PHYS 113 and enrollment in a professional program in the college.

**ARCH 433 and ARCH 434. Building Construction Systems in Architecture I and II.** (3 each). These courses deal with development of decision-making skills related to building construction systems in architecture and with preparation of written and graphic communications which illustrate and direct the construction process. Methodologies for evaluating, selecting, manipulating, and interfacing building systems and materials are introduced with reference to changing technological, regulatory, and economic environments and their impact on building design. Materials properties, sequence of assembly, and studies of the construction process are reviewed. Two hours lec. and five and one-half hours of studio a week.

**ARCH 433. Building Construction Systems in Architecture I.** (3) II. Pr.: ARCH 248, 348, and admission to a professional program in the college.

**ARCH 434. Building Construction Systems in Architecture II.** (3) I. Pr.: ARCH 433.

**ARCH 449. Structural Systems in Architecture II.** (3) II. Instruction in strength of materials focusing on the behavior of building materials under loading; their ability to resist deformation and failure. Instruction in sizing simple structural elements. Three hours lecture, two hours recitation a week. Pr.: ARCH 348.

**ARCH 452. Structural Systems in Architecture III.** (3) I. Instruction in the design of building structures as whole systems. Instruction in the principles of structural subsystem design; emphasis on the overall structural behavior and subsystems integrity required to achieve a variety of building forms. Instruction in strategies for the use of approximation in the manipulation of key quantitative properties of whole systems and major subsystems in building design. Three hours lecture, two hours workshop/test each week. Pr.: ARCH 449.

**ARCH 453. Structural Systems in Architecture IV.** (3) II. Instruction in the design of building structures as whole systems; overall-to-specific systems behavior and manipulative design of major subsystems. Emphasis on the design of subsystems and subsystem components as they are affected by structural material. Instruction in specialized issues associated with the analysis and design of high rise and long-span building structure, including foundation, constructive, and economic factors which affect building design. Three hours lecture, two hours workshop/test each week. Pr.: ARCH 452.

**ARCH 475. Problems in Architectural Presentation.** (Var.) I, II, S. Study of various methods of graphically representing architectural problems to develop professional office techniques. Pr.: Second-year standing and approval of instructor.

**ARCH 505. Architectural Internship, Part A.** (12) II. Thirty weeks off-campus work study program with an approved professional, building industry, government, or non-profit agency sponsor. Must be enrolled in concurrently with ARCH 506, and each course must be successfully completed before credit is awarded in either. This course is graded CR/NCR only and is not for graduate credit. Pr.: ARCH 434, ARCH 605, not more than one D in an architectural design course, and approval of the internship coordinator.

**ARCH 506. Architectural Internship, Part B.** (3) II. Preparation of internship journals and employer profiles during the approved 30-week off-campus work-study program in ARCH 505, and preparation of an internship analysis paper during the first semester after ARCH 505. Must be enrolled concurrently with ARCH 505, and each course must be successfully completed before credit is awarded in either. This course is letter-graded only and is not for graduate credit. Pr.: ARCH 434, ARCH 605, not more than one D in an architectural design course, and approval of the internship coordinator.

### Undergraduate and graduate credit in minor field.

**ARCH 514 and ARCH 515. Environmental Systems in Architecture II and III.** (3 each) Criteria for selection and application of natural and mechanical environmental control systems in architecture. Focus on the integration of thermal, illumination, sanitary, movement, and acoustical systems with the building fabric and the natural environment. Contemporary and developing approaches are explored. Three hours lec. a week.

**ARCH 514. Environmental Systems in Architecture II.** (3) II. Pr.: ARCH 413.

**ARCH 515. Environmental Systems in Architecture III.** (3) I. Pr.: ARCH 413.

**ARCH 566. Problems in Architecture Design.** (Var) S. Study of specific design problems under the direct supervision of a member of the architectural faculty. Pr.: Approval of instructor.

**ARCH 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 built 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. a week. Pr.: ENVD 251 or approval of instructor.

**ARCH 605. Architectural Design Studio V.** (5) I, II. Problem analysis and program development, generalization of alternate solutions, and selection and refinement of the building design. Twelve hours studio a week. Pr.: ARCH 404 and not more than one grade of D in an architectural design course, and LAR 500 or concurrent enrollment in LAR 500.

**ARCH 606. Architectural Design Studio VI.** (5) I, II. Continuation of ARCH 605. Increased complexity of function and space definition systems. Relating environmental technology to total design. Twelve hours studio a week. Pr.: ARCH 605 and not more than one grade of D in an architectural design course.

**ARCH 655. Foreign Seminar.** (Var.) 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.

### Undergraduate and graduate credit

**ARCH 650. Architectural Programming.** (3) I, II. An introductory course surveying the basic philosophies and methodologies for architectural programming; emphasis on the comparative evaluation of different strategies and their integration within the process of design. Pr.: Senior standing or permission of the instructor.

**ARCH 656. Preservation Documentation.** (3) I, II. Investigation of existing buildings and their settings; documenting design qualities, history, materials, systems, construction techniques, landscape, and physical and functional changes over time, using Historic American Building Survey Standards. Pr.: Senior standing and proficiency in drafting.

**ARCH 657. Preservation Principles.** (3) I. Examination of theoretical and practical aspects of preservation; background and current issues; design considerations. Pr.: Senior standing or permission of instructor.

**ARCH 670. History of American Architecture and Allied Design I.** (3) I. The history of American architecture including aspects of interior architecture, landscape architecture, urban planning, and preservation. This course investigates how the built forms of various colonial settlers in America responded to a new environment and how a distinctive American culture eventually took shape by the end of the 1800s. Pr.: ENVD 250 and 251 or approval of the instructor.

**ARCH 671. History of American Architecture and Allied Design II.** (3) II. The history of American architecture including some aspects of interior architecture, urban planning, landscape architecture, and preservation. This course surveys those distinctively American styles of design which originated in the late 1800s and traces their impact on world architecture and how outside influences shaped American design from that time period up to present. Emphasis is placed upon the interplay of formal and functional concerns in architectural design. Pr.: ENVD 250 and 251 or approval of the instructor.

**ARCH 680. Development Analysis.** (3) I, II. An examination of various development characteristics and components and their crucial interactive nature which leads toward success or failure of building and land development. Development factors investigated include: market analysis, location uses and users, cost/benefits, nonmonetary benefits, financial returns expected and needed, financial incentives for investors, and feedback into the design process. Pr.: Admission to the professional program.

**ARCH 703 Environmental Aesthetics.** (3) I, II. Problems involving aesthetics in areas related to student's major field. Three hours a week. Pr.: Senior standing in architecture, landscape architecture, interior architecture, urban design.

**ARCH 704. Environmental Seminar.** (Var.) I, II. Environmental systems related to human perception, reactions, and behavior. Pr.: Senior standing.

**ARCH 705. Project Programming.** (1) I, II. The development of a program for ARCH 707 Architectural Design VIII under the direction of a faculty committee. Pr.:

ARCH 606, ARCH 650, and approval of the faculty committee.

**ARCH 706. Architectural Design Studio VII.** (5) I, II. Integration of the physiological, psychological, and sociological parameters in the design of environments. Analysis, programming, and planning problems, increased complexity of function and space definition systems. Relating environmental technology to total design. Twelve hours studio a week. Pr.: At least 2.0 GPA in required third-, fourth-, and fifth-year courses which have been taken; not more than one D in an architectural design course; at least a 1.75 GPA in required third-, fourth-, and fifth-year courses other than design which have been taken; either ARCH 606 or 505; and 506; ARCH 434, or ARCH 433 and conc. enrollment in ARCH 434; ARCH 515, or ARCH 514 and conc. enrollment in ARCH 515; and ARCH 452.

**ARCH 707. Architectural Design Studio VIII.** (5) I, II. Development of the student's project programmed in ARCH 705, under the direction of a faculty committee. Project must demonstrate a high level of achievement in systematic and comprehensive thinking, application of resources, and communication of total process. Twelve hours studio a week. Pr.: At least 2.0 GPA in required third-, fourth-, and fifth-year courses other than design which have been taken; ARCH 706; ARCH 434; ARCH 515; ARCH 453; or ARCH 452 and conc. enrollment in ARCH 453.

**ARCH 710. Topics in Architectural Design Methods.** (3) I, II. Intensive review of selected design methodologies, including systematic and computer-based approaches to problem definition and project design; emphasis upon the comparative evaluation of problem-solving strategies within the architectural design process. Pr.: Advanced undergraduate or graduate standing.

**ARCH 715. Theory of Design.** (3) I, II. Analysis of theories and philosophies in the design professions, including those in related societal and technological fields. Pr.: ARCH 404 or IAR 602 or LAR 641.

**ARCH 716. Environmental Systems in Architecture.** (3) I, II. Study of site-specific microenvironmental systems and the designed microenvironment about buildings. Exploration of their interaction and manipulation to meet human comfort requirements and achieve resource-efficient site and building design. Pr.: ARCH 413 and 403, or graduate standing.

**ARCH 720. Environment and 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 built environment. Three hours lec. rec. a week. Pr.: Senior standing or permission of instructor.

**ARCH 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 built environment. Three hours lec./seminar a week. Pr.: Senior standing.

**ARCH 730. Environment and Aging.** (3) I, II. An exploration of the aging process related to those factors in the architecturally designed environment that hinder and facilitate successful adaptation by the aging individual. Three hours lec./seminar a week. Pr.: Senior or graduate standing.

**ARCH 735. Topics in Building Construction Systems in Architecture.** (1-4) I, II. Advanced study of the relationship of conceptual and/or technological factors of building construction to architecture. Pr.: ARCH 434; or graduate standing and consent of instructor.

**ARCH 752. Structural Systems in Architecture V.** (Var.) I, II. Study of the relationship of conceptual and/or technological factors of structure to architectural design in more depth, or in a broader context of form-determining interactions than that presented in ARCH 452 and ARCH 453. Pr.: ARCH 453.

**ARCH 753. Professional Practice.** (3) I. Studies of conventional and newly developing methods of professional design practice. Instruction in the relationships of architects, landscape architects, interior architects and other professions to users, clients, construction industry, society,

government, and one another. Two hours lecture and one hour recitation. Pr.: ARCH 433.

**ARCH 765. Problems in Architecture.** (Var.) I, II, S. A study of specific architectural problems under the direction of a member of the department staff. Pr.: Approval of instructor.

## Interior Architecture

Stephen M. Murphy, Head

Professors Haycock, McDonald, and McGraw;\* Associate Professors Dubois, Husseini, and Murphy; Assistant Professors Brown, Bullock, Hastings, Thompson, and Troyer; Emeritus Professor Durgan.\* Adjunct Professors Paolo Barucchieri, Castiglion Fiorentino, Italy; Franz Puschough, Frank Snader, and Klaus Steinman, Trier, Germany.

The bachelor of interior architecture professional program consists of a four-year course of study following the one-year environmental design studies program. The Department of Interior Architecture's five-year program of studies is one of the first curricula in this profession to be recognized and accredited by the Foundation for Interior Design Education Research in the United States.

The curriculum in interior architecture is structured for students who plan a professional career in space planning in commercial, institutional, and industrial interior design. The learning experience is gained through the focus placed upon the department's educational programs in interior architectural space planning, furniture, and product design. After an introduction to basic interior space planning, students undertake studio exercises that include programming and designing of spaces. Special emphasis is placed on spatial organization, behavior analysis, space component design, furniture design and construction, product and exhibit design, the integration of environmental systems, building rehabilitation, and the preparation of working drawings and contract documents.

### Computers in the studio

The department provides a supportive and integrated studio beginning with the fifth semester where students can bring in their CAD-capable computers. The department provides cabinets, peripheral equipment, and a secure environment with updated electrical and data connections. Use of the computer and appropriate software is integrated into all the departmental courses from this point on. Computers are the tool of choice in today's design offices, and the department strives to fully educate its students on their uses.

### Internship program

An elective 30-week internship program, an option available in the spring semester of the fourth year, may include work-study experience in professional interior architectural/

architectural firms or associative firms in: furniture design or product design. The internship gives advanced students the opportunity to work in a professional context and to apply the problem-solving approaches they have developed.

## Foreign study program

During their fourth year, interior architecture students may participate in the semester-long exchange program between K-State and the interior architecture program in Trier, Germany. Another international studies option exists in Italy. This program allows students from the three professional programs to participate in an invaluable learning experience at Santa Chiara. Either of these two foreign studies options can be taken as an alternative to the internship program or remaining at K-State for the semester. Students may earn 15 hours of credit while overseas or on an internship.

## Interior architecture program

### 150 IAR

Total hours required for graduation ..... 161

For the curriculum requirements for the first two semesters, see Environmental Design Studies, earlier in this section.

#### Third semester

IAR 201	Interior Architecture Design Studio I ....	4
IAR 303*	Interior Architecture Design Studio IA .	6
IAR 248	Building Science .....	3
ARCH 350	History Design Environment III .....	3
IAR 430	Visual Communication .....	2
ARCH 448	Structural Systems in Architecture I .....	3
		<b>15</b>

#### Fourth semester

IAR 202	Interior Architecture Design Studio II ...	4
IAR 410	Interior Architecture Microcomputer Applications .....	2
IAR 416	History of Furniture .....	2
ARCH 413	Environmental Systems in Architecture I .....	4
ARCH 449	Structural Systems in Architecture II ....	3
CT 260	Textiles .....	3
		<b>18</b>

#### Fifth semester

IAR 404	Interior Architecture Design Studio III .	5
Humanities elective .....		3
IAR 409	Materials and Finishes .....	2
IAR 413	Materials and Finishes Lab .....	1
IAR 420	Theory of Furniture Design .....	2
Art elective .....		2
		<b>15</b>

#### Sixth semester

IAR 403**	Product Design Studio I .....	5
IAR 456	Theory of Product Design .....	2
ARCH 514	Environmental Systems in Architecture II .....	3
IAR 407	Design Workshop I .....	3
ARCH 433	Building Construction Systems in Architecture I .....	3
		<b>16</b>

\*\* (IAR 403 taken concurrent with IAR 456)

#### Seventh semester

IAR 602	Interior Architecture Design Studio IV .	5
ARCH 515	Environmental Systems in Architecture III .....	3
ARCH 434	Building Construction Systems in Architecture II .....	3
IAR 408	Design Workshop II .....	3
Free elective .....		3
		<b>17</b>

#### Eighth semester

IAR 606	Interior Architecture Design Studio V .....	5
Free electives .....		10
		<b>15</b>

or

IAR 644	Interior Architecture Internship .....	13
IAR 645	Interior Architecture Internship Reports .....	2
		<b>15</b>

or

IAR 646	Interior Architecture Foreign Studies ..	13
IAR 647	Interior Architecture Foreign Report ...	2
		<b>15</b>

#### Ninth semester

IAR 705	Interior Architecture Design Studio VI .....	5
ARCH 720	Environment and Behavior .....	3
	or	
Social science elective .....		3
IAR 714	Furniture Design Workshop .....	3
IAR 730	Facility Management .....	3
Free electives .....		3
		<b>17</b>

#### Tenth semester

IAR 706	Product Design Studio II .....	5
IAR 753	Professional Practice .....	3
IAR 601	Interior Architecture Seminar .....	3
Free electives .....		6
		<b>17</b>

## Interior architecture courses

### Undergraduate credit

**IAR 201. Interior Architecture Design Studio I.** (4) I. Design vocabulary, abstract design, form and space generation, use of light and color theory, application of design process, idea generation, creativity, and diagramming. These concepts are necessary to reinforce graphic development, typography, presentation, and layout. Projects will include an introduction to human scale and anthropometries, perspective as applied to small scale spaces, environmental analysis, and introduction to structure in design. Pr.: DSFN 202 and admission to professional program in interior architecture.

**IAR 202. Interior Architecture Design Studio II.** (4) II. Continuation of topics covered in previous semesters. Projects include signage, model building, rendering and color media presentations, indoor-outdoor site relationships, continuation of environmental studies, contextual issues, various architectonic scales, and analysis of product types with linkages to lighting design and building systems. Pr.: IAR 201.

**IAR 248. Building Science.** (3) I. Instruction in the materials of building and landscape design; sources, characteristics and uses in design and construction; emphasis on evaluation and selection. Two lectures and one recitation per week. Pr.: Second-year standing and PHYS 113.

**IAR 303. Interior Architecture Design Studio IA.** (6) I. This course integrates material from Environmental Design Studio I and II with ADS I, IAD I, LADS I. Twelve hours of studio a week. Pr.: For transfer students; nine or more credit hours of graphics, design, and freehand drawing and admission to a department in the College of Architecture and Design.

**IAR 403. Product Design Studio I.** (5) I, II. Analysis, synthesis, and design of various types of products associated with the interior environment, integrating such human factor determinants as anthropometries and ergonomics. Construction of prototype products associated with the human environment developed concurrently within the design studio. Pr.: IAR 202; not more than one D in an interior architecture design studio course.

**IAR 404. Interior Architecture Design Studio III.** (5) I, II. This course will build upon and extend the knowledge and skill base gained by students in studios I and II. This course will include the introduction of programming methodology and its relationship to the design and organization of interior space. Emphasis will be placed on the ap-

propriate selection of furniture, finishes, fixtures, and equipment within the context of their relationships to form, function, task and users' needs. Pr.: IAR 202; not more than one D in an interior architecture design studio course.

**IAR 406. Problems in Interior Architecture.** (Var.) I, II. Study of specific interior architectural problems under direct supervision of a member of the department. Pr.: Approval of instructor.

**IAR 407. Design Workshop I.** (3) II. An introduction to shop procedures, equipment, design materials, joinery, and elementary design experiences in turning and shaping various materials. This course provides the student the opportunity through a series of small projects exposure to the total creative design process by researching, designing, constructing, and evaluating finished products. Pr.: Admission to the professional program of interior architecture.

**IAR 408. Design Workshop II.** (3) I. Design Workshop is intended to further develop the student's understanding of the three dimensional design process through research, design, prototype construction, evaluation, and redesign. Enhance and increase the student's understanding of the structural characteristics of materials and increase their proficiency at communicating ideas through working and presentation drawings. Pr.: IAR 407

**IAR 409. Materials and Finishes.** (2) I. Introduction to materials and finishes specific to interior applications. Criteria for evaluation, selection, and application of interior materials and finishes with the building fabric and their impact on building design. Preparation of written and graphic communications to illustrate and direct the construction process. Two hours lec. a week. Pr.: Admission to the professional program in interior architecture.

**IAR 410. Interior Architecture Microcomputer Applications.** (2) I, II. Instruction in microcomputer operating procedure, general terminology, programming concepts for microcomputer, and use of appropriate word-processing, specification writing, and computer-aided design software as it relates to the interior architecture profession. Four hours lab a week. Pr.: Enrollment in the interior architecture program.

**IAR 411. Drawing in Black and White.** (3) II. Freehand representational drawing of architectonic space using graphite pencil and ink pen. Emphasis is on the development of the visual perception of space and the communication of the perceived space through drawings that are clear and expressive. Pr.: Third-year standing.

**IAR 413. Materials and Finishes Laboratory.** (1) I. Identification and application of specific interior finishes. Two hours lab a week. Pr.: To be taken concurrently with IAR 409.

**IAR 416. History of Furniture.** (2) I. Analysis of the social, political, and religious influences on product and furniture design in Italy, France, and England from early renaissance through the 18th century. Pr.: Admission to the professional program in architecture, interior architecture, or landscape architecture.

**IAR 420. Theory of Furniture Design.** (2) II. Design theory related to analysis, materials, and construction techniques from the early American period through the contemporary movement. Pr.: Admission to the professional program in architecture, interior architecture, or landscape architecture.

**IAR 430. Visual Communication.** (2) I. Students visualize and communicate in a three-dimensional language using constructed perspective, computer-generated perspective with rendering and animation techniques, and constructed models as tools of the profession. Rapid graphic visual techniques using various medias will be studied enabling exploration of multiple design options in a spatial environment. Graphic arts including photography, typesetting, silk screening, and reproduction as applied to board presentations will be introduced. Throughout the entire semester the study of color theory and its application will be used in all presentations. Pr.: Admission to the professional program of interior architecture.

### Undergraduate and graduate credit

**IAR 520. Design Graphics Workshop.** (3) I, II, S. A course in the use of colored pencils, to render and present form and space using different techniques. Emphasis on the visual perception and composition of elements in design drawings and presentation. Pr.: Sophomore standing.

**IAR 601. Interior Architecture Seminar.** (3) I. Readings and discussion of contemporary thought and movements within the field of interior architecture with special emphasis on the societal factors which produce and affect change. Pr.: IAR 705 or graduate standing.

**IAR 602. Interior Architecture Design Studio IV.** (5) I. This course is directed towards the unique programming and design-related issues and conditions associated with contemporary large-scale office space planning. Emphasis is placed on the nature of the office work environment, and the linking together of various architectural systems. Pr.: IAR 404 Studio III, and IAR 403 Product Design Studio I; not more than one D in an interior architecture design studio course.

**IAR 606. Interior Architecture Design Studio V.** (5) II. This semester provides an option for an interdisciplinary collaborative studio course oriented towards replicating the learning experience and interactive activities that take place in the modern multi-disciplinary professional office. Students enrolled in this studio can be from architecture, interior architecture, and landscape architecture. Pr.: IAR 602; not more than one D in an interior architecture design studio course.

**IAR 644. Interior Architecture Internship.** (13) II, S. Thirty weeks off-campus work study in a professional offices specializing in interior architecture: field and office experience. Pr.: IAR 602, ARCH 433, not more than one grade of D in an interior architecture design studio, and approval by the internship coordinator.

**IAR 645. Interior Architecture Internship Report.** (2) II, S. Taken in conjunction with IAR 644. The purpose is to develop the student's communication skills and awareness of the importance of written communication and record keeping in interior architectural office practice. The required report will provide a detailed documentation of the student's experiences encountered during internship. Pr.: Conc. enrollment in IAR 644.

**IAR 646. Interior Architecture Foreign Studies.** (13) II, S. This course allows the student to study outside of the United States for one semester. The semester will expand their global perspective of design professions, cultural, political, and economic views. One semester studying interior architecture in a foreign university. Pr.: IAR 602, ARCH 433, not more than one grade of D in an interior architecture design studio and approval by the foreign studies coordinator.

**IAR 647. Interior Architecture Foreign Studies Reports.** (2) II, S. Taken in conjunction with IAR 646. The purpose is to develop the student's written communication skills as well as increase awareness of written communication and record keeping in interior architecture office practice. The report will provide detailed documentation of the student's experiences during the foreign studies program. Pr.: Conc. enrollment in IAR 646.

**IAR 705. Interior Architecture Design Studio VI.** (5) I, II. This design studio pursues and extends the architectural knowledge gained in all previous studios. Emphasis is on understanding large-scale buildings in terms of structure, systems, materials, and environment. Design VI addresses the built environment, utilizing existing large scale buildings to explore architectural renovation, rehabilitation, restoration, and preservation. Pr.: IAR 606, or IAR 644 and IAR 645, or IAR 646 and IAR 647; not more than one D in an interior architecture design studio course.

**IAR 706. Product Design Studio II.** (5) I, II. Advanced design projects involving products related to the interior environment. Synthesis of the design, materials, construction, and finishing of prototype products relevant to human use. Pr.: IAR 606 or IAR 644 and IAR 645, or IAR 646 and IAR 647; not more than one D in an interior architecture design studio course.

**IAR 714. Furniture Design Workshop.** (3) I, II, S. Design construction, and finishing of contemporary furniture and accessories. Focused research relative to the development of furniture design concepts. The major project is the design of a seating/body support device. The design development process involves ergonomic analysis, anthropometrics, concept development, form, construction methods, unity, functionality, marketability, production capability, complete working drawings, prototype development, and presentation drawings. Pr.: IAR 408 or equivalent.

Open to all students in the professional programs in architecture, interior architecture, and landscape architecture.

**IAR 720. Advanced Seminar in Interior Architecture.** (1-3) I, II. Advanced readings and discussions of environmental issues related to the practice of interior architecture. Readings, discussions, reports. Pr.: IAR 705 or equiv.

**IAR 730. Facility management.** (3) I. A survey of the methods of managing the physical assets of large facilities—corporate, institutional, and governmental—through a review of current literature, presentations by professionals active in the field, and case studies.

**IAR 740. Advanced Design Workshop.** (1-4) I, II. Advanced instruction in the design, construction, and finishing of contemporary furniture and accessories. The course involves the development of a concept for a complex furniture prototype and includes research, program development, design development, criteria examination and determination, design development, working drawings, complete prototype development, and presentation drawings. Pr.: IAR 714 or equivalent.

**IAR 753. Professional Practice.** (3) I, II. Studies of conventional and newly developing modes of professional design practice. Presented are the relationships of interior architects, architects, and landscape architects and other design professionals to users, clients, building industry, society, government, and one another. Pr.: 5th year standing.

**IAR 756. Theory of Product Design.** (2) II. History and design theory related to analysis materials and construction in product design. Pr.: IAR 420.

## Landscape Architecture/Regional and Community Planning

Alton A. Barnes,\* Head

Stephanie A. Rolley,\* Associate  
Head/Graduate Director, Landscape  
Architecture

C. A. Keithley,\* Associate Head/Graduate  
Director, Regional and Community  
Planning

Professors Barnes,\* Brooks,\* Day,\* Deines,\*  
Forsyth,\* Keithley,\* Keller,\* Law,\*  
Marshall,\* Page,\* and Weisenburger,\*  
Associate Professors Chelz, Clement,\*  
Ewanow, Keane,\* Mattson,\* Rassman, and  
Winslow,\* Assistant Professors Burns,  
Rolley,\* Schrader,\* Wanberg and Wigfall,\*  
Adjunct Professors McGraw,\* Seaman,\*  
D. Watts,\* Emeriti Professor Ealy,\* Foerster.\*

## Landscape architecture

The curriculum leading to the professional bachelor of landscape architecture degree is designed to prepare students for a variety of career opportunities found within the profession. Special emphasis is placed on site analysis, land planning, arrangement and organization of facilities on the land, organization of outdoor spaces, topographical manipulation and other aspects of site construction, and the use of plants in the landscape. Study of human impact on the natural and built environment and methods of minimizing negative aspects of this relationship are emphasized. The bach-

elor of landscape architecture degree is accredited by the Landscape Architectural Accreditation Board of the American Society of Landscape Architects.

The bachelor of landscape architecture program consists of a four-year course of study following the one-year environmental design studies program. All required courses taught in the landscape architecture program that are counted toward the degree must be passed with a grade of C or better.

## Landscape architecture program

### 180 LAR

Total hours required for graduation ..... 165

For the curriculum requirements for the first two semesters, see Environmental Design Studies earlier in this section.

#### Third semester

LAR 220	Landscape Architecture Design Studio I .....	4
LAR 303*	Landscape Architecture Design Studio IA .....	6
LAR 310	Design Graphics and Visual Thinking ...	3
LAR 248	Building Science .....	3
BIOL 210	General Botany .....	4
HORT 374	Woody Plant Materials I** .....	3
		<b>17</b>

#### Fourth semester

LAR 320	Landscape Architecture Design Studio II .....	4
CE 212**	Elements of Surveying Engineering .....	3
LAR 322	Environmental Ethics .....	3
ENGL 415	Written Communications for Engineers ..	3
HORT 375***	Woody Plant Materials II .....	3
Elective .....		2
		<b>18</b>

#### Fifth semester

LAR 410	Landscape Architecture Design Studio III .....	4
LAR 420	Planting Design .....	4
LAR 438	Land Construction I .....	4
ARCH 350	History of the Designed Environment III .....	3
Art elective .....		2
		<b>17</b>

#### Sixth semester

LAR 442	Landscape Architecture Design Studio IV .....	4
LAR 439	Land Construction II .....	4
LAR 433	History and Theory of Landscape Architecture I .....	3
LAR 460	Microcomputer Applications in Landscape Architecture .....	3
LAR 444	Internship/Advanced Studies Planning Seminar*** .....	1
		<b>15</b>

#### Seventh semester

LAR 646	Landscape Architecture Design Studio V .....	4
LAR 647	Land Construction III .....	4
LAR 634	History and Theory of Landscape Architecture II .....	3
PLAN 315	Introduction to Planning .....	3
Business elective .....		3
		<b>17</b>

#### Eighth semester

LAR 648	Landscape Architecture Design Studio VI .....	4
LAR 744	Community Site Planning .....	4
Social science/humanities elective .....		3
Professional elective .....		3
Business elective .....		3
		<b>17</b>

**Ninth semester**

LAR 703	Landscape Architecture Design Studio VII .....	5
LAR 501	Landscape Architecture Seminar I .....	2
LAR 753	Professional Practice .....	3
LAR 645	Professional Internship**** .....	1
Professional elective .....		3
Social science/humanities elective .....		3
		<b>17</b>

**Tenth semester**

LAR 704	Landscape Architecture Design Studio VIII .....	5
LAR 502	Landscape Architecture Seminar II .....	2
Science elective .....		4
Professional elective .....		3
Elective .....		3
		<b>17</b>

\*Alternate studio for certain qualified transfer students

\*\*Surveying is taught in civil engineering; MATH 150 Plane Trigonometry, or equivalent, is a prerequisite.

\*\*\*Woody Plant Materials is taught in horticulture and the prerequisite is one of these two courses: BIOL 210 General Botany; or BIOL 198 Principles of Biology for transfer students.

\*\*\*\*Internship in a professional office is arranged by the student for the summer and credited in the next fall semester.

## Planning certificate for undergraduates

The regional and community planning program offers course work in support of other university programs dealing with the professional practice of planning and in preparation for entry into a graduate program in planning either at K-State or other universities.

Planning encompasses a body of knowledge that has been partially derived from social science theory and embodies awareness or understanding of the physical planning elements of the community and region, as well as the environmental, ecological, socio-economic, and political systems at work in society.

In preparation for possible graduate study in planning, and to provide a different perspective of the community in which individuals and groups work, live, and play, the department offers an undergraduate certificate in planning, which requires students seeking the equivalent to a minor in planning to integrate a minimum of 15 credit hours of planning courses in their undergraduate degree program. The requirements include the following:

**Required**  
PLAN 315 Introduction to Planning ..... 3

**Elective**

12 credit hours of planning course work below the PLAN 800 level offered from the department, in which the student meets the prerequisites. Suggested courses depend on student interest and degree orientation. Advising is available from the departmental faculty or the department head.

**Options**

Several other departments offer courses directed to elements of planning concerns. Upon petition by the undergraduate student enrolled in the certificate program and evaluation by departmental faculty, substitution of up to one 3-credit-hour course as an accepted elective may be possible. Courses that have been approved for substitution include, but are not limited to, the following:

LAR 744	Community Site Planning
CE 570	Transportation Planning

Enrollment in the planning certificate program is accomplished by contacting the director of regional and community planning in Seaton 301D. Upon graduation, students completing the program receive a departmental certificate denoting completion of the requirements.

Students interested in pursuing graduate study in planning are encouraged to complete an undergraduate-level statistics course in their program of study leading to a bachelor's degree. This requirement is a prerequisite for entry into all graduate planning programs in the United States. Knowledge in the use of micro-computers and basic software programs for word processing, spreadsheet, and database applications is indispensable.

While there are many routes to graduate study in planning, students are encouraged to consider following a pre-planning program, such as that offered in the Department of Geography. Students may also seek advising or counsel from faculty in the Department of Landscape Architecture/Regional and Community Planning as to which electives in the various departments will provide better planning-oriented information for later use. Courses which satisfy that orientation at the undergraduate level include the following:

**College of Architecture and Design**

Architecture:		
ARCH 601	Topics: History of Designed Environment .....	3

**Regional and community planning:**

PLAN 315	Introduction to Planning .....	3
PLAN 590	Problems: Shaping the American City ..	3

**College of Arts and Sciences**

Computing and information science:		
CIS 110	Introduction to Personal Computing .....	3

Economics:		
ECON 532	Fiscal Operation of State and Local Government .....	3
ECON 633	Public Finance .....	3
ECON 555	Urban and Regional Economics .....	3

Geography:		
GEOG 200	Human Geography .....	3
GEOG 220	Environmental Geography .....	3
GEOG 440	Geography of Natural Resources .....	3
GEOG 450	Geography of Economic Behavior .....	3
GEOG 460	Geography of Future Worlds .....	3

Political science:		
POLSC 377	Introduction to Public Policy .....	3
POLSC 507	Introduction to Public Administration ...	3
POLSC 618	Urban Politics .....	3

Sociology:		
SOCIO 530	Population and Human Ecology .....	3
SOCIO 531	Urban Sociology .....	3
SOCIO 532	Community Organization and Leadership .....	3
SOCIO 533	Rural Society .....	3

Statistics:		
STAT 330	Elementary Statistics for Social Sciences .....	3

**College of Business Administration**

Finance:		
FINAN 552	Real Estate .....	3

**College of Human Ecology**

Clothing, textiles and interior design:		
FEC 420	Housing .....	3
FEC 625	Consumer and Energy Issues in Housing .....	3

Courses listed above the 500 level (with the exception of those listed in the program of regional and community planning) must be taken for graduate credit and applied towards a graduate degree in planning, per university guidelines, if not needed in the undergraduate degree program of study. Several additional courses could be listed at the 700 level from across the campus. For more information, see the graduate catalog or visit the departmental office.

## Landscape architecture courses

**Undergraduate credit**

**LAR 220 and LAR 320. Landscape Architectural Design Studio I and II.** An introduction to the principles, elements, and materials of landscape architecture. Design procedure, methodology and process are explored with a variety of project types emphasizing exterior spatial development as it relates to human behavior.

**LAR 220. Landscape Architectural Design Studio I.** (4) I. Two hours lecture and six hours design studio a week. Pr.: Admission to the professional program and ENVD 201, 202.

**LAR 248. Building Science.** (3) I. Instruction in the materials of building and landscape design; sources, characteristics, and uses in design and construction; emphasis on evaluation and selection. Two lectures and one recitation per week. Pr.: Second-year standing and PHYS 113.

**LAR 303. Landscape Architectural Design Studio 1A.** (6) I. This course integrates material from Environmental Design Studio I and II with ADS I, IAD I, LADS I. Twelve hours of studio a week. Pr.: For transfer students; 9 or more credit hours of graphics, design, and freehand drawing and admission to a department in the College of Architecture and Design.

**LAR 310. Design Graphics and Visual Thinking.** (3) I, II. A study of graphic communication techniques for the exploration and presentation of landscape architecture design ideas. One hour lec. and four hours studio a week. Pr.: ENVD 202.

**LAR 320. Landscape Architectural Design Studio II.** (4) II. Two hours lec. and six hours design studio a week. Pr.: LAR 220.

**LAR 322. Environmental Issues and Ethics.** (3) II. An introduction to the relationship of the natural environment to the life within it and as a factor in environmental design ethic. Three hours lec. a week.

**LAR 410. Landscape Architecture Design Studio III.** (4) I. Principles and concepts of site planning and programming with special emphasis on recreation facility planning and design. Two hours lec. and six hours studio a week. Pr.: LAR 220.

**LAR 420. Planting Design.** (4) I, II. Emphasis on ecological issues in design, natural systems, and site analysis in planting design. Two hours lec. and six hours studio a week. Pr.: HORT 374 and 375; BIOL 210 or HORT 200, LAR 320.

**LAR 433. History and Theory of Landscape Architecture.** (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 LAR program.

**LAR 438. Land Construction I.** (4) I. Problems in the basic aspects of land construction to include topography, site design, site grading, earthwork estimating, and site layout. Three hours lec. and five hours studio a week. Pr.: LAR 248, 320, CE 212.

**LAR 439. Land Construction II.** (4) II. Continuation of LAR 438. To include landscape irrigation, area and landscape lighting, construction detailing, construction specification writing, bid proposals, and cost estimating. Three hours lec. and five hours studio a week. Pr.: LAR 438.

**LAR 440. Problems in Landscape Design.** (Var.) I, II, S. Assigned problems and reports in landscape architecture. Pr.: Junior standing.

**LAR 442. Landscape Architecture Design Studio IV.** (4) I, II. Design studies emphasizing functional, aesthetic and ecological uses of plants. Relationship between plants and the built environment; preparation of planting plans and

their use as working drawings; elements and principles of planting design; specification writing; contractor relationships; and design implementation. Two hours lec. and six hours of studio a week. Pr.: LAR 410, 420.

**LAR 444. Internship/Advanced Studies Planning Seminar.** (I) I. Review of the nature and scope of professional internships and opportunities for specialized professional study. Pr.: LAR 410.

**LAR 450. General Landscape Design.** (3) I, II. Basic graphic communication skills, design principles, and design vocabulary covering residential and small scale landscape development plans. Two hours lec. and two hours studio a week. A general service course for non-architecture and design majors.

**LAR 460. Microcomputer Applications in Landscape Architecture I.** (3) I, II. Introduction of uses of microcomputers in typical landscape architectural practice; function, operation characteristics, and applications of computer software and hardware. Two hours lec. and two hours lab a week. Pr.: CIS 110.

**LAR 500. Site Planning and Design.** (3) I, II. Theory, principles, and elements of site planning and design. Lectures, readings, short problems, and site visits dealing with site analysis, ecological consideration, grading, drainage, circulation and parking, lighting, planting design, materials and details, management and maintenance, and cost factors. Pr.: ARCH 401 or conc. with ARCH 401.

### Undergraduate and graduate credit in minor field

**LAR 501, 502. Landscape Architecture Seminar I, II.** (2) 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. (Two 2-credit-hour seminars are required for a total of four hours.)

**LAR 510. Landscape Architectural Delineation Techniques.** (2) I, II. A study of delineation media and techniques that are related to the practice of landscape architecture in professional offices. Four hours studio a week. Pr.: DSFN 202.

**LAR 634. History and Theory of Landscape Architecture II.** (3) I. American landscape architecture. Exploring the natural, cultural, and aesthetic forces that shape the American landscape. Three hours lec. a week. Pr.: LAR 433.

**LAR 635. Golf Course Planning and Design.** (2) I, II, S. Fundamentals of golf course planning and design, including history, management, design, facilities, aesthetics, and technical development. One hour lec. and three hours lab a week. Pr.: Junior standing within landscape architecture.

**LAR 646 and LAR 648. Landscape Architectural Design Studio V and 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.

**LAR 646. Landscape Architectural Design Studio V.** (4) I. Twelve hours design studio a week. Pr.: LAR 442.

**LAR 648. Landscape Architectural Design Studio VI.** (4) I. Twelve hours design studio a week. Pr.: LAR 646.

**LAR 645. Professional Internship.** (Var.) 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 written and oral reports by the students. Pr.: LAR 444.

**LAR 647. Land Construction III.** (4) I. Continuation of LAR 437 to include large-scale site design, road alignment, large-area grading, soils and excavation methods, storm drainage, and utilities routing. Three hours lec. and five hours studio a week. Pr.: LAR 437.

**LAR 652. The Small Community in the Plains States.** (3) I, II, S. An overview of the diverse nature of small communities in the Plains states, with an emphasis on the forms and patterns in the existing physical environment. Instruction in various methods of survey and analysis at the regional and community-specific scales, and application of these techniques to a different community each semester. Pr.: Fourth-year standing.

**LAR 660. Landscape Rehabilitation of Disturbed Lands.** (3) I. Planning rehabilitation of lands disturbed by mining and construction. Review of mining procedures, ecological systems, slope rehabilitation, and revegetation techniques. Three hours lec. a week. Pr.: Junior standing.

### Advanced undergraduate and graduate credit

**LAR 703 and LAR 704. Landscape Architectural Design Studio VII and VII.** 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.

**LAR 703. Landscape Architectural Design Studio VII.** (5) I. Fifteen hours design studio a week. Pr.: LAR 648, 647.

**LAR 704. Landscape Architectural Design Studio VIII.** (5) II. Terminal project. Individual studies approved by departmental faculty. Fifteen hours design studio a week. Pr.: LAR 703 and LAR 647.

**LAR 710. Microcomputer Applications in Landscape Architecture II.** (3) I, II. Examination of the application of microcomputer technology in the decision-making processes in the advanced practice and research of landscape architecture. Two hours lec. and two hours lab a week. Pr.: LAR 460.

**LAR 735. Advanced Golf Course Planning and Design.** (2) I, II, S. Advanced methods and strategies of golf course and resort planning and design. One hour of lecture and three hours of lab a week. Pr.: LAR 631.

**LAR 741. Problems in Landscape Architecture.** (Var.) I, II, S. Specific problems and/or reports in the area of landscape architecture. Pr.: Advanced undergraduate or graduate standing.

**LAR 744. Community Site Planning.** (4) II. Growth and development of cities and towns; land subdivision. Two hours lec. and six hours studio a week. Pr.: PLAN 315 or consent of instructor.

**LAR 746. Urban Design Studio I.** (4) I. An interdisciplinary design studio involving large-scale design; projects with extensive time implementation sequence; responses to socioeconomic, cultural, environmental, and technical needs; and implementation strategies. Design methods are applied to selected urban areas of the Midwest. Pr.: PLAN 315 or equiv.; and conc. enrollment in PLAN 745.

**LAR 747. Urban Design Studio II.** (4) II. Continuation of LAR 746. Pr.: LAR 746 and conc. enrollment in PLAN 845.

**LAR 753. Professional Practice.** (3) I. Studies of conventional and newly developing methods of professional design practice. Instruction in the relationships of architects, landscape architects, interior architects, and other professional to users, clients, construction industry, society, government, and one another. Two hours lec. and one hour rec. Pr.: Fifth-year standing.

**LAR 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.: Junior standing.

**LAR 757. Design for Special Populations.** (3) II. Design of exterior environments to accommodate the handicapped and disadvantaged individual. Pr.: Advanced undergraduate or graduate standing.

**LAR 758. Land Resource Information Systems.** (3) I. The understanding, collection, and application of land resource data to land planning and design. Current methods of resource inventory, ecologically oriented site analysis, and environmental impact assessment. Review of common sources for necessary information in each resource category. Two hours lec. and two hours studio a week. Pr.: Advanced undergraduate or graduate standing.

**LAR 759. Landscape Resource Evaluation.** (3) II. The determination of the impact of physical landscape project design upon the natural and man-made environment. Studies of existing site conditions and projections of the effect of such projects upon the site and vicinity. Pr.: Senior or graduate standing.

## Regional and community planning courses

### Undergraduate credit

**PLAN 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 recitation a week. Pr.: Sophomore standing.

### Undergraduate and graduate credit

**PLAN 590. Problems in Planning.** (1-3) I, II, S. Specific planning problems, including process, theory, method and implementation, under direction of department staff. Pr.: PLAN 315.

**PLAN 630. Computer Applications in Planning and Design.** (1-3) I, II, S. The application of computer concepts to problem solving and data analysis in the planning and design professions, including the development of user skills in the application of various software packages for data analysis, mapping, and computer-assisted design. Pr.: CIS 110 and junior standing.

**PLAN 700. Planning Analysis.** (3) I, II. Introduction to quantitative methods in planning to measure change in the socio-economic-political-physical environment and to analyze the interrelations that guide formulation of comprehensive planning. Pr.: PLAN 315 and ECON 555.

**PLAN 705. Planning Communications.** (1-4) I. Study and application of communication concepts and media utilized in regional and community planning, topics to be selected from: (a) graphics, (b) physical models, (c) professional reports, and (d) public hearings. Pr.: Senior status and PLAN 315.

**PLAN 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

**PLAN 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.

**PLAN 721. Institutional Planning and Development.** (3) II. Examination of infrastructure systems, standards, and costs; consideration of policy options and strategies; review of infrastructure finance methods; and implementation of community development with infrastructure planning and finance process. Pr.: PLAN 715 and 9 additional credit hours in planning and/or administration courses.

**PLAN 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.

**PLAN 735. Community Plan Preparation.** (3) II. 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

**PLAN 736. Community Plan Implementation.** (Var.) I. Introduction to legislation and interpretation of codes related to planning, design, and construction. Pr. PLAN 715.

**PLAN 740. Small Community and Rural Area Planning.** (3) II. Synthesis of small community and rural area change, including socio-economic-political determinants as bases for community design and planning. Pr.: PLAN 315 plus 9 credit hours in economics, political science, and sociology.

**PLAN 745. Urban Design.** (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 or graduate status.

**PLAN 746. Urban Design Studio I.** (4) I. An interdisciplinary design studio involving large-scale design; projects with extensive time implementation sequence; responses to socio-economic, cultural, environmental, and technical needs; and implementation strategies. Design methods are applied to selected urban areas of the Midwest. Pr.: PLAN 315 and conc. enrollment in PLAN 745.

**PLAN 750. Housing Policies and Programs.** (3) II. Review and evaluation of historical and current housing issues, production, and financial systems. Examination of federal, state, and local policies and programs for community development. Pr.: PLAN 315.

**PLAN 755. State and Regional Planning.** (3) I. 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 conc. enrollment.

**PLAN 760. Community Development Planning.** (3) II. Examination of past and present approaches to community development planning in the United States. Review and assessment of community development planning policies, programs, and practices. Pr.: PLAN 715 or conc. enrollment, and 9 semester hours in the social sciences.

**PLAN 761. Community Development Workshop.** (Var.) I, II, S. The organization, planning, design, development, and evaluation of community development projects, with real clients and actual locations. Pr.: PLAN 715 and PLAN 760; or conc. enrollment.

**PLAN 770. Planning Law.** (3) I. Examination of evolution and current state of land use regulation within constitutional limits. Introduction to zoning, subdivision, and other police power controls within a comprehensive planning process. Pr.: PLAN 715.

**PLAN 780. Planning in Developing Areas.** (3) I, II. Examination of comparative regional and community systems of development, consideration of alternative approaches to planning, with emphasis on developing countries and underdeveloped areas in the rural United States. Pr.: PLAN 715 plus 9 credit hours from the social sciences.

# Arts and Sciences

Peter J. Nicholls, Dean  
William R. Feyerharm, Assistant Dean  
Judith K. Zivanovic, Associate Dean

117 Eisenhower Hall  
532-6900

The College of Arts and Sciences is the home of the liberal arts and is the largest college at K-State. The liberal arts, which include the physical and biological sciences, the fine arts, the social sciences, the humanities, and the quantitative disciplines, embody the core studies of a university education.

The liberal arts seek to develop intellectual skills, such as critical analysis, self-expression, and creativity. Majors in the College of Arts and Sciences range from those related to specific jobs and professions to those related to vocation in a more general and perhaps more fundamental way.

## Advising

Students with undeclared, interdisciplinary, and pre-professional majors are advised in the office of the dean. Students with other majors are assigned an advisor by the department head who supervises the majors. In all cases, advisors try to ensure that students design their curricula to meet such goals as: the ability to think, speak, and write with clarity and precision; knowledge of another culture or another language; knowledge and appreciation of science and technology; familiarity with major artistic and literary forms; and exposure to moral and ethical issues.

## Advising for Undecided Students (ASUN)

For students who are uncertain about their majors, or who would prefer to explore a number of academic areas before making a choice, the College of Arts and Sciences provides an undeclared curriculum. Undeclared majors work with dean's office advisors to devise programs that satisfy basic degree requirements while exploring personal interests and aptitudes before choosing majors.

All students in ASUN must declare a major on or before completion of 60 hours. Students may petition the dean's office to remain in ASUN for one semester subsequent to attaining the 60 hours if exceptional circumstances exist.

Students with cumulative hours over 45 may *not* transfer from other K-State programs into ASUN. Students may petition the dean's office for special admissions if exceptional circumstances exist.

## Majors and Degrees

The undergraduate degrees offered in the College of Arts and Sciences are: bachelor of arts, bachelor of fine arts, bachelor of music, bachelor of music education, and bachelor of science. In addition, the associate of arts and the associate of science degrees with unspecified majors are offered at Fort Riley.

Below in the left column are majors, options, advising programs, and degrees offered. In the right column are names of the departments under which the major programs are offered. The specific requirements for a degree in the various curricula may be found in the department listings later in the College of Arts and Sciences catalog section.

Anthropology, B.A. or B.S. Applied anthropology	Sociology, anthropology, and social work
Art, B.A. or B.F.A.	Art
Biochemistry, B.A. or B.S.	Biochemistry
Biology, B.A. or B.S.	Biology
Chemical science, B.A. or B.S.	Chemistry
Chemistry, B.A. or B.S.	Chemistry
General textile	
Economics, B.A. or B.S.	Economics
English, B.A.	English
Creative writing	
Literature	
Teaching certification	
Fisheries and wildlife biology, B.A. or B.S.	Biology
Fisheries biology	
Wildlife biology	
Natural history	
General (advising program)	Dean's office
Geography, B.A. or B.S.	Geography
General	
Pre-planning	
Geology, B.A. or B.S.	Geology
Geophysics, B.A. or B.S.	Geology
History, B.A. or B.S.	History
Interdisciplinary	Dean's office
Humanities, B.A.	
Life science, B.A. or B.S.	
Physical science, B.A. or B.S.	
Social science, B.A. or B.S.	
Mass communications, B.A. or B.S.	Journalism and mass communications
Advertising	
Electronic journalism	
Print	
Public relations	
Radio-Television	
Kinesiology, B.A. or B.S.	Kinesiology
Nutrition and Exercise Science	
Mathematics, B.A. or B.S.	Mathematics
Medical technology, B.A. or B.S.	Dean's office
Microbiology, B.A. or B.S.	Biology
Modern languages, B.A.	Modern languages
Music, B.A. or B.M.	Music

Music education, B.M.E.	Music
Philosophy	Philosophy
Interdisciplinary, B.A. or B.S.	
Pre-business, B.A. or B.S.	
Pre-law, B.A. or B.S.	
Pre-ministry, B.A.	
Traditional, B.A.	
Physics, B.A. or B.S.	Physics
Political science, B.A. or B.S.	Political science
Pre-dentistry, B.A. or B.S.	Dean's office
Pre-health information management (advising program)	Dean's office
Pre-law (advising program)	Dean's office
Pre-medicine, B.A. or B.S.	Dean's office
Pre-nursing (advising program)	Dean's office
Pre-occupational therapy (advising program)	Dean's office
Pre-optometry (advising program)	Dean's office
Pre-pharmacy (advising program)	Dean's office
Pre-physical therapy (advising program)	Dean's office
Pre-respiratory therapy (advising program)	Dean's office
Pre-veterinary medicine* (advising program)	Dean's office
Psychology, B.A. or B.S.	Psychology
Social work, B.A. or B.S.	Sociology, anthropology, and social work
Sociology, B.A. or B.S.	Sociology, anthropology, and social work
General	
Criminology	
Speech, B.A. or B.S.	Speech
General	
Linguistics	
Speech Pathology, B.A. or B.S.	Speech
Statistics, B.A. or B.S.	Statistics
Theatre, B.A. or B.S.	Speech
Dance	

### Secondary majors

Secondary majors are majors that can be taken only in addition to the primary majors listed above. The secondary majors in the college are: American ethnic studies, gerontological studies, industrial labor relations, international studies, Latin American studies, and women's studies.

\*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.

## General Requirements

### General education requirements

Requirements in general education are to be fulfilled by courses chosen by students in consultation with their advisors. The aim of these requirements is to provide breadth in the major areas of knowledge outside the field of specialization. Introductory and intermediate-level courses are available for this purpose in departments in natural sciences, social sciences, and humanities. *Courses numbered below 100 may not be applied toward a degree.*

# Bachelor of Arts and Bachelor of Sciences

120 credit hours required for graduation

## Physical education

Purpose: to give a foundation in the principles of physical exercise and fitness.

KIN 101 Principles of Physical Fitness ..... 1

## Basic rhetoric

(Three courses, 8 credit hours minimum)

Purpose: to give students practice in writing and analyzing expository and argumentative prose and in oral presentation.

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 105	Public Speaking IA .....	2
	or	
SPCH 106	Public Speaking I .....	3

## A major

Purpose: to ensure some depth and detail in at least one field of knowledge.

Satisfaction of requirements for any of the majors in the College of Arts and Sciences (see list earlier in this section). With careful scheduling, it is possible to complete an additional major, a secondary major, or pre-professional requirements, as well.

## Basic disciplines

Purpose: The aim of the requirement in the humanities is to encourage and to enable students to recover "a heritage so important that to lose it would be to lose the very qualities that make men and women greater than the systems they devise and mark the difference between a society of robots and a community of civilized human beings." The aim of the requirement in the sciences is to ensure that students gain an immediate acquaintance with the general principles of scientific method and with the different shapes the scientific enterprise takes in the physical sciences, the life sciences, and the social sciences.

Up to two courses from one department may be used to fulfill the distribution requirements for humanities and the social sciences. They may be used at the same time to count towards the student's major. No course may be used to satisfy more than one specific requirement for humanities and social sciences. Only courses taken for 2 or more credit hours satisfy these requirements; courses in excess of 5 credit hours count as two courses.

## Humanities

Four courses, one course each section, 11 credit hours minimum

**Fine arts** (one course, or at least two credits)  
Purpose: to ensure some interpretive or ex-

pressive competence in a traditional nonliterary mode of artistic expression.

Choose from the following:

Anthropology—ANTH 515, 516, or 517  
Art—ART 301, 305, 400, or 560  
Art history—any course  
Art technique—ART 200 to 799  
Dance—DANCE 205, 323, 324, 325, 326, 371, 459, or 520  
History—HIST 459  
Music—MUSIC 200, 201, 245, 250, 255, 280, 310, 385, 420, 424, 455, 480, 570, 601, or 650.  
Theatre—THTRE 260 to 799

## Philosophy (one course)

Purpose: to ensure some interpretive or expressive competence in the fundamental conceptual issues of human thought and activity.

Choose any philosophy course except PHILO 110, 220, or 510.

## Western heritage (one course)

Purpose: to ensure some interpretive or expressive competence regarding the institutions, traditions, and values that have shaped Western civilization.

Choose from the following:

American ethnic studies—AMETH 160, 501, or 560  
Constitutional law—POLSC 613, 614, 615, 616, or 799  
Foreign civilizations—FREN 514, GRMN 530, SPAN 565, or SPAN 566  
History—courses dealing with the Greco-Roman, Western European, or North American experience; HIST 515  
History of Sport  
Kinesiology—KIN 515 (crosslisted with HIST 515), 325  
Music—MUSIC 245  
Political thought—POLSC 301, 661, 663, 667, 671, 675, or (SOCIO) 709  
Sociology—507  
Speech—SPCH 460  
Western humanities—ENGL 230, 231, 233, or 234  
Women's studies—WOMST 105, 405, 500, or 506

## Literary or rhetorical arts (one course)

Purpose: to ensure some interpretive or expressive competence in a traditional literary or rhetorical mode of artistic expression.

Choose from the following:

English—literature or creative writing—ENGL 250 to 799 except 300, 400, 415, 420, 430, 476, 490, 492, 499, 516, 604, 759, 790, or 796  
Modern languages—literature courses including literature in translation  
Theatre—THTRE 562 or 764  
History of rhetoric—SPCH 330, 331, 430, 432, 434, 460, 725, 730, 732, or 733

Exception: Students in B.S. programs who take two courses in one foreign language may use these to satisfy the requirements for Western heritage and for literary and rhetorical arts.

## Social sciences

Four courses, 12 credit hours minimum, from three disciplines

Purpose: to acquaint students with the adaptation of scientific method to the analysis of human social systems.

One course must be at 500 level or above, or carry a prerequisite in the same department.

Three of the four courses must be from these areas:

Cultural anthropology—including archaeology  
Economics—any course  
Geography—except GEOG 220 or 221  
History—any course  
Political science—any course

Psychology—any course

Sociology—any course

The fourth course must be from the above areas or from:

American ethnic studies—AMETH 501  
Anthropology—ANTH 432, 520, 532, or 640  
Gerontology—GERON 315 or 600  
Mass communications—MC 235, 300, 530, 565, 612, 710, 715, or 720  
Kinesiology—KIN 320, 340, 345, or 435  
Linguistics—except LG 601  
Speech—SPCH 323, 435, 720, or 726  
Women's studies—WOMST 105, 405, 500, or 506

## Natural sciences

Three courses, 11 credit hours minimum

## Life sciences (one course with laboratory)

Purpose: to introduce students to the systematic study of organisms and their interrelationships.

Choose from the following:

Biology—any course  
Biochemistry—any course  
Paleobiology—GEOL 581 or 704  
Physical anthropology—ANTH 280, 281, 680, 688, 691, 694, or 695

## Physical sciences (one course with laboratory)

Purpose: to introduce students to the appropriate attitudes and methods that characterize the systematic study of matter and energy.

Choose from the following:

Chemistry—any course  
Environmental geography—GEOG 220 or 221  
Geology—any course except GEOL 581 or 704  
Physics—any course

One additional natural science course selected from life sciences or physical sciences lists above.

## International studies overlay

One course

Purpose: to equip students better to become citizens of a world where the most important problems are unavoidably defined in international terms and to understand cultures of the world outside the Western tradition.

A student must take one course of which at least half is devoted to: economic, political, and social relations or interactions between or among different countries, in which the major focus is upon the interdependency of nations of the modern world; or contemporary features or historical traditions of non-Western cultures (excluding those dealing primarily with Greek, Roman, Western European, or North American experience).

Students may satisfy the international studies requirement at the same time they satisfy requirements in the major, in the humanities, or the social sciences. These courses qualify:

Agricultural economics—AGEC 615  
Anthropology—ANTH 200, 220, 260, 505, 506, 507, 508, 511, 512, 515, 516, 517, 532, 536, 545, 550, 604, 618, 630, 634, 640, 673, or 676  
Economics—ECON 505, 506, 507, 636, 681, or 682  
Geography—GEOG 100, 200, 201, 505, 506, 620, 640, 650, 710, or 715

History—HIST 250, 350, 504, 505, 506, 509, 510, 514, 543, 544, 545, 560, 561, 562, 564, 576, 577, 578, 591, 592, 593, or 598

Mass communications—MC 670

Management—MANGT 690

Marketing—MKTG 544

Modern languages—RUSSN 250, 504, 508, or 552

Political science—POLSC 333, 505, 506, 511, 541, 543, 545, 622, 623, 624, 625, 626, 627, 628, 629, 642, 645, 647, 649, 651, 652, or 653

Sociology—SOCIO 505, 506, 507, 535, 618, or 742

Students may use the fourth course in a single foreign language sequence (other than Latin) to satisfy the international studies overlay requirement.

## Additional requirements for the B.A.

### Foreign language

(The four basic courses, 15 credit hours, in one of the foreign language sequences in the Department of Modern Languages, or equivalent competency)

**Purpose:** to bring students to a point at which they are able to proceed on their own to a command of a second language—a key for access both to a foreign culture and to much primary and secondary material in many special fields.

### Mathematics

(One 3-credit-hour course, 100 level or above, or any other course for which there is a mathematics prerequisite)

**Purpose:** to give students a college-level competence in mathematical reasoning and analysis.

Any course used to satisfy this requirement cannot be used to satisfy any other general education requirement.

## Additional requirements for the B.S.

### Natural sciences

(One course, 3 credit hours minimum, with a prerequisite in the same department; for this requirement, biochemistry courses with a chemistry prerequisite qualify as upper-level courses.)

**Purpose:** to give students who elect the bachelor of science degree an especially solid foundation in the natural sciences.

Courses that qualify are those listed earlier under natural sciences, and:

Kinesiology—KIN 330 or 335

Psychology—PSYCH 470 or 480

### Quantitative and abstract formal reasoning

**Purpose:** to give students training in a clear, nonambiguous, simplified language for the efficient transfer and logical analysis of information—a language in which a good deal of discussion is conducted in the sciences.

A course that satisfies this requirement may at the same time be used to satisfy any major re-

quirement for which it qualifies. Fulfill this requirement one of three ways:

1. Three courses, 9 credit hours minimum, selected from:  
Computer science—100 level or above (CIS 200 requires lab 203 and is equivalent to one required course.)  
Mathematics—100 level or above  
Philosophy—PHILO 110, 220, or 510  
Statistics—any course
2. One course and its Level II prerequisite, selected from:  
Geography—GEOG 700  
Kinesiology—KIN 710  
Physics—PHYS 113, 223, 224, 325  
Sociology—SOCIO 520 or 725  
Social work—SOCWK 519
3. Equivalent competency:  
Competency may be demonstrated by taking two Level II courses or a Level III course from:

#### Level II courses (two courses):

Computer science—CIS 200 and lab 203 to count as one course

Mathematics—MATH 150, 201, or 205

Philosophy—PHILO 510

Statistics—STAT 320, 330, 340, 350, 702, or 703

#### Level III courses (one course):

Computer science—CIS 300 or 350

Mathematics—MATH 210 or 220

Philosophy—PHILO 701

Statistics—STAT 341, 351, 704, or 705

## Bachelor of Fine Arts

120 hours required for graduation

The bachelor of fine arts degree is a professionally oriented undergraduate degree in art. Emphasis is 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, and for the master of arts in art therapy, which is required for certification as an art therapist. The B.F.A. in art is a four-year, 120-credit-hour program with emphases possible in painting, sculpture, ceramics, graphic design, printmaking, metal-smithing and jewelry, drawing, and pre-art therapy. The degree requirements are as follows:

### General education (45 hours)

Communications—English composition, two courses; and oral communication, one course

Social sciences—two courses

Humanities—three courses

Philosophy or mathematics—one course

Natural sciences—two courses, one with a lab

General electives—11-19 hours

Kinesiology—KIN 101 Principles of Physical Fitness

### Art courses (75 credit hours)

Core—39 hours

Major—20 hours

Art electives and related courses—16 hours

## Bachelor of Music

129–134 credit hours required for graduation

Areas of concentration offered in this curriculum are: all instruments, voice, and composition. A secondary performance area also is required.

### General requirements (42 hours)

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 106	Public Speaking I .....	3
KIN 101	Principles of Physical Fitness .....	1
PHYS 101	The Physical World I .....	3
PSYCH 110	General Psychology .....	3
Nonmusic electives .....	minimum of 9	
Modern language .....	two courses minimum	

The remaining hours are to be taken in the area of concentration. For specific music requirements, see the Music section of this catalog.

## Bachelor of Music Education

136–139 credit hours required for graduation, depending on emphasis

The program of study leading to this degree is a nine-semester curriculum designed to prepare music teachers for grades K-12. With careful planning and enrollment during summer session(s) all requirements may be completed in four years. Within this curriculum there are two optional emphases—one in vocal/choral music, the other in instrumental music.

### General education requirements

ENGL 100	Expository Writing I .....	3
	and	
ENGL 200	Expository Writing II .....	3
	or	
ENGL 110	English Honors Composition I .....	3
	and	
ENGL 125	English Honors Composition II .....	3
SPCH 106	Public Speaking I .....	3
Literature elective (ENGL 261, 262, 271, 272, 361, 362, 381, 382) .....		3
Modern language (two courses in the same language) .....		3
	or	
One course in computer science .....		3–8
PSYCH 110	General Psychology .....	3
One course in American or world history (HIST 101, 102, 251, or 252) .....		3
ANTH 200	Introduction to Cultural Anthropology ..	3
MATH 100	College Algebra (or other math course having College Algebra as a prerequisite) .....	3
Biological science .....		3–4
Physical science (one of these two courses must include a lab) .....		3–4
KIN 101	Principles of Physical Fitness .....	1
Humanities electives to complete a total of 50 hours required general education .....		

The remaining hours are to be taken in the area of concentration. For specific music requirements, see the Music section of this catalog.

## Associate of Arts at Fort Riley

60 hours including the following general requirements:

English—ENGL 100 and 200

Speech—SPCH 105 (or one course), courses subject to approval by Department of Speech

Modern languages—two years in one language or equivalent competence

Mathematics—one course

Humanities—three courses from: art, dance, English, history, modern languages, music, philosophy, speech, and Introduction to Women's Studies. No more than three courses in history may be used to fulfill humanities and social sciences requirements.

Social sciences—three courses from: anthropology, economics, geography (excluding GEOG 220 and 221), history, political science, psychology, sociology, social work, mass communications, and Introduction to Women's Studies. No more than three courses in history may be used to fulfill humanities and social sciences requirements.

Natural sciences—four courses, including one laboratory course and one course that has a prerequisite in the same department: biochemistry, biology, chemistry, computer science, geography, (GEOG 220 and 221 only), geology, mathematics, physics, or statistics

Kinesiology—KIN 101 Principles of Physical Fitness

## Associate of Science at Fort Riley

60 hours including the following general requirements:

English—ENGL 100 and 200

Speech—SPCH 105 (or one course), courses subject to approval by Department of Speech

Humanities and social sciences—seven courses, taken from at least two departments, including one course in philosophy, from: anthropology, art, dance, economics, English, geography (excluding GEOG 220 and 221), history, modern languages, music, philosophy, political science, psychology, sociology, social work, speech, mass communications, and Introduction to Women's Studies

Natural sciences—four courses, including one laboratory course and one course that has a prerequisite in the same department: biology, biochemistry, chemistry, computer science, geography (GEOG 220 and 221 only), geology, mathematics, physics, or statistics

Kinesiology—KIN 101 Principles of Physical Fitness

## Institute for Social and Behavioral Research

M. Duane Nellis, Director  
James Shanteau, Associate Director

The Institute for Social and Behavioral Research promotes, encourages, and facilitates research and graduate studies in the social, behavioral, and statistical sciences. This interdisciplinary institute conducts its own research, enhances research by faculty, assists faculty in securing research funding, assists graduate students and undergraduates through fellowship programs, and provides outreach

services to public agencies and institutions in Kansas. Research colloquia and faculty research fellowships are also sponsored by the ISBR. Programs coordinated by the ISBR include the Population Research Laboratory, the Geographic Information Systems/Spatial Analysis Laboratory, the Labor Studies Program, the Risk Analysis Laboratory, the Statistical Design and Analysis Unit, the Survey Research Laboratory, the Center for Exercise Research, and the Advanced Research Development Program.

## Program Options

### Honors program

The honors program offers intellectually able and motivated students experiences in the humanities and in the social-behavioral and natural sciences that are challenging and unusual in breadth and focus. By stressing liberal studies in the freshman and sophomore year, interdisciplinary study in the junior year, and independent study in the senior year, the honors program enables students to develop broad intellectual interests.

The honors program further enriches the experiences of its members by creating opportunities for them to develop a sense of community and to meet faculty and distinguished guests of the university in informal settings.

Students with high ACT scores are invited to participate in the honors program during the freshman year. Formal admission to the program is granted at the end of the freshman year to students who have achieved a 3.3 GPA.

Students in the honors program are expected to enroll in DAS 110 Introduction to the Honors Program in arts and sciences and an honors section of ENGL 125 Expository Writing II or receive consent of the director. Students must complete: two seminars, one in social sciences or humanities and one in the natural sciences or mathematics; an interdisciplinary colloquium, and research leading to a senior thesis, an independent study, under the supervision of a faculty member of the student's choice, during the senior year. Honors sections of regular Arts and Sciences classes are also available each semester.

The senior study culminates in an honors thesis or other documentation of performance, which is filed with the director. This project is invaluable as evidence of a student's ability to organize and complete a study independently. It provides evidence of capability to do well in graduate studies and may enable the student to strengthen significantly an application to graduate school. It may also help make the case for a scholarship application or serve as the impetus for more detailed investigation later in the student's career. Honors students are encouraged to complete a four-course se-

quence in a modern language other than English.

All phases of the honors program emphasize oral and written communication, both as a method of demonstrating one's understanding of a subject, and as a strategy for developing one's thinking skills. In addition to the curricular options described, students in the honors program have many opportunities to individualize their courses of study. Student-designed curricular plans may be approved with the consent of department heads involved, the director of the honors program, and the dean of the college. Students are also encouraged to propose other plans in their course work, including off-campus learning experiences that may be supplemented by reading, discussion, and reporting for course credit with the approval of the proper supervising faculty.

A transfer student or other upperclassman who has a grade point average of 3.3 and who receives a positive evaluation by the director may be admitted to the honors program as late as the beginning of the junior year. Students who wish to be considered for late admission should contact the director.

For more information, contact the director of the honors program, College of Arts and Sciences, Office of the Dean.

**DAS 110. Introduction to the Honors Program in Arts and Sciences.** (1) I. Direction and goals for the honors program in the College of Arts and Sciences.

**DAS 388. Honors Internship.** (1–3) I, II, S. A scholarly investigation related to activities in a place of employment or in a volunteer situation. Written and oral presentations are required. Pr.: Concurrence of a faculty advisor and approval of the arts and sciences honor program advisory council.

**DAS 450. Honors Colloquium.** (3) An interdisciplinary colloquium in which topics vary by semester. Consistently incorporates perspectives from more than one discipline and area among the arts, humanities, social sciences, and sciences. Pr.: Membership in the honors program; one honors course in addition to introduction to the honors program in Arts and Sciences.

### Freshman Seminar

Freshman Seminar introduces students to what a university is, the purpose of a university education, and what it means to be an educated person. This is done, not through a lecture approach, but through sharing the varied cultural and intellectual activities that occur at K-State, demonstrating by example the characteristics of educated persons and the importance of higher education.

**DAS 100. Freshman Seminar.** (2) I. An introduction to the intellectual and cultural life of Kansas State University.

### Natural resources/ environmental sciences

Increasing national and international concerns have generated opportunities for individuals to contribute to the resolution of environmental and resource problems. These issues are so complex that they lie beyond the scope of any one discipline.

The natural resources and environmental science secondary major broadens students' perspectives through course offerings and interaction with students and faculty from many disciplines. The option prepares students to apply broadly-based knowledge to the use, management, sustainability, and quality of soil, air, water, mineral, biological, and energy resources.

The NRS option includes entry requirements; at least five block courses selected from natural science, applied science, and social science/humanities offerings; and an interdisciplinary capstone course. Interested students should contact Steve J. Thien, acting director, 317B Throckmorton Hall, 532-7207.

**DAS 582. Natural Resources/Environmental Sciences Project (NRES).** (3) I, II. A comprehensive project in NRES. Requires integration of information and understanding acquired in NRES secondary major courses. Students must prepare and present written and oral reports. Three hours recitation per week. Pr.: All writing and oral communications courses required for the major. Pr. or conc.: 15 hours of approved courses in NRES secondary major. Crosslisted with GENAG 582 and DEN 582.

## Study abroad

Barry Michie, Director  
304 Fairchild Hall  
532-5990

The Office of Study Abroad should be the first stop for students who wish to study in another country for a year, a semester, a summer, or an intersession.

In addition to a number of good language programs, there are opportunities to study almost every subject from art to zoology in Africa, Asia, Canada, Latin America, and Europe. Every attempt is made to ensure the best match between the interests of a student and the ingredients of a program sponsored by K-State or by another institution.

Students may apply for scholarships, such as the Fulbright or the Pearson, or scholarship-exchanges, such as the K-State/Justus Liebig year abroad. Through the International Student Exchange Program it is possible to study for a semester or a year at one of 100 colleges and universities outside the U.S. for the same cost as tuition, room, and board at K-State. Financial aid from almost every agency is applicable to all credit-earning programs.

## Cooperative education

Cooperative education is the integration of academic experience with planned, paid employment experiences related to a student's academic major or career goals. Check with Career and Employment Services for eligibility requirements, available opportunities, and faculty contacts.

## Linguistics

The Departments of English, Modern Languages, Speech, and Sociology, Anthropology, and Social Work offer cross-

listed linguistics courses available for either graduate or undergraduate credit.

The courses provide students in education, anthropology, foreign languages, psychology, philosophy, literature, and other areas an opportunity to appreciate both the rich structure of language itself and the relationships between their disciplines and linguistic studies.

For further information about linguistics courses, contact either the participating departments or the linguistics advisor in 110 Leasure Hall.

## Secondary teacher certification

An arts and sciences major may apply some elective hours toward the requirements for secondary teacher certification. In most arts and sciences departments, students can complete an academic major and earn certification within the 120 hours of course work required for a degree. Because the teacher training courses are offered through the College of Education, students who choose to combine these two programs are entitled to two advisors, one in the major field of study, the other in secondary education.

By combining a traditional academic major with teaching certification, students can be assured of varied choices after graduation. By pursuing an arts and sciences major, students also have the option of working toward a bachelor of arts degree and studying a foreign language. In addition, the teaching certification will qualify graduates to teach in a public secondary school. For specific certification requirements in secondary education, see the College of Education section of this catalog.

## Interdisciplinary Majors

Interdisciplinary majors provide an opportunity for students to organize their interests within a broad area of study rather than within the narrower focus required by a major in a single discipline. Students who want to create their own fields of emphasis and students who are eager to pursue multidisciplinary solutions to complex problems often choose an interdisciplinary major. Other students choose interdisciplinary study as a second major, adding it to a departmental major in order to gain expertise in complementary areas.

The College of Arts and Sciences offers four interdisciplinary majors:

Major	Degree(s)	Credit hrs.
Humanities	B.A. only	36
Life science	B.S. or B.A.	36
Physical science	B.S. or B.A.	36
Social science	B.S. or B.A.	36

The requirements for each of the interdisciplinary majors are sufficiently flexible to allow individual students, in consultation with

their advisors, to devise degree programs designed to meet their particular needs, interests, and career goals.

Interdisciplinary majors are advised in the College of Arts and Sciences dean's office.

## Humanities

The humanities disciplines require the study of cultural artifacts, traditions, and activities. The purpose of cultural study is to learn what culture means and how individuals operate within it. This study should enable students to understand their own places in existing traditions, and help them to contribute positively to the development of new ones. Creativity, imagination, and interpretation are central to humanistic study. The humanities disciplines include art, dance, speech, theater, history, languages, literature, music, and philosophy. A humanities major leads to the traditional liberal degree, the bachelor of arts.

A student seeking admission to the program must submit a plan of study to an interdisciplinary humanities advisor in the College of Arts and Sciences dean's office for approval. This proposal must include a rationale or thematic design for the interdisciplinary degree and a tentative listing of courses. The student must confer with other humanities faculty members who have special expertise in the areas of the student's interest. This procedure should be accomplished before or during the semester in which the student completes 60 credit hours toward the degree. *The student's proposal must be approved by the Humanities Advisory Committee.*

The humanities major consists of 36 credit hours.

Fifteen credits must be completed in each of two humanities disciplines; these should be selected from among courses normally counted toward a major in the field.

At least 15 credit hours must be completed in humanities disciplines at the 500–699 level, including at least two courses in each of the two humanities concentration areas. (Students interested in music are encouraged to seek special advising in the music department.)

No more than 9 credit hours may be counted toward both the general requirements and the major.

A student with a well-defined theme that exceeds the scope of these requirements may petition the Humanities Advisory Committee for an appropriate waiver.

A 2.0 GPA in the major is required for graduation.

## Life sciences

Life science is a multidisciplinary major that deals with studies of living organisms and life processes.

BIOL 198	Principles of Biology .....	4
BIOL 201	Organismic Biology .....	5
BIOCH 265	Introductory Organic and Biological Chemistry .....	5
	or	
CHM 350/351	General Organic Chemistry and Lab ...	5
BIOL 455	Microbiology .....	4
ANTH 280/281	Introduction to Physical Anthropology and Lab .....	4
	Psychology course with prerequisite .....	3
	Electives .....	11*
		<b>36</b>

The 11 remaining elective hours must be selected from two or more of the following fields: biochemistry, biology, microbiology, organic chemistry, physical anthropology, and psychology. At least two of these courses must have a prerequisite. A 2.0 GPA is required in the major for graduation.

## Physical science

Physical science is a multidisciplinary major that deals primarily with nonliving matter. It concerns itself with the theoretical and observable natural phenomena of our world and universe.

Student majoring in physical science must earn grades of C or better in all courses prescribed for this curriculum, including electives, as outlined below.

Math 220	Analytic Geometry and Calculus I .....	4
Statistics 320, 340, 410, or 510	.....	3
CHM 210	Chemistry I .....	4
	or	
CHM 220	Chemical Principles I .....	5
	and	
CHM 230	Chemistry II .....	4
	or	
CHM 250	Chemical Principles II .....	5
PHYS 113	General Physics I .....	4
	or	
PHYS 213	Engineering Physics I .....	5
	and	
PHYS 114	General Physics II .....	4
	or	
PHYS 214	Engineering Physics II .....	5
GEOL 100/300	Introduction to Geology and Lab .....	4
	or	
GEOL 220	Environmental Geography I .....	4
Electives	.....	5-9*

\*Students must complete a total of 36 hours in the major. Electives must be selected from the following:

Computing and information sciences—200 or above  
Chemistry—271, 350, 351, 500 or above  
Geology—100, 105, 130, 300, 500 or above, except 512  
Geography—221  
Mathematics—221, 222, 240, 510, or 551  
Physics—100, 191, 300 or above, except 515  
Statistics—341, 511, or above

Problems, seminar, or topics courses are not acceptable unless listed above. At least five elective hours must have a prerequisite.

## Social science

Social science is a branch of learning that examines society's institutions—their structures, theoretical foundations, evolution, and interrelationships—and how they affect and are affected by human behavior. The social science disciplines include anthropology, economics,

geography, history, political science, psychology, and sociology.

A student seeking admission to the program must submit a plan of study to an interdisciplinary social science advisor in the College of Arts and Sciences for approval. This proposal must include a rationale or thematic design for the interdisciplinary degree and a tentative listing of courses. The theme or rationale should run through a minimum of 12 hours of courses in the major. One course outside the stipulated social science disciplines may be used to count toward the major if the course fits the student's theme. No more than one course may be used unless more seem to be necessary to fulfill a student's theme.

The student's social sciences advisor may encourage him or her to confer with other social science faculty members who have special expertise in the area of the student's interest. This procedure should be accomplished before or during the semester in which the student completes 60 hours of university credit.

A total of 36 credit hours must be completed with at least 3 credits being completed in each of four different social science disciplines.

At least 9 credit hours must be completed in one social science discipline, including at least one course at the 500–699 level.

At least 15 credit hours must be completed in social science disciplines at the 500–699 level.

No more than 9 credit hours may be counted toward both the general requirements and the major.

A 2.0 GPA in the major is required for graduation.

Students must complete at least one course in social science research methods or data analysis. This course may be any statistics course that a student is qualified to take or may be selected from: GEOG 700 Quantitative Analysis in Geography; HIST 586 Junior Seminar in History; POLSC 400 Political Inquiry and Analysis; POLSC 700 Research Methods in Political Science; PSYCH 350 Experimental Methods in Psychology; SOCIO 520 Methods of Social Research; STAT 330 Elementary Statistics for the Social Sciences.

The research/data course cannot be used to fulfill any other requirement in the major. It can, however, be used to fulfill a general requirement.

## Pre-Professional Programs

Pre-professional programs are advised in the College of Arts and Sciences dean's office.

## Pre-law

While the Association of American Law Schools does not specify a particular pre-law curriculum, it does emphasize the selection of rigorous courses that will enable students to achieve comprehension and expression in words; critical understanding of the human institutions and values with which the law deals; and creative power in thinking. The development of these capacities is a highly individualized process vigorously pursued in a variety of disciplines and degrees. Students in all majors who are considering law study should consult with the K-State pre-law advisor in the College of Arts and Sciences dean's office as early as possible in their undergraduate careers.

## Pre-health professions program

As careers in health professions continue to be plentiful, applicants to the professional training programs become more numerous and requirements for admission into those programs become more stringent. One of the universal requirements for admission is a high grade point average. For this reason students entering K-State for the first time as freshmen will enroll in the pre-health professions program (PHPP). Students requesting transfer into a health professions curriculum with previous academic work at K-State or elsewhere must have a 2.75 GPA or higher to enroll in PHPP. For purposes of admission into PHPP, GPAs will be based on all courses attempted at colleges or universities.

The pre-health professions program will allow students to establish a firm base for application to the professional school of their choice. During the time in PHPP students will be advised in the health professions advising office for two semesters, normally 30 credit hours, during which time they will take science and math courses required for their chosen professional program.

Admission to a pre-health curriculum (pre-medicine, pre-nursing, etc.) will be granted after completion of the 30 hours with a GPA of 2.75 or above. Students with a GPA below 2.75 will be required to find an alternative to a pre-health curriculum.

**DAS 115. Orientation to Health Careers.** (1) I, II. Acquaints students whose career goals are in the health professions fields with the variety of options available and with the corresponding academic requirements. Discussion covers an introduction to the personal responsibilities that health-care workers assume and the impact of social and economic problems on our health-care delivery system. Includes an orientation to general requirements for success as a student at K-State and in professional health related programs.

**DAS 240. Practicum in Pre-Health.** (3) I, II, S. Forty hours spent observing the practice of dentistry, medicine, or optometry. Students are under the supervision and direction of individual dentists, physicians, or optometrists. Pr.: Sophomore standing, permission of the health professions advisor.

## Medical technology

The medical technology curriculum requires 90 semester hours of preclinical courses and 12 to 18 months of work at one of the affiliated clinical programs in Kansas City, Topeka, or Wichita. Admission into that portion of the training is by application; students are expected to have a minimum GPA of 2.0 to 2.5 for both overall work and for the required science courses. All the requirements for a bachelor's degree must be completed before a student is allowed to sit for the certification examination.

In addition to the general requirements for a bachelor's degree in the College of Arts and Sciences, the following courses are required:

### Preclinical courses

One course in statistics .....	3
MATH 100 College Algebra .....	3
CHM 210 Chemistry I .....	4
CHM 230 Chemistry II .....	4
CHM 350 General Organic Chemistry .....	3
CHM 351 General Organic Chemistry Laboratory .....	2
BIOCH 521 General Biochemistry .....	3
BIOCH 522 General Biochemistry Laboratory .....	2
or	
CHM 271 Chemical Analysis .....	4
BIOL 198 Principles of Biology .....	4
BIOL 455 Microbiology .....	4
BIOL 670 Immunology .....	4

Select two of the following courses:

BIOL 240 Human Body .....	6
BIOL 530 Pathogenic Microbiology .....	3
BIOL 545/546 Parasitology and Lab .....	5

Internship in affiliated school of medical technology ..... 30

Highly recommended courses:

BIOL 400 Human Genetics .....	3
BIOL 671 Immunology Laboratory .....	2
CIS 110 Introduction to Personal Computers .....	3
PHYS 115 Descriptive Physics .....	4
MANGT 420 Management Concepts .....	3

Either CHM 271 or BIOCH 522—whichever was not taken above

**DAS 001. Medical Technology Clinical Semester.** (Var.) I, II, S. Enrollment in this course allows students attending a hospital-based clinical program to complete the 30 credit hours of clinical work required for the bachelor's degree in medical technology. Pr.: Completion of the 90 credit hours of undergraduate course work required for the medical technology degree.

### Clinical courses (taken during internship)

**DAS 401. Clinical Microbiology.** (6–8) II. The theory and laboratory study of pathogenic bacteria, viruses, rickettsiae, fungi, and parasites. Includes morphology, physiology, taxonomy, and medical significance.

**DAS 402. Clinical Chemistry.** (6–8) I. Theory and laboratory study of analytical biochemistry, incorporating both routine and special chemical procedures.

**DAS 403. Clinical Hematology.** (4–6) S. Study of blood cell derivation, maturation, and function, principles of hemastasis, and blood coagulation. Methodology used in routine and special hematology studies.

**DAS 404. Clinical Immunology.** (2–6) I. Immunohematology, the study of fundamentals of antigen-antibody reactions, blood groups and types, crossmatches, blood components, and the laboratory methods used in immunohematology studies; and serology, the theory of immunologic responses and procedures used in determination of serological studies.

**DAS 405. Topics in Medical Technology.** (3–6) II. Basic principles and practices of the medical laboratory, techniques and special projects.

Contact the College of Arts and Sciences dean's office for more information.

## Pre-dentistry

U.S. dental schools require applicants to have satisfactorily completed a specified set of courses and to present acceptable scores on the Dental Admission Test. The majority of entrants earn bachelor's degrees prior to matriculating.\* The courses listed in the pre-dental major satisfy the admission requirements for most dental schools.

PHYS 113	General Physics I .....	4
PHYS 114	General Physics II .....	4
CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
CHM 350	General Organic Chemistry .....	3
CHM 351	General Organic Chemistry Laboratory .....	2
or		
CHM 531	Organic Chemistry I .....	3
CHM 532	Organic Chemistry Laboratory .....	2
CHM 550	Organic Chemistry II .....	3
BIOL 198	Principles of Biology .....	4
BIOL 201	Organismic Biology .....	5
	Biology electives (400 level or above) .....	8
MATH 100	College Algebra .....	3
MATH 150	Plane Trigonometry .....	3

\*Students who enter dental school after completing only 90 credit hours, which include the courses listed in the pre-dental major and the general education requirements for the B.A. or B.S. degree, may complete degree requirements by transferring 30 credit hours from an accredited dental school.

Contact the College of Arts and Sciences dean's office for more information.

## Pre-medicine

Medical schools in the United States require applicants to have satisfactorily completed a bachelor's degree before matriculating, to include a series of required science courses and a broad range of humanities and social sciences in their studies, to show leadership and an interest in the health field, and to present acceptable scores on the Medical College Admission Test. Kansas residents are given preference at the University of Kansas School of Medicine. The courses listed below constitute the pre-medical major and fulfill the course requirements at most U.S. medical schools and at the University of Kansas School of Medicine.

CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
CHM 271	Chemical Analysis .....	4
CHM 531	Organic Chemistry I .....	3
CHM 532	Organic Chemistry Laboratory .....	2
CHM 550	Organic Chemistry II .....	3
CHM 551	Organic Chemistry II Laboratory .....	2
MATH 220	Analytic Geometry and Calculus I .....	4
or		
MATH 205	General Calculus and Linear Algebra ...	3
PHYS 113	General Physics I .....	4
PHYS 114	General Physics II .....	4
BIOL 198	Principles of Biology .....	4
BIOL 400	Human Genetics .....	3
or		
ASI 500	Genetics .....	3
BIOL 510	Embryology .....	3
BIOL 511	Embryology Laboratory .....	1

Contact the College of Arts and Sciences dean's office for more information.

## Pre-optometry

In order to apply for admission to a school of optometry, students are expected to have successfully completed at least three years of college work including a set of specified science and math courses and to have taken the Optometry Admission Test. Students must receive a bachelor's degree before the optometry degree will be granted. Pre-optometry is not a major toward an undergraduate degree.

The following courses satisfy the admission requirements at most optometry schools:

MATH 100	College Algebra .....	3
MATH 150	Plane Trigonometry .....	3
MATH 220	Analytic Geometry and Calculus I .....	4
PHYS 113	General Physics I .....	4
PHYS 114	General Physics II .....	4
BIOL 198	Principles of Biology .....	4
BIOL 201	Organismic Biology .....	5
BIOL 455	Microbiology .....	4
BIOL 240	Structure and Function of the Human Body .....	6
CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
CHM 350	General Organic Chemistry .....	3
CHM 351	General Organic Chemistry Laboratory .....	2
BIOCH 521	General Biochemistry .....	3
PSYCH 110	General Psychology .....	3
STAT 320	Elements of Statistics .....	3

Requirements for some optometry schools vary, so consultation with the pre-optometry advisor is recommended.

Contact the College of Arts and Sciences dean's office for more information.

## Pre-veterinary

Seventy semester hours are required for students applying for admission to the freshman class entering the College of Veterinary Medicine.

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 105	Public Speaking IA .....	2
CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
CHM 350	General Organic Chemistry .....	3
CHM 351	General Organic Chemistry Laboratory .....	2
BIOCH 521	General Biochemistry .....	3
BIOCH 522	General Biochemistry Laboratory .....	2
PHYS 113	General Physics I .....	4
PHYS 114	General Physics II .....	4
BIOL 198	Principles of Biology .....	4
BIOL 510	Embryology .....	3
BIOL 511	Embryology Laboratory .....	1
BIOL 455	General Microbiology (with lab) .....	4
ASI 500	Animal Genetics .....	3
	Social sciences and/or humanities .....	12
	Electives .....	9
		70

Because the pre-veterinary curriculum is not a degree-granting program, students in arts and sciences are encouraged to combine the pre-veterinary requirements with a degree-granting major of their choice. Students should consult the pre-veterinary advisor in the College of Arts and Sciences dean's office.

The pre-veterinary requirements may be completed in the College of Agriculture if a student's major is in that college.

### Pre-pharmacy

The admission committee of the Pharmacy School at the University of Kansas gives a preference to applicants who are Kansas residents. The following courses constitute their requirements.

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
CHM 531	Organic Chemistry I .....	3
CHM 532	Organic Chemistry Laboratory .....	2
CHM 550	Organic Chemistry II .....	3
CHM 551	Advanced Organic Chemistry Laboratory .....	2
MATH 220	Analytic Geometry and Calculus I .....	4
BIOL 198	Principles of Biology .....	4
BIOL 240	Structure and Function of the Human Body .....	6
BIOL 455	General Microbiology .....	4
PHYS 115	Descriptive Physics* .....	4
SPCH 106	Public Speaking I .....	3
Humanities and social sciences electives .....		9

\*Students who have completed high school physics with a grade of B or better may be exempt.

Requirements for other pharmacy schools vary, so consultation with the pre-pharmacy advisor is recommended.

Contact the College of Arts and Sciences dean's office for more information.

### Pre-nursing

Students entering the pre-nursing curriculum take the necessary courses and electives for transferring to a school of nursing. The number and types of 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 (60–65 credit hours), as prescribed by the university granting the degree, are required.

The following are core requirements needed for *most* BSN programs:

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 106	Public Speaking I .....	3
SOCIO 211	Introduction to Sociology .....	3
PSYCH 110	General Psychology .....	3
CHM 110/111	General Chemistry and Lab .....	4
BIOL 198	Principles of Biology and Lab .....	4
MATH 100	College Algebra .....	3
BIOL 455	General Microbiology .....	4
BIOL 240	Structure and Function of the Human Body .....	6
PSYCH 520	Life Span Personality Development .....	3
FN 132	Basic Nutrition .....	3
STAT	One introductory statistics course .....	3
Electives .....		(Var.)

The number of additional specific courses and elective hours vary with the BSN program of your choice. Individual advising is strongly recommended.

Contact the College of Arts and Sciences dean's office for more information.

### Pre-physical therapy

To be eligible for the state's two physical therapy master's degree programs, which are located at the University of Kansas and Wichita State University, students should complete an undergraduate degree in the field of their

choice. The following are core requirements needed for *most* physical therapy programs. Additional humanities, social sciences, and other electives are required and vary with each program. *Individual advising is strongly recommended.*

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 106	Public Speaking I .....	3
PSYCH 110	General Psychology .....	3
PSYCH 505	Abnormal Psychology .....	3
PSYCH 520	Life Span Personality Development .....	3
SOCIO 211	Introduction to Sociology .....	3
MATH 100	College Algebra .....	3
MATH 150	Plane Trigonometry .....	3
or		
MATH 220	Analytic Geometry and Calculus I .....	3
STAT	One introductory statistics course .....	3
BIOL 198	Principles of Biology .....	4
BIOL 240	Structure and Function of the Human Body .....	6
BIOL 455	General Microbiology .....	4
CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
PHYS 113	General Physics I .....	4
PHYS 114	General Physics II .....	4

Contact the College of Arts and Sciences dean's office for more information.

### Pre-occupational therapy

To be eligible for admission to regional occupational therapy programs, the following course work needs to be completed:

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
ENGL (Literature) 200+	.....	3
SPCH 106	Public Speaking I .....	3
SOCIO 211	Introduction to Sociology .....	3
PSYCH 110	General Psychology .....	3
PSYCH 505	Abnormal Psychology .....	3
PSYCH 520	Lifespan Personality Development .....	3
CHM 110/111	General Chemistry and Lab .....	4
BIOL 198	Principles of Biology .....	4
BIOL 240	Structure and Function of the Human Body .....	6
MATH 100	College Algebra .....	3
STAT	One introductory statistics course .....	3
PHYS 113	Physics I .....	3
CIS 110	Introduction to Personal Computing .....	3
Basic art course*		3
Restricted liberal arts elective .....		3
Humanities .....		(Var.)
Philosophy .....		5
General electives .....		11

\*Tangible art/craft classes (metal and jewelry, drawing I, sculpture, weaving, ceramics, painting, etc.)

Individual advising is strongly recommended.

Contact the College of Arts and Sciences dean's office for more information.

### Pre-respiratory therapy

Advising is available for two years of preparatory work for application to respiratory therapy programs. The following classes should be taken:

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 106	Public Speaking .....	3
MATH 100	College Algebra .....	3
STAT	One introductory statistics course .....	3
CHM 110/111	General Chemistry and Lab .....	4
BIOL 198	Principles of Biology .....	4
BIOL 240	Human Body .....	6
BIOL 455	General Microbiology .....	4
PHYS 115	Descriptive Physics .....	4
LATIN 105	Latin and Greek for Scientists .....	1
Social science electives .....		3

Humanities electives .....	3
Math and science electives .....	6–10
Electives .....	12
63–66	

Individual advising is strongly recommended.

Contact the College of Arts and Sciences dean's office for more information.

### Pre-health information management

The pre-health information management curriculum is a three-year program. Qualified applicants then apply to the health information management program at the University of Kansas. The following course work needs to be completed:

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
ENGL 516	Written Communication for Sciences ..	3
SPCH 106	Public Speaking .....	3
MATH 100	College Algebra .....	3
STAT	One introductory statistics course .....	3
PSYCH 110	General Psychology .....	3
PSYCH 535	Social Psychology .....	3
SOCIO 111	Introduction to Sociology .....	3
BIOL 198	Principles of Biology .....	4
BIOL 240	Structures and Function of the Human Body .....	6
BIOL 455	Microbiology .....	4
FN 132	Basic Nutrition .....	3
MANGT 420	Management Concepts .....	3
MANGT 531	Personnel and Human Resource Management .....	3
MANGT 390	Business Law .....	3
CIS 110	Introduction to Personal Computing ...	3
Humanities electives .....		6
Electives .....		18
		86

Individual advising is strongly recommended.

Contact the College of Arts and Sciences dean's office for more information.

## Aerospace Studies

William G. Byrns, Head

Assistant Professors Lobmeyer and Vavra

108 Military Science Hall  
532-6600

The Air Force Reserve Officer Training Corps provides the best means for undergraduate and graduate students to become officers in the United States Air Force. Upon completion of the university program, students are commissioned second lieutenants, and then enter active duty as a pilot, missileer, or navigator, or enter a technical or nontechnical career field; are deferred for graduate study, to enter active service after degree completion; or enter into Air Force-sponsored graduate study at full pay while serving as Air Force officers.

Any student—graduate or undergraduate—who is a U.S. citizen may become a cadet by enrolling in AERO 110. The duration of the program varies from two to four years, depending upon an applicant's previous experience and the availability of different options.

## Scholarships

Full-time students who qualify to become Air Force officers, with two or more years left for degree completion (including graduate study), are eligible to apply for scholarships. If selected, students will have their tuition, fees, and book expenses paid for by the U.S. Air Force; they will also receive a \$100 monthly stipend while in school. All payments are tax free.

Students who apply for and receive the Air Force Pre-Health Professions Scholarship, and are subsequently accepted to medical school, are guaranteed scholarship through medical school. The Pre-Health Professions Scholarship pays for tuition, fees, and books, plus \$100 monthly. The medical school scholarship pays med-school tuition, fees, books, and more than \$700 per month.

High school students considering the four-year Air Force College Scholarship Program must be highly motivated toward becoming Air Force officers. To qualify, students should be above-average scholars, be physically capable, possess leadership potential, and apply before December of the senior year. Financial benefits are the same as the undergraduate scholarships mentioned earlier. Applicants should contact their high school counselor or an AFROTC officer for applications and further information.

## Four-year program

### Basic course

Students electing the four-year program normally will begin with the General Military Course during the freshman or sophomore year. This program consists of four semesters of 1 credit hour each, counts toward all bachelor's degrees awarded by K-State, and in no way obligates students to a military commitment. Aerospace studies GMC courses are open to all students at the university without obligation to military service. Students in the GMC are provided uniforms, texts, and other equipment needed for their AFROTC courses. Students may begin enrollment in GMC courses at any time until two years prior to graduation (graduate or undergraduate).

### Advanced course

The Professional Officer Course is the upper-class program and consists of four courses of 3 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. Upon completion of the POC and their degree requirements, students are commissioned as second lieutenants in the United States Air Force.

## Two-year program

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, an Air Force physical, and completion of six weeks of summer field training. Applicants should contact AFROTC before February 15.

## Field training

Cadets practice their leadership and management skills in a cadet group. Cadets who are in the four-year program attend four weeks of field training at an Air Force base during the summer prior to entering the POC. Two-year program cadets attend six weeks of field training. During training, cadets are paid approximately \$140 per week, and receive travel pay to and from the training base.

## Extracurricular activities

Students enrolled in Air Force ROTC may participate in many activities including detachment-sponsored events and social functions. Cadets pursuing officers' commissions are eligible for membership in the Arnold Air Society, a national honorary professional and service organization established to foster good relations among Air Force ROTC, the Air Force, the campus, and the local community. Participation in the Arnold Air Society is voluntary.

## AFROTC Supplemental Courses Program

The Supplemental Courses Program provides both required and recommended courses to enhance the career and officer performance of students commissioned through AFROTC.

GMC scholarship cadets must successfully complete a course in English composition by the end of the sophomore year. They are also encouraged to take a course in speech.

POC cadets must successfully complete a course in mathematical reasoning prior to commissioning.

In all cases, successful completion of a K-State required course in a supplemental subject area will also satisfy the AFROTC requirement. Details on the SCP are available through the Department of Aerospace Studies.

## Foreign language requirement

AFROTC cadets who accept scholarships are required to successfully complete at least two semesters of college instruction in a major Indo-European or Asian language prior to commissioning. AFROTC policy is to allow cadets to meet the requirement by completing a course or by demonstrating proficiency as certified by the Department of Modern Languages.

## General military courses

### Undergraduate credit

**AERO 099. Aerospace Studies Lab.** (0) I, II. The leadership laboratory for aerospace studies. Students will receive

leadership training and experience as well as training in Air Force customs and courtesies. Pr.: Instructor permission.

**AERO 110. 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.

**AERO 111. Aerospace Studies 1B.** (1) II. U.S. strategic offensive and defensive forces; their mission, function, and employment. One hour of class plus one hour of leadership training a week.

**AERO 210. Aerospace Studies 2A.** (1) I. 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.

**AERO 211. Aerospace Studies 2B.** (1) II. 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 significant examples of the impact of air power on strategic thought. One hour of class plus one hour of leadership training a week.

**AERO 215 AFROTC Summer Program.** (4) S. Mission and organization of United States Air Force, including function and employment; development of air power from its beginning to the present. Emphasis on factors prompting research and technological change and impact of air power on strategic issues. Taught off campus at selected Air Force bases. Pr.: Open only to students entering AFROTC program at the junior level.

## Professional officers courses

### Undergraduate credit

**AERO 310. The Professional Officer 3A.** (3) I. A study of USAF professionalism, leadership, and management. Includes the meaning of professionalism, professional responsibilities, 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.

**AERO 311. The Professional Officer 3B.** (3) II. Continuation of AERO 310. Three hours of class plus one hour of leadership training a week.

**AERO 399. Problem in Aerospace Studies.** (Var.) 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.

**AERO 410. Aerospace Studies 4A.** (3) I. 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 overall defense policy-making process. Three hours a week.

**AERO 411. Aerospace Studies 4B.** (3) II. 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.

**AERO 491. Introduction to Flight Training.** (1) II. Basic aerodynamics, aviation weather, navigation, flight/mission planning, and introduction to undergraduate pilot/navigator training. Normally taken by senior professional officer course students. Pr.: Consent of instructor.

## Art

Gary Woodward,\* Head

Professors Garzio,\* Ikeda,\* Pujol,\* Stroh,\* and Sturr;\* Associate Professors Clore,

Culley,\* Harmes,\* Hower,\* Kren,\* Munce,\* Noblett,\* Rex Replogle,\* and Woodward,\* Assistant Professors Andrus, Dollar, Love,\* Mastranardi, Ogg, O'Shea,\* Renata Replogle, Routson,\* Schmidt,\* Swiler,\* and Winegardner; Emeriti: Professors Garzio\* and Larmer;\* Emeriti Associate Professors Hill and Vogt; Instructor Hagan.

Bachelor of arts

The B.A. degree in art consists of three parts: the general education courses outlined under the humanities curriculum; a core of beginning art courses to provide prerequisites and a broad range of art experience for the art major; and 16 hours concentration of related subjects that should provide a minimal basis for establishing professional competence. Concentration possibilities will be in one of the following: painting, printmaking, ceramics, sculpture, drawing, art history, metal-smithing and jewelry, or graphic design. The bachelor of arts degree requires a minimum of 48 semester hours in art. The major requirements are as follows:

Art history (12 hours)		
ART 195	Survey of Art History I .....	3
ART 196	Survey of Art History II .....	3
ART 545	Twentieth Century Art History I .....	3
ART 550	Twentieth Century Art History II .....	3
ART 100	Design I .....	2
ART 200	Design II .....	2
ART 190	Drawing I .....	2
ART 210	Drawing II .....	2
ART 225	Figure Drawing I .....	2
ART 230	Sculpture I .....	2
ART 245	Painting I .....	2
ART 235	Printmaking I .....	2
ART 220	Water Color I .....	2
ART 265	Ceramics I .....	2
Major concentration .....		16

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, artist-teachers, or art therapists. Greater emphasis is placed on actual practice in the creative art disciplines.

The degree is considered the appropriate preparation for a master of fine arts degree, which is recognized as the terminal degree in studio arts, and for a master's degree in art therapy, which is required for registration as an art therapist. The B.F.A. in art is a four-year, 120-hour program with concentrations possible in painting, sculpture, ceramics, graphic design, printmaking, drawing, metal-smithing and jewelry, and pre-art therapy. The major requirements are as follows:

Art history (15 hours)		
ART 195	Survey of Art History I .....	3
ART 196	Survey of Art History II .....	3
ART 545	Twentieth Century Art History I .....	3
ART 550	Twentieth Century Art History II .....	3
Art history electives .....		3
ART 100	Design I .....	2
ART 200	Design II .....	2

Drawing (8 hours)		
ART 190	Drawing I .....	2
ART 210	Drawing II .....	2
Drawing electives .....		4
ART 225	Figure Drawing I .....	2
ART 245	Painting I .....	2
ART 230	Sculpture I .....	2
ART 265	Ceramics I .....	2
ART 235	Printmaking I .....	2
ART 270	Metalsmithing and Jewelry .....	2
ART 410	B.F.A. Exhibition .....	0
Major concentration .....		20
Art electives .....		16
		75

Art education

Students may satisfy requirements to teach art in public schools by any of three programs: B.A. and teacher certification; B.F.A. and teacher certification; or B.S. in education with art concentration. Under the first two options students qualify for teacher certification by completing specified courses in the College of Education. See the College of Education approved programs section for more information.

Studios, laboratories, and 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.

Pre-art therapy

The B.F.A. with a pre-art therapy concentration provides a strong background in studio art and psychology plus an introduction to the field of art therapy. This program of study prepares students to do graduate studies in art therapy and related fields.

Transfer students

Art hours transferred to K-State will be assigned by the art department. Students may use transfer hours toward their area of concentration only when obtained from a four-year college or university.

Art courses

**ART 095. Art Assembly.** (0) I, II. Recommended for all art and art education majors each semester. By appt.

Undergraduate credit

- ART 100. Design I.** (2) I, II, S. Introduction to and laboratory practice in the principles and elements of design. Four hours lab.
- ART 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 hour lab.
- ART 195. Survey of Art History I.** (3) I. Historical development of art from pre-history through the Middle Ages.
- ART 196. Survey of Art History II.** (3) II. Historical development of art from the Renaissance to the nineteenth century.
- ART 200. Design II.** (2) I, II. Further work in the principles and elements of design, with emphasis on color, texture, and pictorial composition. Four hours lab. Pr.: ART 100.

- ART 205. Graphic Design Techniques.** (2) I, II. 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.
- ART 210. Drawing II.** (2) I, II. Continuation of Drawing I, with strong emphasis on creative expression. Four hours lab. Pr.: ART 100, 190.
- ART 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.
- ART 220. Water Color I.** (2) I, II. Painting in water color and other water-soluble media; includes both studio and outdoor painting and sketching. Four hours lab. Pr.: ART 100, 190.
- ART 225. Figure Drawing I.** (2) I, II. Sustained drawings of the human figure using a variety of media; introduction to human anatomy used by artists. Four hours lab. Pr.: ART 210.
- ART 230. Sculpture I.** (2) I, II. 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.
- ART 235. Printmaking I.** (2) I, II. Introduction to the intaglio, lithographic, and serigraphic printmaking techniques and tools. Four hours lab. May be taken for three semesters in order to obtain experience in each of the three techniques. Pr.: ART 100, 190.
- ART 240. 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.
- ART 245. Painting I.** (2) I, II. Introduction to painting through a variety of media and techniques. Four hours lab. Pr.: ART 100, 190.
- ART 250. Spinning and Natural Dyes.** (2) I, II. Basic instruction in use of spindle and spinning wheel; process of extracting and use of dye from commonly available plants. Four hours lab. Pr.: ART 100, 190.
- ART 255. Primitive Loom Construction.** (2) I, II. Exploration of primitive loom systems and construction of some suited to individual purposes. Basic instruction in weaving with emphasis on acquisition and aesthetic use of commonly available materials. Four hours lab. Pr.: ART 100, 190.
- ART 260. Design in the Crafts.** (2) I. Crafts work in various media, with emphasis on contemporary design. Four hours lab. May be taken for credit two semesters. Pr.: ART 100.
- ART 265. Ceramics I.** (2) I, II. Introduction to basic hand building techniques; 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.
- ART 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 100 or nonmajors consent of instructor.
- ART 275. Weaving I.** (2) I, II. Introduction to basic weaving techniques and the use of four harness looms. Emphasis on the aesthetic use of fibers. Four hours lab. Pr.: ART 100, 190.
- ART 280. Art Education Seminar.** (2) II. An introduction to concepts in art education. Research, literature, creativity, aesthetics, and the history of art education as they relate to teaching art.
- ART 285 Introduction to Color Media.** (2) I, II, S. Materials and teaching for the use of air brush, color markers, and other color media used in comprehensive rendering as well as finished illustrations. Resources include photography and life. Pr.: ART 100, 190.
- ART 290. Letterforms.** (2) I, II. Study of some traditional letterforms with a selection of contemporary adaptations of these into typefaces. Applications of typography in design is considered. Four hours lab. Pr.: ART 100, 190

**ART 295. Photography in Art I.** (2) I, II. Understanding and using photography as an art form. The basic elements and principles of art are explored. Camera usage and photographic processing are covered. An adjustable camera is required. Pr.: ART 100, 190.

**ART 300. Special Studies in Art.** (1, 2) I, II. Specialized workshops or seminars conducted in studio, art therapy, art education, or art history.

**ART 301. Human Form and Composition.** (2) Inter- sessions only. Building stylization and expressive image making of the human form with experimental methods: use of color, mono-print, mixed media. A connected and sustained studio time available during inter-session only, providing students a working rhythm without interruption from other course work. Four hours lab. Pr.: ART 100, 190.

**ART 305. Introduction to Museum Studies.** (3) I, II. Fundamentals of museum work including specific museum functions, role of professional personnel, and proper care and handling of art works.

**ART 310. Sophomore Honors Seminar in Art.** (3) Selected topics in art. Pr.: For students in the honors program only.

**ART 400. Computer Imaging.** (3) I, II, S. Exploration of computer imaging through the use of paint system and image processing technologies. Two hours lecture, four hours lab a week. Pr.: ART 200 and 210.

**ART 410. B.F.A. Exhibition.** (0) I, II. The preparation and execution of a senior exhibition of the student's own creative work primarily from his/her area of concentration. The option of a portfolio presentation exists for students whose area of concentration is graphic design. The student will be responsible for all the arrangements for the exhibition including scheduling, installation, and publicity.

**ART 425. Art for Elementary Schools.** (3) I, II, S. Art methods, materials, and philosophy of children's art at different grade levels. Six hours lab.

**ART 430. Independent Study—Ceramics.** (1–5) I, II, S. Work in ceramics after competency has been achieved. Personal development is emphasized.

**ART 435. Independent Study—Crafts.** (1–5) I, II, S. Work in crafts after competency has been achieved. Personal development is emphasized.

**ART 440. Independent Study—Drawing.** (1–5) I, II, S. Work in drawing after competency has been achieved. Personal development is emphasized.

**ART 445. Independent Study—Graphic Design.** (1–5) I, II, S. Work in graphic design after competency has been achieved. Personal development is emphasized.

**ART 450. Independent Study—Metalsmithing and Jewelry.** (1–5) I, II, S. Work in metalsmithing and jewelry after competency has been achieved. Personal development is emphasized.

**ART 455. Independent Study—Painting.** (1–5) I, II, S. Work in painting after competency has been achieved. Personal development is emphasized.

**ART 460. Independent Study—Printmaking.** (1–5) I, II, S. Work in printmaking after competency has been achieved. Personal development is emphasized.

**ART 465. Independent Study—Sculpture.** (1–5) I, II, S. Work in sculpture after competency has been achieved. Personal development is emphasized.

**ART 470. Independent Study—Water Color.** (1–5) I, II, S. Work in water color after competency has been achieved. Personal development is emphasized.

**ART 480. Independent Study/Research Computer Art and Design.** (3) I, II, S. This course is intended to provide students an opportunity to focus on a specific visual project/problem that will be solved using computers to focus on as the primary tool/medium. Pr.: ART 400.

### Undergraduate and graduate credit in minor field

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

**ART 550. Twentieth Century Art History II.** (3) II. Origins and development of twentieth century art from 1914 to 1950. Pr.: ART 195 or 196.

**ART 560. Art for the Exceptional Individual.** (3) I, II. Using art concepts and activities to meet the needs of the mentally retarded, physically impaired, emotionally disturbed, or gifted. Three hours lec. Pr.: PSYCH 110. Same as EDCI 560.

**ART 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 four semesters. Pr.: ART 265.

**ART 570. Painting II.** (3) I, II. Continuation of Painting I. Emphasis on a more extensive understanding of concepts about painting which will lead to the development of a wider range of personal experience and expression. Six hours lab. Pr.: ART 245.

**Art 575, 576, 577, and 580. Graphic Design and Illustration Studios I through IV.** Problems in layout design and illustration for newspapers, magazines, and promotional materials. A progression of study building competence in technical execution and promoting an understanding of visual design criteria in communication arts. Media experiences range from traditional approaches to contemporary technology. Six hours lab.

**ART 575. Graphic Design and Illustration I.** (3) I, II, S. Pr.: ART 205 and 290 or consent of instructor.

**ART 576. Graphic Design and Illustration II.** (3) I, II, S. Pr.: ART 575 or consent of instructor.

**ART 577. Graphic Design and Illustration III.** (Workshop–Matrix) (3) I, II, S. Students selected by portfolio review, design projects to client specifications. May be repeated. Pr.: ART 576 or consent of instructor.

**ART 580. Graphic Design and Illustration IV.** (3) I, II, S. Pr.: ART 400 and 576 or consent of instructor.

**ART 582. Internships in Graphic Design.** (1–3) I, II, S. The student works with the supervision of faculty and an appointed professional. Emphasis is on the development of approaches to problem solving and strengthening related skills in visual communications within a professional setting. May be repeated for up to 9 hours credit. Pr.: ART 575 and consent of instructor.

**ART 590. Approaches to Art Therapy.** (3) I, II, S. Supervised studies in research relating to the art therapy profession, its current developments, and goals. Pr.: ART 560 or junior standing in a program that emphasizes work with special population groups and consent of instructor.

**ART 595. Independent Study in Art Therapy.** (1–5) I, II, S. This course offers students who have fulfilled the full sequence of art therapy course work an opportunity for individual advanced study. Area of research to be selected by the student under the advisement of the instructor. Pr.: ART 560, 590 and consent of the instructor.

**ART 602. Art from 1950 to 1980.** (3) I, II. Art movements beginning with abstract expressionism and continuing through pop, op, minimal, and conceptual art movements up to 1980. Pr.: ART 195 or 196.

**ART 603. Art of the 1980s and Beyond.** (3) I, II, S. The art movements of the 1980s beginning with photo-realism and continuing through pattern and decoration, new image art, neo-expressionism, and neo-abstraction. Pr.: ART 195 or 196.

**ART 604. Greek Art History.** (3) I, II. The art of classical Greece, from its Aegean origins through the Hellenistic period. Pr.: ART 195 or 196.

**ART 612. Renaissance Art History.** (3) I, II. Renaissance art of northern and southern Europe in the fifteenth and sixteenth centuries, with a brief discussion of its fourteenth century origins. Pr.: ART 195 or ART 196.

**ART 622. Baroque Art History.** (3) I, II. The development of the baroque period in northern and southern Europe, from its beginnings in the early seventeenth century to the rococo style of the eighteenth century. Pr.: ART 195 or 196.

**ART 626. Independent Study—Photography.** (Var.) I, II. Advanced work in photography, an emphasis on personal development. Competency in camera and photo-related processes required. Pr.: ART 295.

**ART 632. The Development of American Art.** (3) I, II. American art from the Colonial period to the beginnings of abstract expressionism in the early 1940s, with major emphasis on the late nineteenth and early twentieth century developments. Pr.: ART 195 or 196.

**ART 634. History of Modern Sculpture.** (3) I, II. Directions in sculpture since the time of Rodin. Pr.: ART 195 or 196.

**ART 642. Nineteenth Century Art History.** (3) I, II. Painting, sculpture, and architecture of the late eighteenth and nineteenth centuries, with emphasis on the art of France. Pr.: ART 195 or 196.

**ART 654. Women in Art.** (3) I, II. The work of women artists from early Middle Ages to the twentieth century, with emphasis on the contemporary period. Pr.: ART 195 or 196.

**ART 662. Southwestern Indian Arts and Culture.** (3) I, II. The development of southwestern Indian silversmithing, weaving, pottery, basketry, and painting from the prehistoric period through the twentieth century. Pr.: ART 195 or 196.

### Undergraduate and graduate credit

**ART 600. Advanced Drawing.** (1–5. Credits over 3 hours must be approved by the instructor.) I, II. Upper-level drawing, development, and personal motivation. Lectures and problems directed toward an understanding of the historical development of drawing as well as investigations of contemporary attitudes. May be taken for four semesters. Pr.: ART 225, 240.

**ART 610. Figure Drawing II.** (3) I, II. Continuation of Figure Drawing I, with emphasis on individual expression. Six hours lab. May be taken for four semesters. Pr.: ART 225.

**ART 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.

**ART 620. Water Color II.** (3) I, II. Continuation of Water Color I. Emphasis on individual expression within limitations of medium. Six hours lab. May be taken for two semesters. Pr.: ART 220.

**ART 623. Advanced Concepts in Computer Art and Design.** (3) I, II, S. Advanced level studio exploration of computers as a tool/medium for art disciplines. Two hours lec., four hours lab. a week. Pr.: ART 200, 400, and instructor permission.

**ART 625. Independent Study-Art Education.** (1–5) I, II, S. Work offered in art education after competency has been achieved. Personal development is emphasized. Pr.: Full sequence of courses related to art education subject matter.

**ART 635. Printmaking II.** (3) I, II. Advanced work in blockprints, serigraphy, lithography, and intaglio. Six hours lab. May be taken for four semesters. Pr.: ART 235.

**ART 645. Sculpture II.** (3) I, II. Emphasis on artistic 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.

**ART 650. Painting III.** (1–5) I, II. Continuation of Painting II. Emphasis on individual directions in painting to attain personal expression and competency. Primarily for undergraduate painting majors. May be taken for four semesters. Pr.: ART 570.

**ART 655. Metalsmithing Techniques.** (3) I, II. 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.: ART 270.

**ART 660. Sculpture III.** (1–5) I, II. 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 645.

**ART 665. Ceramics III.** (1-5) I, II. Individual exploration and further development of ceramic design and glaze technology; continuation of kiln design and construction. Six hours lab. May be taken for three semesters. Pr.: ART 565.

**ART 675. History of Ceramics.** (3) I, 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 195 or 196.

**ART 680. Metals Workshop.** (1-5) I, II. A number of metalsmithing techniques will be explored by the upper division student with emphasis on experimental problems and possibilities. The development of an individual point of view will predominate throughout the course. May be repeated twice. Pr.: ART 655.

**ART 685. Advanced Independent Study Design.** (Var.) I, II, S. Advanced work in design-related subjects. Pr.: Full sequence of courses related to problem subject matter.

**ART 690. Techniques in Teaching Art.** (Var.) I. Lectures and class discussion of methods, consideration of suitable laboratory equipment, use of illustrative material, and preparation of courses of study. Pr.: Twelve hours in art or consent of instructor.

**ART 695. Topics in Art History.** (Var.) I, II, S. Independent exploration in selected problems in art history. Pr.: Twelve hours art history.

## Biochemistry

Thomas E. Roche,\* Head

Professors Davis,\* Hedgcoth,\* Kramer,\* Muthukrishnan,\* Reeck,\* Roche,\* and D. Takemoto;\* Associate Professors Krishnamoorthi,\* Mueller,\* and Tomich;\* Assistant Professors Andersson, Kanost, and Wang; Emeriti: Professors Burkhard, Clegg, Koeppe, Mitchell, Nordin, Parrish, and Ruliffson.

Biochemistry seeks to understand the molecular events of life processes. It applies chemical and physical techniques to elucidate the structure and organization of molecules, particularly macromolecules that are responsible for the structural organization as well as operation and control of all cellular processes. The emerging knowledge has broad importance and consequences for all areas of the life sciences.

The Department of Biochemistry offers work leading to bachelor of arts and bachelor of science degrees with majors in biochemistry. The B.A. degree provides a liberal education with sufficient emphasis on science for students who wish to prepare for certain professional schools. The B.S. degree prepares students for professional careers in biochemistry or entry into graduate biochemistry training programs.

### Bachelor of arts

The requirements for the B.A. degree with a major in biochemistry include the general requirements of the College of Arts and Sciences plus the following:

BIOCH 100	Biochemistry Orientation .....	1
CHM 220	Chemical Principles I .....	5
	<b>and</b>	
CHM 250	Chemical Principles II .....	5

CHM 210	<b>or</b> Chemistry I .....	4
CHM 230	<b>and</b> Chemistry II .....	4
	<b>and</b>	
CHM 271	Chemical Analysis .....	4
CHM 531	Organic Chemistry I .....	3
CHM 550	Organic Chemistry II .....	3
CHM 532	Organic Chemistry Laboratory .....	2
BIOCH 290	Biochemistry Seminar .....	2
BIOCH 522	General Biochemistry Laboratory .....	2
BIOCH 755	Biochemistry I .....	3
BIOCH 765	Biochemistry II .....	3
MATH 220	Analytic Geometry and Calculus I .....	4
MATH 221	Analytic Geometry and Calculus II .....	4
PHYS 113	General Physics I .....	4
PHYS 114	General Physics II .....	4
BIOL 198	Principles of Biology .....	4
	Biological science electives .....	8

These science courses satisfy the mathematics and natural sciences requirements shown in the general requirements for the B.A. degree.

### Bachelor of science

The requirements for the B.S. degree with a major in biochemistry include the general requirements of the College of Arts and Sciences plus the following:

BIOCH 100	Biochemistry Orientation .....	1
CHM 220	Chemical Principles I .....	5
	<b>and</b>	
CHM 250	Chemical Principles II .....	5
	<b>or</b>	
CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
	<b>and</b>	
CHM 271	Chemical Analysis .....	4
CHM 531	Organic Chemistry I .....	3
CHM 550	Organic Chemistry II .....	3
CHM 532	Organic Chemistry Laboratory .....	2
BIOCH 290	Biochemistry Seminar .....	2
BIOCH 755	Biochemistry I .....	3
BIOCH 756	Biochemistry I Laboratory .....	2
BIOCH 765	Biochemistry II .....	3
CHM 585	Physical Chemistry I .....	3
CHM 595	Physical Chemistry II .....	3
	Upper-division biochemistry or chemistry electives (one hour of which must be BIOCH 799 Problems in Biochemistry) .....	3
MATH 220	Analytic Geometry and Calculus I .....	4
MATH 221	Analytic Geometry and Calculus II .....	4
MATH 222	Analytic Geometry and Calculus III .....	4
PHYS 213	Engineering Physics I .....	5
	<b>and</b>	
PHYS 214	Engineering Physics II .....	5
	<b>or</b>	
PHYS 113	General Physics I .....	4
	<b>and</b>	
PHYS 114	General Physics II .....	4
BIOL 198	Principles of Biology .....	4
	Biological science electives .....	8
	Biology, statistics, or computer science elective .....	3-4

The science courses in this list satisfy the natural science and quantitative reasoning requirements shown in the general requirements for the B.S. degree.

### Transfer students

Community college students who plan to transfer into either of the biochemistry curricula at the junior level should take the following science courses during their first two years of college:

A year of freshman chemistry—lecture and laboratory

A semester of analytical chemistry—lecture and laboratory

A year of organic chemistry—lecture and laboratory

A year of analytic geometry and calculus

A year of biology—lecture and laboratory

Completion of these science courses should allow students to go directly into biochemistry and advanced biology courses upon entry into a biochemistry curriculum. For those planning to complete the B.S. requirements, it is advisable to have completed all three of the required semesters of analytic geometry and calculus before the junior year.

### Biochemistry courses

#### Undergraduate credit

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

**BIOCH 101. Biochemistry Colloquium.** (2) I, II. Offered by TELENET. Topics in biochemistry chosen to illustrate current research of scientists and methods chosen to study biological problems from a biochemical point of view. At each offering of this course a syllabus will be available giving the topics to be studied and the details of administration of the course. May be repeated once. Not open to biochemistry majors.

**BIOCH 110. Biochemistry and Society.** (3) I, II. A cultural and environmental approach to biochemical compounds and circumstances affecting man. Topics to be discussed include compounds of biochemical interest, biochemical evolution, food additives, heavy metals, drugs, and certain control chemicals, e.g., pesticides. Intended for nonscience majors.

**BIOCH 265. Introductory Organic and Biochemistry.** (5) I, II. For students in human ecology, nursing, and other areas desiring an integrated organic and biochemistry course to provide an understanding of carbohydrates, proteins, lipids, and digestive and metabolic systems. Three hours lec. and six hours lab a week. Pr.: CHM 110.

**BIOCH 290. Biochemistry Seminar.** (2) II. Lectures and discussions on basic topics in biochemistry. Pr.: BIOCH 100.

**BIOCH 300. Sophomore Honors Seminar in Biochemistry.** (3) II. Lecture, guided reading, and discussion of topics of general interest in biochemistry. Topics will vary depending on the interests and backgrounds of students enrolled. Pr.: Freshman Honors Seminar.

**BIOCH 365. Elementary Biochemistry.** (3) I. An elementary treatment of the chemistry and metabolism of carbohydrates, lipids, proteins, and nucleic acids. Pr.: CHM 350.

**BIOCH 499. Senior Honors Thesis.** (2) I, II, S. Open only to seniors in the arts and sciences honors program. May be used by honors students to satisfy B.S. requirement for BIOCH 799. Pr.: BIOCH 755 or conc. enrollment.

#### Undergraduate and graduate credit in minor field

**BIOCH 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 BIOCH 365. Pr.: CHM 350.

**BIOCH 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.: CHM 351 and BIOCH 521 or conc. enrollment, or BIOCH 755 or conc. enrollment.

#### Undergraduate and graduate credit

**BIOCH 700. Advanced Topics in Plant Biochemistry.** (3) I; Fall 1994 and alternate years or on sufficient demand. An advanced treatment of topics of current interest in plant

biochemistry, including photosynthesis and carbon metabolism, nitrogen fixation and nitrogen metabolism, structure and function of the higher plant genome, and production of material of economic interest. Pr.: \*BIOCH 521 or 765.

**BIOCH 755. 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. BIOCH 755 and 765 are for students interested in a two-semester comprehensive coverage of biochemistry. For a one-semester course, enroll in BIOCH 521. Pr.: \*Chemical analysis, one year of organic chemistry, differential and integral calculus.

**BIOCH 756. Biochemistry I Laboratory.** (2) I. An intensive laboratory course to accompany BIOCH 755. BIOCH 756 and 766 are sequential courses for students interested in a two-semester comprehensive coverage of experiments in biochemistry. For a one-semester laboratory course, enroll in BIOCH 522. Six hours lab a week. Pr.: \*BIOCH 755 or conc. enrollment.

**BIOCH 765. Biochemistry II.** (3) II. Continuation of BIOCH 755; lipid chemistry and metabolism, amino acid metabolism, nutrition, nucleic acid chemistry and metabolism, integration of biochemical pathways and metabolic control mechanisms. Pr.: \*BIOCH 755.

**BIOCH 766. Biochemistry II Laboratory.** (2) II. A continuation of CHM 756. Six hours lab a week. Pr.: \*BIOCH 756 and 765 or conc. enrollment.

**BIOCH 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, BIOCH 755, 756, 765, and 766.

**BIOCH 799. Problems in Biochemistry.** (Var.) 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.

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

## Biology

Jerry S. Weis, Interim Director

Professors Barkley,\* Center,\* Conrad,\* Consigli,\* Denell,\* Guikema,\* Johnson,\* Kaufman,\* Kramer,\* Reichman,\* Robel,\* Roufa,\* C. Smith,\* Spooner,\* Takemoto,\* Wilson,\* Wong,\* and Zimmerman,\* Associate Professors Chapes,\* Hartnett,\* Klaassen,\* Knapp,\* Marchin,\* Montelone,\* Perchellet,\* Rintoul,\* A. Smith, Tomb,\* Upton,\* Urban,\* Weis,\* Welti,\* and Williams,\* Assistant Professors Blair,\* Chitnis,\* Dodds,\* Justice,\* Li,\* Murray,\* and Ulug,\* Instructors Davis, Hook, Pacey, and Paulsen; Emeriti: Professors Fina,\* Hansen,\* Pady,\* and Pittenger,\* Associate Professors Lockhart\* and McCracken,\* Instructor Kundiger.

The biology undergraduate requirements provide students a basic understanding of biological principles and methods, and allow students to build on that base by further intensive or extensive study.

Course offerings and curricula accurately reflect both recent developments in the field of

biology and changing requirements of students. Undergraduate majors are offered in biology, microbiology, and fisheries and wildlife biology, plus the professional (paramedical) and pre-professional areas. Students majoring in areas of the Division of Biology are assigned advisors to assist in planning their academic programs. Course offerings and degree requirements are sufficiently broad to allow great flexibility in tailoring a program of study to the interests and needs of an individual student. Undergraduate curriculum planning, including choice of areas of emphasis and elective courses, is ultimately the responsibility of students in consultation with their advisors.

## Biology degree

Students in this major may obtain either the B.A. or B.S. degree. In addition to the requirements of the College of Arts and Sciences, biology majors must take the courses of blocks A, B, and C as listed below.

### Block A: Courses offered by other departments

MATH 220	Analytical Geometry and Calculus I .....	4
CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
CHM 350	General Organic Chemistry .....	3
CHM 351	General Organic Chemistry Laboratory .....	2
BIOCH 521	General Biochemistry .....	3
PHYS 113	General Physics I .....	4
PHYS 114	General Physics II .....	4

Prerequisites for MATH 220 are MATH 100 and 150 or four semesters of high school algebra and one semester of trigonometry plus appropriate math placement exam scores. Upon consultation with a Division of Biology advisor a student may substitute: Biochemistry I and II for General Biochemistry; Organic Chemistry I and II for General Organic Chemistry; Organic Chemistry I Lab for General Organic Chemistry Lab; and Engineering Physics I and II for General Physics I and II.

### Block B: Division of Biology courses

BIOL 198	Principles of Biology .....	4
BIOL 201	Organismic Biology .....	5
BIOL 430	Population Biology .....	4
BIOL 540	Molecular Biology .....	3
BIOL 541	Cell Biology .....	3

### Block C: Biology major electives

In addition to the Block B courses students must take a minimum of 15 credit hours of biology courses at the 400\* level or higher, including two courses providing a laboratory experience.

\*Students who take BIOL 240 will be awarded 2 hours of biology elective credit.

Because the biology major has room for at least 20 hours of free electives beyond the 15 hours of biology electives, it is a popular major for students aiming at a variety of professional health disciplines, at graduate programs ranging from molecular biology to ecology, and at a diversity of bachelor's-level jobs. Depending on the student, free electives could be courses in computer science, statistics, foreign language, business, etc. and/or additional courses in biology, biochemistry, chemistry, and math.

## Microbiology degree

Students in microbiology may obtain either the B.A. or B.S. degree. The requirements for

a microbiology major, in addition to those requirements of the College of Arts and Sciences, include blocks A, B, and C as listed below.

### Block A: Courses offered by other departments

MATH 220	Analytical Geometry and Calculus I .....	4
CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
CHM 350	General Organic Chemistry .....	3
CHM 351	General Organic Chemistry Laboratory .....	2
BIOCH 521	General Biochemistry .....	3
PHYS 113	General Physics I .....	4
PHYS 114	General Physics II .....	4

Prerequisites for MATH 220 are MATH 100 and 150 or four semesters of high school algebra and one semester of trigonometry plus appropriate math placement exam scores. Upon consultation with a Division of Biology advisor a student may substitute: Biochemistry I and II for General Biochemistry; Organic Chemistry I and II for General Organic Chemistry; Organic Chemistry I Lab for General Organic Chemistry Lab; and Engineering Physics I and II for General Physics I and II.

### Block B: Division of Biology courses

BIOL 198	Principles of Biology .....	4
BIOL 455	General Microbiology .....	4
BIOL 540	Molecular Biology .....	3
BIOL 670	Immunology .....	4
BIOL 675	Genetics of Microorganisms .....	3
BIOL 690	Microbial Physiology and Metabolism .....	2

### Block C: Microbiology major electives

Students must take an additional 14 hours from courses listed below. At least half the 14-hour total must be laboratory courses.

BIOL 397, 495, or 697	Topics in Biology .....	1-3
BIOL 410	Biology of the Cancer Cell .....	2
BIOL 530	Pathogenic Microbiology .....	3
BIOL 541	Cell Biology .....	3
BIOL 545	Human Parasitology .....	3
BIOL 546	Human Parasitology Lab (lab course) ...	1
BIOL 604	Biology of Fungi .....	3
BIOL 625	Animal Parasitology (lab course) .....	4
BIOL 671	Immunology Lab (lab course) .....	2
BIOL 676	Microbial Genetics Laboratory (lab course) .....	3
BIOL 687	Microbial Ecology .....	3
BIOL 698	Problems in Biology (lab course) .....	1-3
BIOL 720	Anaerobic Bacteriology .....	2
BIOL 730	General Virology .....	3
BIOL 731	Virology Laboratory .....	2
BIOL 755	Specialized Cell Functions .....	3
BIOL 760	Genetic Engineering .....	2
ASI 607	Food Microbiology .....	4
AGRON 645	Soil Microbiology .....	4

By consultation with a Division of Biology advisor a student may choose elective courses from Block C that allow a more specific focus on interest and experience. Areas of specialization would include prokaryotic microbiology, eukaryotic microbiology, biotechnology/genetic engineering, and infectious diseases. The microbiology curriculum coupled with appropriate electives provides an excellent education base for students moving directly into the job market, for students headed toward medical, dental, medical technology, and veterinary programs, and for students going into graduate programs in the biological sciences.

## Fisheries and wildlife biology

Students in this major may obtain either the B.A. or B.S. degree. In addition to the requirements of the College of Arts and Sciences,

fisheries and wildlife biology majors must take the courses of Block A, Block B, and one of the three options of Block C as shown below. Students who wish to qualify for professional certification as a fisheries or wildlife biologist should consult their academic advisors about any additional courses needed for such certification.

#### Block A: Courses offered by other departments

SPCH 106	Public Speaking I .....	3
One math course*	.....	3-4
Chemistry courses**	.....	13
PHYS 113	General Physics I .....	4
	and	
PHYS 114	General Physics II .....	4
	or	
PHYS 115	Descriptive Physics .....	4
CIS 110	Introduction to Personal Computing ...	3
	or	
CIS 200	Fundamentals Computer Programming and Lab .....	4
STAT 340	Biometrics I .....	3
		<b>29-35</b>

\*To be selected from among MATH 100, 150, or 220.

\*\*To be fulfilled by CHM 210, 230, 350, and 351 or by CHM 210, 230, and BIOCHM 265.

Students who plan to proceed into graduate programs should take MATH 220; CHM 210, 230, 350, and 351; PHYS 113 and 114; and CIS 200.

#### Block B: Division of Biology courses

BIOL 198	Principles of Biology .....	4
BIOL 201	Organismic Biology .....	5
BIOL 430	Population Biology .....	4
BIOL 433	Wildlife Conservation .....	3
BIOL 529	Fundamentals of Ecology .....	3
BIOL 632	Ecology Laboratory .....	1
Plus at least two courses in the Division of Biology (400 level or above) totaling 5 hours or more .....		5
		<b>25</b>

#### Block C: Options

##### Fisheries biology option

STAT 341	Biometrics II .....	3
BIOL 513	Physiological Adaptations of Animals ..	3
	and	
BIOL 514	Physiological Adaptations of Animals Lab .....	1
BIOL 542	Ichthyology .....	3
BIOL 612	Limnology .....	4
BIOL 680	Aquaculture .....	3
BIOL 696	Fisheries Management .....	4
		<b>21</b>

##### Wildlife biology option

STAT 341	Biometrics II .....	3
AGRON 501	Range Management .....	3
AGEC 525	Natural Resource Economics .....	3
ENTOM 312	General Entomology .....	2
	and	
ENTOM 313	General Entomology Lab .....	1
BIOL 513	Physiological Adaptations of Animals ..	3
	and	
BIOL 514	Physiological Adaptations of Animals Lab .....	1
BIOL 543	Ornithology .....	3
BIOL 544	Mammalogy .....	3
BIOL 551	Taxonomy of Flowering Plants .....	4
BIOL 684	Wildlife Management .....	3
BIOL 685	Wildlife Management Techniques .....	3
		<b>32</b>

##### Natural history option

BIOL 551	Taxonomy of Flowering Plants .....	4
	or	
FOR 330	Dendrology I .....	2
	and	
FOR 340	Dendrology II .....	2
BIOL 542	Ichthyology .....	3
BIOL 543	Ornithology .....	3
BIOL 544	Mammalogy .....	3

BIOL 513	Physiological Adaptations of Animals ..	3
	and	
BIOL 514	Physiological Adaptations of Animals Lab .....	1
	or	
BIOL 500	Plant Physiology .....	4
Nine hours of biology electives (400 level or above) .....		9
		<b>26</b>

Hours from Block B may not be counted as a part of Block C electives.

## Pre-professional curricula

Students preparing to seek admission to veterinary, medical, dental, optometry, physical therapy, medical technology, and other professional schools may major in biology (or another discipline) provided the specific pre-professional requirements are met. Students should work with both an appropriate pre-professional advisor in the College of Arts and Sciences dean's office and a biology advisor to assure the proper planning of an academic program to meet their professional goals.

Students preparing to be biology teachers in secondary education are encouraged to pursue a degree program in the Division of Biology. Students should utilize both an advisor in the College of Education (regarding certification requirements and education courses) and a Division of Biology advisor.

## Research facilities

### Konza Prairie

Konza Prairie Research Natural Area is an 8,616-acre area within a few miles of the university dedicated to ecological research by the Division of Biology and the Kansas Agricultural Experiment Station. This nationally important research facility provides an opportunity for basic research on the prairie and for baseline information needed to assess the nature and magnitude of the ecological changes resulting from human activity.

### Center for Basic Cancer Research

The Center for Basic Cancer Research offers research awards to allow deserving undergraduate students an opportunity to participate in cancer research that is ongoing in the Division of Biology. The anticancer drug laboratory allows students to focus research on anticancer compounds—determining the mode of action of these compounds, their molecular action, the reasons for their toxicity, and the reasons why some cancers have developed a resistance to them.

### BioServe Space Technologies

The Division of Biology, in cooperation with Aerospace Engineering Sciences at the University of Colorado, was selected by the National Aeronautics and Space Administration to lead BioServe Space Technologies, a center for the commercial development of space. This space training and research program gives young biologists, plant scientists, engineers, and others an awareness of opportunities in space sciences that will intellectually involve them in space missions of the fu-

ture. Initial research projects are directed towards an understanding of many biological processes in the absence of gravity. Projects also are focused on areas of significant market value, such as biotechnology and bioengineered pharmaceuticals, synthetic organ products, and high efficiency agriproducts and agrigenetic materials.

### The Center for Gravitational Studies in Cellular and Development Biology

NASA's funding of this research program carries with it the designation of the Division of Biology as a NASA Specialized Center of Research and Training. As such, the Division will be NASA's only research center to focus on the role of gravity in cellular and developmental processes. The training and research components offer students training in space life sciences.

### Cooperative Fish and Wildlife Research Unit

The Kansas Cooperative Fish and Wildlife Research Unit was established by the Fish and Wildlife Service of the U.S. Department of the Interior, Kansas State University, the Kansas Department of Wildlife and Parks, and the Wildlife Management Institute. Faculty scientists hold appointments in the Division of Biology and participate in its graduate education programs in the area of fisheries and wildlife.

## Biology courses

### Undergraduate credit

**BIOL 101. Introduction to Biological Research.** (1) S. An introduction to research strategies and techniques in the biological sciences. Current topics will be selected and studied through laboratory experience and lecture in a short course workshop format. May be repeated once.

**BIOL 107. Biological Science Colloquium.** (2) I, II. Offered by TELENET. Topics in biological science chosen to illustrate current research of scientists and methods used to study the biological world. At each offering of this course a syllabus will be available giving the topics to be studied and the details of administration of the course. May be repeated once. Not open to biology majors.

**BIOL 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, equiv. to two hours lec., one hour rec., and three hours lab a week.

**BIOL 201. Organismic Biology.** (5) I, II. A study of the structure and function of organisms with special attention paid to the phylogenetic origins of taxonomic groups and the integration of their structural systems. Three hours lec. and four hours lab. Pr.: BIOL 198 or equiv.

**BIOL 210. General Botany.** (4) I, II. Plant groups and their evolutionary development. Physiology, anatomy, ecology, identification of seed plants, and economic applications. Two hours lec. and six hours lab a week.

**BIOL 222. Field Ornithology.** (1) II, in odd years. Identification of bird species in the field and the illustration of attributes of avian behavior and ecology. One three-hour lab a week. Pr.: Sophomore standing.

**BIOL 240. Structure and Function of the Human Body.** (6) I, II. 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 a week. Pr.: BIOL 198.

**BIOL 303. Ecology of Environmental Problems.** (3) II. Principles of ecology and their application to such problems as pollution, human population growth, and land-use

planning. Two hours lec. and one hour discussion a week. Pr.: Two courses in natural science.

**BIOL 310. Bioethics.** (3) II. Discussions of the developments and use of biomedical technology and its social, moral, and ethical impact on the human spectrum from conception to death. Three hours lec. per week. Pr.: Junior standing.

**BIOL 320. Economic Botany.** (3) I, II. Origin and uses of cultivated plants useful to humans, especially grains, legumes, spices, beverage plants, fibers, and dyes. Pr.: BIOL 198 or BIOL 210.

**BIOL 365. Practicum in Biology.** (1–4) I, II. Experimental approaches to learning biology through teaching. One hour rec. a week plus three to nine hours lab a week. Pr.: Permission of instructor and credit with superior performance in the course in which the student will be involved.

**BIOL 397. Topics in Biology.** (1–6) I, II, S. Pr.: Consent of instructor.

**BIOL 399. Honors Seminar in Biology.** (1–3) II. Selected topics. Open to nonmajors in the honors program.

**BIOL 400. Human Genetics.** (3) I. Principles of Mendelian genetics dealing with inheritance of human traits and the molecular and biochemical bases of those traits. Topics covered include classical genetics, chromosome abnormalities, gene structure and function, quantitative and population genetics of humans, and the implications of scientific and technological innovations on human genetics. Pr.: BIOL 198; CHM 110 or 210; MATH 100.

**BIOL 402. Eugenics.** (2–3) Intersession only. Examination of the development and use of genetic information ranging from that of the nineteenth century to modern molecular genetics. Lectures, discussions, and readings from primary sources with a focus on bioethical considerations of the use of genetic information. Pr.: BIOL 198.

**BIOL 404. Biology of Aging.** (3) II, in even years. An introduction to theories, both physiological and evolutionary, proposed to explain the aging phenomena. Major emphasis on a systems approach, e.g., circulatory, nervous, etc. A coverage of each system includes a review of normal structure and function, age related changes and age related dysfunctions and diseases. Pr.: BIOL 198; and DAS 315 or a second course in biology.

**BIOL 410. Biology of the Cancer Cell.** (2) I. Current concepts of cancer biology including roles of cell surfaces, cell division, viruses, self-recognition, and chemical carcinogens. Pr.: Two courses in biology.

**BIOL 430. Population Biology.** (4) I. A study of the patterns and processes of inheritance and of changes in gene frequencies and numbers of individuals in interbreeding populations of individuals. Three hours lec. and one hour rec. Pr.: BIOL 201.

**BIOL 433. Wildlife Conservation.** (3) II. An introductory course to the fields of fisheries and wildlife conservation, history of the conservation movement, review of important wildlife species, overview of management concepts, and exposure to wildlife-related issues. Pr.: BIOL 201.

**BIOL 455. General Microbiology.** (4) I, II. Microorganisms; their handling, morphology, growth, and importance. Two hours lec. and four hours lab a week. Pr.: BIOL 198 and one course in chemistry.

**BIOL 495. Topics in Biology.** (1–6) I, II, S. Pr.: Consent of instructor.

**BIOL 496. Honors Tutorial in Biology.** (1–3) I, II, S. Individual directed research and study of a topic in biology, normally as a prerequisite to writing a senior honor thesis. May be repeated once to a total of 3 hours credit. Pr.: Sophomore standing, membership in the honors program of the College of Arts and Sciences, and permission of instructor.

**BIOL 497. Senior Honor Thesis.** (2) I, II, S. Open only to seniors in the arts and sciences honors program.

### Undergraduate and graduate credit in minor field

**BIOL 500. Plant Physiology.** (4) I. Detailed consideration of physiological processes of higher plants. Three hours

lec. and three hours lab a week. Pr.: BIOL 201 or 210; and a course in organic chemistry.

**BIOL 505. Comparative Anatomy of Vertebrates.** (4) I. Interpretation of vertebrate structure with emphasis on function and phylogeny. Two hours lec. and six hours lab a week. Pr.: BIOL 198.

**BIOL 510. Embryology.** (3) II. Developmental anatomy and physiology of reproduction of birds and mammals. Three hours lec. a week. Pr.: BIOL 198.

**BIOL 511. Embryology Laboratory.** (1) II. One three-hour lab a week. Pr.: BIOL 510 or conc. enrollment.

**BIOL 513. Physiological Adaptations of Animals.** (3) I. Integration of physiological mechanisms as the basis for adaptive responses of animals to different environments. Pr.: BIOL 201; and a course in organic chemistry or biochemistry.

**BIOL 514. Physiological Adaptations of Animals Laboratory.** (1) I. One three-hour lab a week. Pr.: Conc. enrollment in BIOL 513.

**BIOL 515. Behavioral Ecology.** (3) II. Study of the social, environmental, genetic, and evolutionary processes that affect animal behavior. Topics include evolution of social organization, spacing and group behavior, mating systems and parental care, sexual selection, communication, aggression, habitat selection, and foraging. Research project required. Pr.: BIOL 201.

**BIOL 526. Human Physiology.** (3) II. Functions of various organ systems of mammals, primarily humans. Three hours lec. a week. Pr.: BIOL 198; and a course in biochemistry or organic chemistry.

**BIOL 529. Fundamentals of Ecology.** (3) I. Ecosystem structure and function including energy flow; biogeochemical cycling; effect of climate, soil, fire, succession; application to land management practices. Three hours lec. a week and optional field trips. Pr.: BIOL 201 or 210; and CHM 210.

**BIOL 530. Pathogenic Microbiology.** (3) I. Etiology and descriptions of major infectious diseases of humans within the perspective of host defenses. Two hours lecture and one hour laboratory-demonstration a week. Pr.: BIOL 455.

**BIOL 540. Molecular Biology.** (3) I. An introduction to the synthesis and regulation of DNA, RNA, and protein. Mutation and the chromosome are studied at the molecular level. Emphasis is placed on recombinant DNA technology and on the handling of biological information in both higher and lower organisms. Pr.: BIOL 201 and CHM 350.

**BIOL 541. Cell Biology.** (3) II. Structure and function of cells and subcellular components. A molecular understanding of membranes and cellular physiology will be emphasized. Three hours lec. Pr.: BIOL 540 and CHM 350.

**BIOL 542. Ichthyology.** (3) II, in even years. Classification, morphology, physiology, distribution, and natural history of fishes. Two hours lec. and three hours lab a week. Pr.: BIOL 201.

**BIOL 543. Ornithology.** (3) II. Classification, morphology, physiology, distribution, and natural history of birds. Two hours lec. and three hours lab a week. Pr.: BIOL 201.

**BIOL 544. Mammalogy.** (3) I. Characteristics, evolution, life histories, and ecology of mammals, especially North American game species. Two hours lec. and three hours lab a week. Pr.: BIOL 201.

**BIOL 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. Three hours lec. a week. Pr.: BIOL 201.

**BIOL 546. Human Parasitology Laboratory.** (1) II. Examination of prepared materials and identification of internal parasites of man. Two hours lab a week. Pr.: Conc. enrollment in BIOL 545.

**BIOL 547. Herpetology.** (2) II, in odd years. Classification morphology, physiology, distribution, and natural history of amphibians and reptiles. One hour lec. and three hours lab a week. Pr.: BIOL 201.

**BIOL 550. Lower Plants.** (3) II, in odd years. Morphology, adaptive mechanisms, and evolutionary relationships of the cellular and vascular cryptograms. Two hours lec. and one three-hour lab a week. Pr.: BIOL 201 or 210.

**BIOL 551. Taxonomy of Flowering Plants.** (4) I. Morphology, taxonomy, and biogeography of the vascular plants. Two hours lec. and two three-hour labs a week. Pr.: BIOL 201 or 210.

### Undergraduate and graduate credit

**BIOL 604. Biology of the Fungi.** (3) I. An introduction to fungal structure, function, physiology, ecology, and genetics. Importance of fungi as disease organisms, as saprotrophs, and in industry. Techniques of isolation, cultivation, and as experimental organisms. Two hours lec. and two hours lab a week. Pr.: BIOL 198 or 210.

**BIOL 612. Limnology.** (4) I, in even years. Basic ecological principles of aquatic environments. Plants and animals of local streams, rivers, ponds, and reservoirs are used to demonstrate the interaction of biological processes with the chemical and physical features of natural aquatic environments. Three hours lec., three hours lab a week; two optional weekend field trips. Pr.: BIOL 201 and CHEM 110 or 210.

**BIOL 615. Cytogenetics.** (4) I, in even years. Chromosome structure and mechanics, cytotaxonomy, and karyotypic analysis in eukaryotes. Two hours lec. and six hours lab a week. Field trips. Pr.: BIOL 430 or a course in genetics.

**BIOL 620. Evolution.** (3) II, in even years. A study of the theory of evolution including its historical and social implications. Three hours lec. a week. Pr.: BIOL 430 or a course in genetics.

**BIOL 625. Animal Parasitology.** (4) I, in odd years. Biology and pathology of the principal protozoan, helminth, and arthropod parasites of domestic animals and wildlife. Three hours lec. and two hours lab a week. Pr.: BIOL 198 and junior standing.

**BIOL 632. Ecology Laboratory.** (1) II. Laboratory and field experiences with ecological problems. Pr.: STAT 340 or equiv., BIOL 631 or conc. enrollment.

**BIOL 645. Advanced Field Studies.** (1–2) Offered in intersession only. Different ecosystems and the opportunity to apply classroom knowledge to field biology situations under the guidance of experienced biologists. Pr.: One course in field biology at or above the 400 level.

**BIOL 655. Genetics Laboratory.** (3) II. Basic genetic principles of prokaryotic and eukaryotic organisms will be demonstrated through isolation and analysis of gene mutations. Two hours lec. and four hours of lab a week. Pr.: BIOL 430 or a course in genetics.

**BIOL 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 equiv.

**BIOL 671. Immunology Lab.** (2) II. Laboratory exercises in immunology. Pr.: BIOL 670 or conc. enrollment. Three-hour lab a week plus one hour rec.

**BIOL 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.: BIOL 455 and 540.

**BIOL 676. Molecular Genetics Laboratory** (3) I. An advanced course in the techniques of molecular genetics and recombinant DNA technology. Emphasis will be placed on successful completion of a project that will involve several methods in modern molecular genetics. Some typical methods used in the course include mutagenesis, characterization of mutants, polymerase chain reaction, molecular cloning, and DNA sequencing. One-hour lec. and two three-hour labs. Pr.: BIOL 675 or concurrent enrollment.

**BIOL 680. Aquaculture.** (3) I, in odd years. Principles and methods of culturing fishes for commercial purposes. Topics of study include: species of fishes used in production; breeding; feeds and feeding of fishes; fish parasites and diseases; environmental requirements; facilities; and potential markets. Two hours lec. and three hours lab a week. Pr.: Two courses in biology, two courses in chemistry, and junior standing.

**BIOL 684. Wildlife Management.** (3) II. Concepts of managing wildlife with emphasis on North American game species. Applied population dynamics as they relate to

management, historical, and recent developments in wildlife management, habitat improvement, and related material. Three hours lec. a week. Pr.: BIOL 430 and 433.

**BIOL 685. Wildlife Management Techniques.** (3) I. Ecology and management techniques. Two hours lec. and three hours lab a week. Pr.: BIOL 430 and 433.

**BIOL 687. Microbial Ecology.** (3) II, in even years. The ecology of aquatic and terrestrial microorganisms in their natural environment. Pr.: BIOL 455.

**BIOL 690. Microbial Physiology and Metabolism.** (2) II. The study of structure, function, regulation, and intermediary metabolism of bacteria. Pr.: BIOL 455; and BIOCH 521 or 765.

**BIOL 691. Microbial Genetics Laboratory.** (3) II. Examination of the genetic processes of bacteria. A self-paced experimental regimen emphasizing current methodology employed in mutagenesis, selection, gene transfer, gene analysis, plasmid manipulation, and recombinant DNA technology. Pr.: BIOL 540 and 675. Enrollment limited to 12 students.

**BIOL 696. Fisheries Management.** (4) I, in even years. Methods of managing fisheries resources; physical and biological survey methods; methods of aquatic environment improvement; fish population manipulation; management of streams, ponds, and lakes. Three hours lec. and three hours lab a week. Pr.: BIOL 433.

**BIOL 697. Topics in Biology.** (1–6) I, II, S. Pr.: Consent of instructor.

**BIOL 698. Problems in Biology.** (1–8) I, II, S. Pr.: Consent of instructor.

**BIOL 699. Undergraduate Seminar in Biology.** (1) I, II. Pr.: Consent of instructor.

**BIOL 702. Radiation Safety in the Research Laboratory.** (1) I. Principles of radioactive safety and radioisotope handling, licensing procedures, and laboratory techniques. Pr.: BIOL 198 or 555; and CHM 210 or PHYS 113.

**BIOL 710. Endocrinology.** (3) II, in even years. 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.: BIOL 198; and a course in organic chemistry or biochemistry.

**BIOL 719. Biomembranes.** (2) II, in even years. Fundamental concepts in membrane biochemistry. Emphasis on the relationship of membrane structure and function. Includes an introduction to research literature on cellular and model membranes. Reading/discussion format. Pr.: BIOL 541 and BIOCH 521.

**BIOL 720. Anaerobic Bacteriology.** (2) II, in even years. Study of anaerobic bacteria, anaerobiosis, description of anaerobic techniques, and physiology and biochemistry of anaerobes of the natural environment, including the gastrointestinal tract, and of veterinary, medical and industrial importance. Two hours of lec. a week. Same as ASI 720. Pr.: BIOL 455 and BIOCH 521.

**BIOL 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 BIOL 455 and 540; and BIOCH 521 or equiv.; consent of instructor.

**BIOL 731. Virology Laboratory.** (2) II. An introduction to the techniques used in virus propagation, detection, and quantification. Emphasis will be placed on the methodology used to study virus replication and virus-host cell interactions. One-hour lec. and three-hour lab. Pr.: BIOL 730.

**BIOL 735. Human Oncology.** (3) II, in even years. Etiology and pathogenesis of human cancer, with emphasis on the biology and biochemistry of the neoplastic process; host-tumor relationships; mechanism of action of anti-cancer drugs; and the clinical polychemotherapy of cancer. Pr.: BIOL 540 and BIOCH 521 or equiv.

**BIOL 736. Cancer Therapy.** (3) II, in odd years. Current methods of cancer management with emphasis on the kinetic principles of chemotherapy and radiation therapy; diagnosis; surgical oncology; oncologic emergencies; adverse effects of cancer therapy; and the new therapies. Pr.: BIOL 540 and BIOCH 521 or equiv.

**BIOL 740. Anatomy of Higher Plants.** (3) II. Structure and development of the various tissues and organs of seed plants. Two hours lec. and one two-hour lab a week. Pr.: BIOL 201 or 210.

**BIOL 755. Specialized Cell Functions.** (3) I, in even years. *In vitro* cell and organ culture techniques as tools for differentiation and specialization studies. Emphasis on mammalian cell culture systems with some study of plant cell culture. Pr.: BIOL 541.

**BIOL 760. Genetic Engineering.** (2) I. An in-depth coverage of techniques and approaches currently used in gene cloning. Recent papers which describe the application of gene cloning to basic research will be read and discussed. Pr.: BIOL 540.

## Chemistry

M. Dale Hawley, Head

Professors Copeland,\* Fateley,\* Hammaker,\* Hawley,\* Hua,\* Isenhour,\* Klabunde,\* Maatta,\* McDonald,\* Meloan,\* J. Paukstelis,\* Setser,\* and Sherwood;\* Assistant Professors Borovik,\* Buszek,\* Collinson,\* Duneczky,\* Lenhart, O'Hair,\* and Riordan;\* Instructor M. Paukstelis; Director of Laboratories E. Dikeman; Emeriti: Professors Kruh,\* Lambert,\* Moser,\* and Schrenk;\* Associate Professors Johnson\* and Lanning;\* Instructor Weyerts.

The Department of Chemistry occupies the Chemistry/Biochemistry Building, the H.H. King Chemical Laboratory, and part of Willard Hall. The faculty of the department consists of 19 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.

Instruction and research in chemistry are conducted in laboratories equipped with modern facilities and instruments.

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 preparation

High school students who plan to major in chemistry must have a good background in mathematics and English composition. Trigonometry and two years of algebra are essential, as are courses in chemistry and physics.

### Transfer students

It is recommended that community college students take general chemistry, qualitative and quantitative analysis, one year of organic chemistry, analytic geometry, calculus, physics, and English composition prior to entering K-State.

### Independent study and research

Many chemistry students are engaged in independent study and research, some as early as their first year. Two credit hours of research experience are required, culminating in a

final, formal, written report, under the supervision of a faculty member of the student's choice.

### Dual degrees

Programs are available that lead to a dual degree in chemistry and another field such as chemical engineering, mechanical engineering, or agriculture. The degree requirements of both curricula must be met and a minimum of 150 credit hours completed.

Graduates of such a program are highly sought by industry and are well suited for graduate study in either field of their dual degrees.

### 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 advisors in both chemistry and education. For specific certification requirements in secondary education, see the College of Education section of this catalog.

### General undergraduate major requirement

Students majoring in chemistry or chemical science must earn grades of C or better in all courses prescribed for these curricula, as outlined below.

### Chemistry curriculum for the B.S. degree\*

120 credit hours required for graduation

The following is the preferred curriculum for students preparing for employment as chemists or for graduate study in chemistry. This curriculum is approved by the American Chemical Society.

#### Chemistry option† (40–42 hours)

#### Biochemistry option‡ (45–47 hours)

CHM 220	Chemical Principles I .....	5
	and	
CHM 250	Chemical Principles II .....	5
	or	
CHM 210	Chemistry I .....	4
	and	
CHM 230	Chemistry II .....	4
	and	
CHM 271	Chemical Analysis .....	4
CHM 531	Organic Chemistry I .....	3
CHM 532	Organic Chemistry Laboratory .....	2
CHM 550	Organic Chemistry II .....	3
CHM 585	Physical Chemistry I .....	3
CHM 595	Physical Chemistry II .....	3
CHM 598	Physical Chemistry II Laboratory .....	2
CHM 566	Instrumental Methods of Analysis .....	3
CHM 567	Instrumental Methods of Analysis Laboratory .....	1
CHM 657	Inorganic Techniques .....	2
CHM 711	Inorganic Chemistry I .....	3
CHM 712	Inorganic Chemistry II .....	3
CHM 599	Undergraduate Research .....	2

#### Mathematics (12 hours)

MATH 220	Analytic Geometry and Calculus I .....	4
MATH 221	Analytic Geometry and Calculus II .....	4
MATH 222	Analytic Geometry and Calculus III .....	4

**Physics (10 hours)**

PHYS 213	Engineering Physics I .....	5
PHYS 214	Engineering Physics II .....	5

†CHM 711 or 712 may be replaced with CHM 752

(Advanced Organic Chemistry, 3 credits).

‡For the biochemistry option, either CHM 711 or 712 may be replaced with BIOCH 755, 756, and 765 (Biochemistry I, Biochemistry I Lab., and Biochemistry II, 8 credits). CHM 657 may be taken for 1 or 2 hours under this option.

## Chemical science curriculum for the B.S. degree\*

120 credit hours required for graduation

The chemical science curriculum serves students who want a strong background in chemistry but not as much specialization as in the chemistry curriculum.

**Chemistry (25–27 hours)**

CHM 220	Chemical Principles I .....	5
	and	
CHM 250	Chemical Principles II .....	5
	or	
CHM 210	Chemistry I .....	4
	and	
CHM 230	Chemistry II .....	4
	and	
CHM 271	Chemical Analysis .....	4
CHM 531	Organic Chemistry I .....	3
CHM 532	Organic Chemistry Laboratory .....	2
CHM 550	Organic Chemistry II .....	3
CHM 566	Instrumental Methods of Analysis .....	3
CHM 567	Instrumental Analysis Methods of Laboratory .....	1
CHM 500	General Physical Chemistry .....	3
	or	
CHM 585	Physical Chemistry I .....	3

**Biochemistry (5 hours)**

BIOCH 521	General Biochemistry .....	3
BIOCH 522	General Biochemistry Laboratory .....	2

**Mathematics (8 hours)**

MATH 220	Analytic Geometry and Calculus I .....	4
MATH 221	Analytic Geometry and Calculus II .....	4

**Physics (8 hours)**

PHYS 113	General Physics I .....	4
PHYS 114	General Physics II .....	4

\*A program leading to the B.A. degree may be planned by modifying the social sciences and humanities requirements. See general college section for specific requirements for the B.A. degree.

## Chemistry minor

CHM 210	Chemistry 1† .....	4
CHM 230	Chemistry 2‡ .....	4
CHM 271	Chemical Analysis† .....	4
CHM 350	General Organic Chemistry‡ .....	3
CHM 351	General Organic Chemistry Lab§ .....	2
CHM 500	General Physical Chemistry# .....	3
		<b>20</b>

†CHM 220 (Chemical Principles 1, 5 credits) and CHM 250 (Chemical Principles 2, 5 credits) could replace CHM 210, CHM 230, and CHM 271.

‡CHM 531 (Organic Chemistry 1, 3 credits) could replace CHM 350.

§CHM 532 (Organic Chemistry Lab, 2 credits) could replace CHM 351.

#CHM 585 (Physical Chemistry 1, 3 credits) could replace CHM 500.

## Introductory and general chemistry courses

**Undergraduate credit**

**CHM 101. Chemical Science Colloquium.** (2) I, II. TELENET only. Current topics in chemistry presented by a

distinguished international authority and moderated by a K-State faculty member. Syllabus provided and final original paper required. May be repeated once. Not open to chemistry majors.

**CHM 110. General Chemistry.** (3) I, II, S. Principles, laws, and theories of chemistry; important metallic and nonmetallic substances. (An optional laboratory course, CHM 111, is available for an additional hour of credit.) Three hours lec. a week. Pr.: MATH 010 or at least one year of high school algebra.

**CHM 111. General Chemistry Laboratory.** (1) I, II, S. An optional laboratory course to supplement the material of CHM 110. Three hours lab a week. Pr.: CHM 110 or conc. enrollment.

**CHM 195. Approved Techniques in Criminalistics.** (3) Intersession only. Physical evidence at a crime scene and its examination in the laboratory. Soils, glass, hair fibers, drugs, explosives, poisons, castings, inks, and arson and rape situations are investigated.

**CHM 200. Undergraduate Seminar in Chemistry.** (0, 1) I, II. Programs and activities of chemical interest including lectures given by undergraduate chemistry majors.

**CHM 210. Chemistry I.\*** (4) I, II, S. First course of a two-semester study of the principles of chemistry and the properties of the elements and their compounds. Three hours lec. and three hours lab a week. Pr.: One year of high school chemistry and MATH 100 (or two courses of high school algebra).

\*In the fall semester, the chemistry department conducts an accelerated program that provides the opportunity for students with good preparation in high school chemistry to earn credit in both CHM 210 Chemistry I and CHM 230 Chemistry II. Credit in Chemistry I is earned through satisfactory performance on a review examination and completion of a special laboratory of three hours per week. Credit in Chemistry II is earned through a special lecture program. For assignment to this program, a student should have a probability of at least 90 percent for earning a grade of C or better in Chemistry 1, as indicated in the Overall GPA Predictions table of the students' ACT profile form.

**CHM 220. Chemical Principles I.** (5) I. First course of a two-semester study of chemical principles. For students in curricula with a major emphasis in chemistry. Three hours lec. and six hours lab a week. Pr.: High school chemistry (one year) and algebra (one and one-half years).

**CHM 230. Chemistry II.** (4) I, II, S. Second course of a two-semester study of the principles of chemistry and the properties of the elements and their compounds. Three hours lec. and three hours lab a week. Pr.: CHM 210.

**CHM 250. Chemical Principles II.** (5) II. Continuation of CHM 220, covering the principles of chemistry. Laboratory stresses quantitative chemistry. Three hours lec. and six hours lab a week. Pr.: CHM 220.

**CHM 399. Sophomore Honors Seminar.** (3) Open to students in the arts and sciences honors program.

**CHM 498. Senior Honors Thesis.** (2) I, II, S. Open only to seniors in the arts and sciences honors program.

**CHM 499. Problems in Undergraduate Chemistry.** (Var.) I, II, S. Problems may include classroom and/or lab work. Pr.: Consent of instructor.

**CHM 601. Safe Chemical Laboratory Practices.** (1) I. A general safety course for persons working or teaching in a chemical laboratory. One hour of lecture per week. Pr.: CHM 271 and 350 or equivalents.

### Undergraduate and graduate credit in minor field

**CHM 599. Undergraduate Research.** (1, 2, 3) I, II, S. Analytical, inorganic, organic, or physical chemistry. A final, formal written report is required.

**Undergraduate and graduate credit**

Unless otherwise stated, all chemistry courses numbered 600 or above require the following as minimum prerequisites: CHM 550 Organic Chemistry II; CHM 532 Organic Chemistry Laboratory; CHM 595 Physical Chemistry II;

and CHM 598 Physical Chemistry II Laboratory.

**CHM 600. Scientific Glassblowing.** (1) II. The basic techniques of bending, sealing, and blowing glass used to fabricate scientific glassware. Three hours of laboratory including one lecture-demonstration a week. Pr.: Senior or graduate standing in physical sciences.

**CHM 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.

**CHM 799. Problems in Chemistry.** (Var.) I, II, S. Problems may include classroom or laboratory work. Not for thesis research. Pr.: Consent of instructor.

## Analytical chemistry courses

**Undergraduate credit**

**CHM 240. Environmental Chemistry Laboratory.** (1) II. Selected experiments in air quality, water quality, and other environmental topics. Three hours lab a week. Pr.: CHM 230 or conc. enrollment.

**CHM 271. Chemical Analysis.** (4) II. Principles of chemical equilibria and qualitative, gravimetric, and titrimetric analyses. Two hours lec. and six hours lab a week. Pr.: CHM 230.

### Undergraduate and graduate credit in minor field

**CHM 545. Chemical Separations.** (2) II. Principles of modern separation techniques. One hour lec. and three hours lab a week. Pr.: CHM 250 or 271.

**Undergraduate and graduate credit**

**CHM 566. Instrumental Methods of Analysis.** (3) I. Introduction to theory and practice of electrochemical methods, molecular and atomic spectroscopy, surface science, mass spectrometry, separation methods, and electronics in analytical chemistry. Three hours lec. a week. Pr.: CHM 550, PHYS 114 or 214, and MATH 221.

**CHM 567. Instrumental Methods of Analysis Laboratory.** (1) I. Three hours lab a week. Pr.: CHM 566 or conc. enrollment

**CHM 668. Chemical Equilibria.** (1) I. One hour lec. a week.

**CHM 725. Instrumentation in Chemistry.** (3) On sufficient demand. 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.: CHM 566 or consent of instructor.

## Inorganic chemistry courses

**Undergraduate and graduate credit**

**CHM 650. History of Chemistry.** (2) II, in even years. Traces the beginnings of chemistry from 3500 B.C. to 1920 A.D. Early metallurgy, Greek thought about atoms, alchemy, atomic theory, discovery of gases; definition of elements, chemical bonds, organic, inorganic, and physical chemistry. Pr.: CHM 585.

**CHM 657. Inorganic Techniques.** (1–2) II. The preparation, characterization, and study of transition metal, main group, and organometallic compounds of unusual interest, using techniques commonly encountered in industrial and academic research. Three to six hours lab a week. Pr.: CHM 585.

**CHM 711. Inorganic Chemistry I.** (3) I. Atomic and molecular structure, bonding concepts used in the practice of inorganic chemistry. Applications of symmetry and group theory to structure, bonding, and spectra. Three hours lec. a week. Pr.: CHM 550, 595.

**CHM 712. Inorganic Chemistry II.** (3) II. Structure, reactivity, and mechanistic aspects of main group and transition metal complexes. Organometallic reactions, catalysis, and bioinorganic chemistry. Three hours lec. a week. Pr.: CHM 550, 595.

## Organic chemistry courses

### Undergraduate credit

**CHM 350. General Organic Chemistry.** (3) I, II, S. A survey of types of organic reactions important to biological science areas including pre-veterinary and certain agriculture and home economics programs. Conc. enrollment in CHM 351 is urged. Three hours lec. a week. Pr.: CHM 230.

**CHM 351. General Organic Chemistry Laboratory.** (2) I, II, S. One five-hour lab and one hour of lec. a week. Pr. or conc.: CHM 350.

### Undergraduate and graduate credit in minor field

**CHM 531. Organic Chemistry I.** (3) I, II. 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 curricula and for entrance to medical schools. Three hours lec. a week. Pr.: CHM 230 or 250.

**CHM 532. Organic Chemistry Laboratory.** (2) I, II. One five-hour lab and one hour of lec. a week. Pr.: CHM 550 or conc. enrollment.

**CHM 550. Organic Chemistry II.** (3) I, II. Continuation of CHM 531, including additional aromatic chemistry, condensation reactions, and introduction to some advanced topics, such as dyes, polymers, and heterocyclic chemistry. Three hours lec. a week. Pr.: CHM 531.

**CHM 551. Advanced Organic Laboratory.** (2) I, II. One five-hour lab and one hour of lec. a week. Pr.: CHM 550 and 532.

**CHM 752. Advanced Organic Chemistry.** (3) I. Advanced study of organic compounds and fundamental types of reactions. Three hours lec. a week. Pr.: CHM 550 and 595.

## Physical chemistry courses

### Undergraduate and graduate credit in minor field

**CHM 500. General Physical Chemistry.** (3) II. Elementary principles of physical chemistry. Three hours lec. a week. Pr.: CHM 230 or CHM 250 and MATH 210 or MATH 220, and PHYS 114 or equivalent.

**CHM 585. Physical Chemistry I.** (3) I. Elementary chemical thermodynamics and kinetic theory of gases. Three hours lec. a week. Pr.: CHM 230 or CHM 250, MATH 222, PHYS 214.

**CHM 586. Physical Chemistry I Laboratory.** (2) I. Six hours lab a week. Pr.: CHM 250 or CHM 271, CHM 585 or conc. enrollment.

**CHM 595. Physical Chemistry II.** (3) II. Elementary quantum chemistry, spectroscopy, statistical thermodynamics, and chemical kinetics. Three hours lec. a week. Pr.: CHM 585.

**CHM 598. Physical Chemistry II Laboratory.** (2) II. Six hours lab a week. Pr.: CHM 250 or CHM 271 and CHM 595 or conc. enrollment.

## Economics

James F. Ragan,\* Head

Professors Babcock,\* Emerson,\* Nafziger,\* Ragan,\* and Thomas;\* Associate Professors Akkina,\* Chang,\* Gormely,\* McNulty,\* Oldfather, and Olson;\* Assistant Professors Bratsberg, Fisher,\* Terrell,\* and Weisman;\* Instructor Trenary; Emeriti: Professors Bagley,\* and Chalmers.\*

Economics is concerned with the principles governing the production and distribution of goods and services, the best use of resources,

and the causes of economic prosperity, depression, growth, inflation, and deflation. Students may pursue specialized study in economic theory, econometrics, economic development, economic fluctuations, economic systems, industrial organization, international trade, labor economics, managerial economics, mathematical economics, monetary theory and policy, public finance, regional economics, and transportation economics.

A student majoring in economics may earn either the bachelor of arts or the bachelor of science degree.

## Requirements

Requirements for an economics major for either the B.A. or B.S. degree are:

ECON 110	Principles of Macroeconomics .....	3
ECON 120	Principles of Microeconomics .....	3
ECON 510	Intermediate Macroeconomics .....	3
ECON 520	Intermediate Microeconomics .....	3
ECON 580	Senior Seminar in Economics .....	3

Five additional economics department courses at the 500 level or above (except ECON 505 and 506).

Two courses in statistics. One course must be an introductory course: STAT 320, 330, 340, 350, 510, 702, or 703. The other course must be STAT 351, 511, or 705.

Either MATH 205 (General Calculus and Linear Algebra) or MATH 220 (Analytic Geometry and Calculus I).

To graduate, a student must receive a grade of C or higher in Intermediate Macroeconomics and Intermediate Microeconomics. In addition, a student must either (a) receive a grade of C or higher in all other 500-level or higher economics courses used to satisfy the degree requirements or (b) have a GPA of at least 2.50 in all economics courses used to satisfy the degree requirements.

Courses taken A/Pass/F may not be used to fulfill these requirements.

Students interested in graduate study in economics should take MATH 220 and 221. Additional courses in calculus, matrix algebra, and statistics are also recommended. Early counsel with an advisor is encouraged.

## Secondary major in industrial and labor relations

See the Secondary Majors section of this catalog.

## Accelerated undergraduate and graduate programs

Students who begin graduate work after completing the B.A. or B.S. degree generally require more than one year to complete work for a master's degree. However, a five-year program leading to a B.A. or B.S. in economics at the end of four years and a master of arts in economics at the end of five years is available for promising undergraduate students. Students who have completed their 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 advisor, will plan an individualized program of study that meets requirements for the B.A.

or B.S. and the M.A. degrees. Features of the program include 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.

## Economics minor

A minor in economics is also available. The requirements are as follows:

ECON 110	Principles of Macroeconomics .....	3
ECON 120	Principles of Microeconomics .....	3
Four economics courses at the 500 level or higher (ECON 505 and 506 may not be used to satisfy this requirement)	.....	12

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Students must have an overall GPA of 2.0 or higher in courses to satisfy the minor requirements.

## Economics courses

### Undergraduate credit

**ECON 110. Principles of Macroeconomics.** (3) I, II, S. Basic facts, principles, and problems of economics; determination of the level of employment, output, and the price level; the monetary and banking system; problems and policies of economic instability, inflation, and growth; principles of economic development; other economic systems. Pr.: Probability of a grade of C or higher (PROB  $\geq$  C) of at least 40 percent according to the economics component of the ACT Student Profile, a score of 18 or higher on the Math Placement Exam, or a grade of B or higher in MATH 010.

**ECON 111. Principles of Macroeconomics Honors.** (3) Course description same as ECON 110. Pr.: Participation in honors program and consent of instructor.

**ECON 120. Principles of Microeconomics.** (3) I, II, S. Basic facts, principles, and problems of economics including study of the determination of prices; the determination of wages, rent, interest, and profit; theory of the firm; monopoly and government regulation; international economic relations. Pr.: Probability of a grade of C or higher (PROB  $\geq$  C) of at least 40 percent according to the economics component of the ACT Student Profile, a score of 18 or higher on the Math Placement Exam, or a grade of B or higher in MATH 010.

**ECON 399. Honors Seminar in Economics.** (3). For sophomores in honors program—scheduled irregularly. Readings and discussions. Open to students in the honors program not majoring in economics.

**ECON 499. Seniors Honors Thesis.** (2) I, II, S. Open only to seniors in the arts and sciences honors program.

### Undergraduate and graduate credit in minor field

**ECON 505. Introduction to the Civilization of South Asia I.** (3) I. Interdisciplinary survey of the development of civilization in India, Pakistan, Sri Lanka, Bangladesh, and Afghanistan; geographical and demographic context, philosophical and social concepts, economic, social and political institutions, literature and historical movements. Same as HIST 505, POLSC 505, SOCIO 505, ANTH 505.

**ECON 506. Introduction to the Civilization of South Asia II.** (3) II. Interdisciplinary survey of recent and contemporary civilization in India, Pakistan, Sri Lanka, Bangladesh, and Afghanistan, including recent history, current economy, religion, culture, languages and literature, geography, social and political structures and ideas. Same as HIST 506, POLSC 506, SOCIO 506, ANTH 506.

**ECON 507. The Japanese Economy.** (3) II. Analyzes Japan's growth, productivity change, income distribution, government policies, agriculture, industrial structure, labor relations, education and technology, and international trade and finance. Emphases will be on U.S.-Japanese competition and comparisons. Pr.: ECON 110.

**ECON 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; ECON 120 or AGECE 120.

**ECON 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.

**ECON 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.

**ECON 532. Fiscal Operation of State and Local Government.** (3) 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.

**ECON 540. Managerial Economics.** (3) I, II, some S. Microeconomic topics applicable to understanding and analyzing firm behavior: optimization, demand, estimation, production, and cost theory. Applications to business problems. Pr.: ECON 120, an introductory-level statistics course, and MATH 205.

**ECON 555. Urban and Regional Economics.** (3) I. An examination of the determinants of the economic performance of urban and regional economies, including theory, problems, and policy. Pr.: ECON 120.

**ECON 580. Senior Seminar in Economics.** (3) I. Topics for class discussion include history of economic thought, research methods in economics, and current economic issues. Students will prepare and present papers written with faculty guidance. Required of all economics majors; open to others with permission of instructor. Pr.: ECON 510 and ECON 520; STAT 351, 511, or 705 or concurrent enrollment in one of the three.

**ECON 595. Problems in Economics.** (Var.) I, II, S. Individual study is offered in international trade, labor relations, money and banking, public finance, transportation, general economics.

**ECON 599. Topics in Economics.** (1–3) On sufficient demand. Courses on special topics to be taught on demand. Pr.: To be set for each topics course.

### Undergraduate and graduate credit

**ECON 620. Labor Economics.** (3) I, some 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; current issues. Pr.: ECON 120 or consent of instructor.

**ECON 627. Contemporary Labor Problems.** (3) Some II. Emphasis on current research and public policies dealing with such matters as full employment, poverty, discrimination, social security, unemployment insurance, health care, minimum wages, training, and education. Pr.: ECON 620 or consent of instructor.

**ECON 631. Principles of Transportation.** (3) II. 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 120 or AGECE 120.

**ECON 633. Public Finance.** (3) II. Course seeks answers to questions such as: Which goods should be provided by the private sector and which by the public sector (government)? With what criteria are public expenditures evaluated? What is an equitable and efficient tax system? Who bears the tax burden? What aspects of existing taxes need reform? Pr.: ECON 110; ECON 120 or AGECE 120.

**ECON 636. Capitalism and Socialism.** (3) II. A survey of Marxian economics, major perspectives on U.S. capitalism, market and self-governing socialism, and the Russian, Chinese, and other economies. Pr.: ECON 110 or ECON 120.

**ECON 640. Industrial Organization and Public Policy.** (3) II. An examination of measures and determinants of in-

dustrial concentration, and an analysis of market structure, conduct, and performance, and policies related to performance. Pr.: ECON 120.

**ECON 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; ECON 120 or AGECE 120.

**ECON 682. Economics of Underdeveloped Countries.** (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.

**ECON 686. Business Fluctuations and Forecasting.** (3) I. Types of business fluctuations; measurement of business cycles; theories of the causes of business cycles; proposals for stabilizing business activity; techniques of forecasting business activity. Pr.: ECON 110; ECON 120 or AGECE 120.

**ECON 690. Monetary, Credit, and Fiscal Policies.** (3) II. Goals of aggregative economic policy, conflicts among goals, and measures to resolve conflicts; money markets; targets of central bank control; the relative strength of monetary and fiscal policies; rational expectations hypothesis and policy ineffectiveness debate; term structure of interest rates. Pr.: ECON 530.

**ECON 699. Seminar in Economics.** (1–3) On sufficient demand. Seminars of special interest will be offered on demand. Pr.: ECON 120.

**ECON 720. Microeconomic Theory.** (3) I. Demand, cost, and production theories; price and output determination in different market structures; the theory of factor market pricing; an introduction to general equilibrium and welfare analysis. Pr.: ECON 520; MATH 205 or MATH 220.

**ECON 730. Introduction to Econometrics.** (3) II. Analytical and quantitative methods used in economics. Applications to specific problems. Pr.: MATH 220 or 205; STAT 550 or both STAT 510 and 511.

**ECON 735. Mathematical Economics.** (3) I. Application of mathematical tools of concrete problems in micro- and macro-economics; mathematical treatment of models of consumption, production, market equilibrium, and aggregate growth. Pr.: ECON 520, MATH 205 or 220, or consent of instructor.

## English

Dean G. Hall,\* Head

Professors Dees,\* Hedrick,\* Heller,\* Holden,\* Keiser,\* Nyberg,\* Rees,\* and L. Warren;\* Associate Professors Brondell,\* Conrow,\* Dodd,\* Donnelly,\* Gillespie, Hall,\* Machor,\* T. Murray,\* Nelson,\* and Smit;\* Assistant Professors Brigham,\* Crossley, Dayton,\* Eiselein,\* Franko,\* Hubler, Kremer,\* Phillips,\* Rodgers,\* Sigler, Tabbi,\* Ward,\* and Wood;\* Instructors Baker, Bussing, J. Clark, M. Clark, Clift, Dillon, Frazier, Friedmann, Hajda, Kolonosky, Kremer, Mosher, D. Murray, Rankin, Ransom, Roper, Seltzer, P. Stewart, A. Warren, and Wheatley; Emeriti: Professors Eitner, Johnston, McCarthy, Moses, Noonan, and M. Schneider; Associate Professors Adams, Ansdell, Cohen, Geissler, Grindell, and H. Schneider; Assistant Professor Glenn; Instructors Bergman, Clark, Pelischek, Rochat, and Vance.

## Bachelor of arts

Students may elect to earn a B.A. in the department through a course of study based on one of the following three patterns.

### Literature track

ENGL 252	Introduction to Literary Studies .....	3
One Shakespeare course .....		3
One language course (430, 476, 490, or 790) .....		3
Two "Survey" courses in one national literature .....		6
(361 and 362 or 381 and 382)		
Three English courses numbered 320-599 .....		9
Four English courses numbered 600 and above .....		12
		<b>36</b>

Students must take at least 6 hours of American literature and 6 hours of British literature other than Shakespeare. At least 15 of the 21 hours in courses numbered 320 and above must be literature courses.

### Literature and creative writing track

ENGL 252	Introduction to Literary Studies .....	3
One Shakespeare course .....		3
One language course (430, 476, 490, or 790) .....		3
Any two "Survey" courses .....		6
ENGL 410	Introduction to Creative Writing .....	3
Three advanced creative writing courses in at least two genres .....		9
Two literature courses numbered 600 and above .....		6
One course in literature or language numbered 320 and above .....		3
		<b>36</b>

Students must take at least 6 hours of American literature and 6 hours of British literature other than Shakespeare.

### Literature with teaching certification track

ENGL 252	Introduction to Literary Studies .....	3
One Shakespeare course .....		3
ENGL 400	Advanced Expository Writing for Prospective Teachers .....	3
ENGL 430	The Structure of English .....	3
ENGL 490	Development of the English Language .....	3
Any two "Survey" courses .....		6
A world literature course .....		3
ENGL 545	Literature for Adolescents .....	3
Three literature courses numbered 600 and above .....		9
Composition elective .....		3
		<b>39</b>

Students must take at least 6 hours of American literature and 6 hours of British literature other than Shakespeare.

## Teacher certification

Students preparing to teach English in high school may adopt either of two programs: the major outlined above, leading to the B.A. degree; or the College of Education major in secondary education, leading to the B.S. degree. Majors desiring certification should consult their advisors in both the English department and the College of Education.

For specific certification requirements in secondary education, see the College of Education section of this catalog.

## English courses

**ENGL 030. Writing Laboratory.** (2) I, II, S. Credit/No Credit. Laboratory practice in writing for all students who need review in fundamentals of composition. Especially for students who have difficulty in meeting standards in Expository Writing I and II, but also designed to assist students who desire to improve their composition skills. Hours are not applicable toward degree requirements. Pr.: Consent of instructor.

**ENGL 035. Special Studies in Intensive English.** (2–12) I, II, S. Equivalent to enrollment in one or two segments (structure, writing, reading, or speaking and listening) of

Intermediate Intensive English I or II. Placement by the English Language Program according to the student's needs and ability level.

**ENGL 036. Beginning Intensive English I.** (15) I, II. Introduction to basic English syntax, writing, reading, speaking, and listening for native speakers of other languages. No prior knowledge of English required.

**ENGL 038. Beginning Intensive English II.** (15) I, II. Intensive study of basic English syntax, writing, reading, speaking, and listening for native speakers of other languages. Pr.: Minimum TOEFL score of 350.

**ENGL 040. Intermediate Intensive English I.** (15) I, II. Intensive study of basic English sentence structure, writing, reading, speaking, and listening for native speakers of other languages. Pr.: Minimum TOEFL score of 400.

**ENGL 050. Intermediate Intensive English II.** (15) I, II. Continued intensive study of English structure, writing, reading, speaking, and listening. Placement by the English Language Program.

**ENGL 052. Advanced Intensive English.** (15) I, II. Advanced intensive study of English writing, reading, speaking, and listening with emphasis on university-level tasks. Placement by the English Language Program.

**DAS 060. Summer Intensive English.** (10) S. Intensive study of English for native speakers of other languages. Instruction in English language structure, writing, reading, speaking, and comprehension.

**ENGL 070. Advanced English as a Second Language.** (6) I, II. A support course required of international students whose performance on the English screening test indicates that they would still benefit from half-time instruction in English. Three specialized sections are offered: for undergraduates, for graduate students in technical fields, and for graduate students in non-technical fields. Placement by the English Language Program or on the recommendation of an advisor.

**ENGL 075. English for International Students.** (3) I, II. Distinguished from DAS 060 by being a nonintensive, 3-hour university support course. English structure, reading, and writing for graduate or undergraduate nonactive speakers who wish to reduce a written language deficiency or to prepare for Composition I. Required of students who do not pass the Written English Proficiency Test. Students may also be admitted on recommendation of their advisor. Repeatable if necessary.

## Undergraduate credit

**Introductory courses not for major credit, except for the required ENGL 252. Repeatable once (where indicated) with change of syllabus.**

**ENGL 100. Expository Writing I.** (3) I, II, S. Introduction to expressive and informative writing. Frequent discussions, workshops, and conferences. Offers extensive practice in the process of writing: getting ideas, drafting, analyzing drafts, revising, and editing.

**ENGL 110. English Honors Composition I.** (3) I, II, S. Critical reading and composition for freshmen whose scores on their entrance examinations indicate that they will benefit from a more sophisticated and challenging program than that of ENGL 100. Students may also be admitted at the discretion of the director of the expository writing program.

**ENGL 125. English Honors Composition II.** (3) I, II. Advanced critical reading and composition. Students who receive A in ENGL 100 may, on the recommendation of their instructor and the director of the expository writing program, be admitted. Students who are members in good standing of one of the various college honors programs may also be admitted. Otherwise, admission is on the same basis as that for ENGL 110.

**ENGL 150. English Studies Abroad.** (2–3) Intersession only. Travel abroad, with selected readings, lectures, and discussions which explore the relationships between literary texts and their physical and cultural environments.

**ENGL 200. Expository Writing II.** (3) I, II, S. Introduction to writing persuasively and in response to literature. As with ENGL 100, uses discussions, workshops, and

conferences, and emphasizes the writing process. Pr.: ENGL 100 or 110 and sophomore standing.

**ENGL 210. The Uses of Poetry.** (1), I, II, S. Credit/No Credit only. The experience of poetry read for pleasure, for knowledge, and for personal fulfillment. Repeatable once.

**ENGL 220. Fiction into Film.** (2) I, II, S. Discussions of film adaptation of works of literature.

**ENGL 230. Humanities: Classical Cultures.** (3) I, II, S. As do the following three courses (ENGL 231–234), develops an understanding, appreciation, and enjoyment of the humanistic resources of Western culture by examining great works of literature, philosophy, art, music, and religion in each major or period. The four courses may be taken individually and in any order.

**ENGL 231. Humanities: Medieval and Renaissance.** (3) I, II, S.

**ENGL 233. Humanities: Baroque and Enlightenment.** (3) I, II, S.

**ENGL 234. Humanities: Modern.** (3) I, II, S.

**ENGL 251. Introduction to Literature.** (3) I, II, S. Study of form and technique in works of fiction, poetry, and drama.

**ENGL 252. Introduction to Literary Studies.** (3) I, II, S. Elements of literary form and style: an introduction to criticism for English majors. Intended as a first course in the analysis of form and technique, an introduction to literary terms commonly used in later courses, and practice in critical writing. Readings from a broad range: poems, plays, essays, and novels.

**ENGL 261. British Literature: Medieval and Renaissance.** (3) I, II, S. Major works to about 1700, selected for the general student, emphasizes Chaucer, Shakespeare, and Milton. Will not apply to survey requirement for English majors.

**ENGL 262. British Literature: Enlightenment to Modern.** (3) I, II, S. Major works since about 1700, selected for the general student. Will not apply to survey requirement for English majors.

**ENGL 271. American Literature: Colonial through Romantic.** (3) I, II, S. Major works selected for the general student. Will not apply to survey requirement for English majors.

**ENGL 272. American Literature: Realists and Moderns.** (3) I, II, S. Major works selected for the general student. Will not apply to survey requirement for English majors.

**ENGL 280. Selected American Ethnic Literatures.** (3) I, II, S. Selected studies in ethnic literatures of the United States, including African, Asian, Hispanic, Jewish, and Native Americans. Repeatable.

**ENGL 287. Great Books.** (3) I, II, S. Introduction to world classics from past to present.

**ENGL 297. Honors Introduction to the Humanities I.** (3) I. Study of selected major works of history, literature, and philosophy of central importance in the Western cultural tradition. Emphasis on classroom discussion and writing interpretive essays. Limited to entering freshmen. Pr.: Consent of instructor. Same as HIST 297, MLANG 297, PHILO 297.

**ENGL 298. Honors Introduction to the Humanities II.** (3) II. Continuation of ENGL 297. Pr.: ENGL 297 or consent of instructor. Same as HIST 298, MLANG 298, PHILO 298.

**ENGL 299. Honors Topics in English.** (3) I, II. Readings and colloquia in selected topics in literature or language. Pr.: Open only to arts and sciences honors program students and to others completing ENGL 100 or 200 and 110 or 125 with a 3.5 GPA.

## Courses for major credit (except ENGL 300 and 399)

**ENGL 300. Expository Writing III.** (3) I, II, S. Advanced practice in writing a variety of expository forms: personal essays and informative and persuasive reports. Additional work on style and the demands of various rhetorical situations. Pr.: ENGL 125 or 200.

**ENGL 320. The Short Story.** (3) I, II, S. Study of short stories from world literature with emphasis on American, British, and Continental.

**ENGL 330. The Novel.** (3) I, II, S. Novels selected from various periods and cultures. Concern for form and critical analysis.

**ENGL 340. Poetry.** (3) I, II, S. Close reading of poems and analysis of poetic genres, with emphasis on modern poetry.

**ENGL 345. Drama.** (3) I, II, S. Study of drama from classical times to the present.

**ENGL 350. Introduction to Shakespeare.** (3) I, II, S. Study of representative comedies, histories, and tragedies.

**ENGL 355. Literature for Children.** (3) I, II, S. Survey of literature for children. Emphasizes the reading and evaluating of books for children. For teachers of elementary grades. Pr.: Sophomore standing.

**ENGL 361. British Survey I.** (3) I, II, S. English literature from Anglo-Saxon times through Milton. Will apply to survey requirement for English majors.

**ENGL 362. British Survey II.** (3) I, II, S. English literature from Dryden to the end of the nineteenth century. Will apply to survey requirement for English majors.

**ENGL 381. American Survey I.** (3) I, II, S. American literature from the early accounts of colonization through the American Renaissance. Will apply to survey requirement for English majors.

**ENGL 382. American Survey II.** (3) I, II, S. American literature from the Civil War to the present. Will apply to survey requirement for English majors.

**ENGL 390. Fable and Fantasy.** (3) I, II, S. Study of modern works in the fabulous or fantastic modes in relation to the traditions underlying them. Pr.: ENGL 100 or 110.

**ENGL 395. Topics in English.** (1–3) I, II, S. Selected studies in literature and language. Repeatable with change in topic.

**ENGL 399. Honors Seminar in English.** (1–3) I. Readings and colloquia in selected masterpieces. May not be used for English major credit. Pr.: Honors students only.

## Courses for major and nonmajor credit

**ENGL 400. Advanced Expository Writing for Prospective Teachers.** (3) I, II, S. Expository writing and a brief introduction to the history and theory of teaching writing, primarily for candidates for Secondary certification in English. Pr.: ENGL 125 or 200.

**ENGL 410. Introduction to Creative Writing.** (3) I, II, S. For those beginning the craft of imaginative writing. A practical introduction to poetry and short fiction. Pr.: ENGL 120 or 125 or 200.

**ENGL 415. Written Communication for Engineers.** (3) I, II, S. Study and intensive use of writing forms characteristic of professional practice. Pr.: Enrollment in the College of Engineering with junior or senior standing and ENGL 100 or equivalent with A or B credit or ENGL 200.

**ENGL 420. Literature and Film.** (3) I, II, S. Emphasizes such matters as the turning of a story, novel, play into film; the handling of point of view; the interrelating of techniques between fiction and film; and the comparing of the forms of fiction and film. Pr.: ENGL 125 or 200.

**ENGL 425. Women in Literature.** (3) I, II, S. Literary works by or about women. Treats individual writers, writers considered within various traditions, themes, or formal issues. Pr.: ENGL 125 or 200.

**ENGL 430. The Structure of English.** (3) I, II, S. Systematic study of the structure of the English language and a consideration of the current theories of analysis: traditional, structural, and transformational-generative. Primarily for candidates for secondary certification in English or for elementary language arts majors. Pr.: ENGL 125 or 200.

**ENGL 440. Themes in Literature.** (1–3) I, II, S. Explores the literary treatment of important and recurring themes. Repeatable once. Pr.: ENGL 125 or 200.

**ENGL 445. Literary Kinds.** (1–3) I, II, S. Examines the characteristics, the growth and development, or the uses of

specified literary genres. Repeatable once. Pr.: ENGL 125 or 200.

**ENGL 450. Literature and Society.** (1-3) I, II, S. Literature in relation to social and cultural patterns and influences. Repeatable once. Pr.: ENGL 125 or 200.

**ENGL 460. American Folklore and Folk Literature.** (3) I, II, S. Focuses on definition, form, and function of folktales and anecdotes, legends, proverbs, riddles, beliefs, and customs. Pr.: ENGL 125 or 200.

**ENGL 470. English Bible.** (3) I, II, S. The Bible as literature and history and the cultural and historical backgrounds of the Old Testament. Pr.: ENGL 125 or 200.

**ENGL 476. American English.** (3) I, II, S. A systematic study of the English language as it has been and is spoken in the continental United States. Topics may include Tall Talk, Americanisms, Colonial and Modern dialects, and American dictionaries. Pr.: ENGL 125 or 200.

**ENGL 485. Introduction to History and Theory of Composition and Rhetoric.** (3) I, II, S. Introduction to primary issues and representative writers on rhetoric from ancient Greece and Rome to the present. Emphasizes the relationship of such material to writing instruction in Western civilization. Pr.: ENGL 125 or 200.

**ENGL 490. Development of the English Language.** (3) I, II, S. Depicts the English language in its place among other world languages, and introduces students to the major ways in which English has changed through time. Considers both internal and external influences as causes of language change. Pr.: ENGL 125 or 200.

**ENGL 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 equiv. background, such as courses in Western civilization, art, or world literature, with consent of instructor).

**ENGL 497. Special Investigations in English.** (Var.) I, II, S. Individual investigation in authors, genres, periods of literature or language. Pr.: Background of preparation needed for investigation undertaken.

**ENGL 498. Honors Tutorial in English.** (1-3) I, II, S. Individually guided study in which the student will formulate and explore a narrowly defined topic in literature or language. May be used to initiate research for senior honors thesis. Pr.: Consent of tutorial instructor.

**ENGL 499. Senior Honors Thesis.** (2) I, II, S. Open only to seniors in the arts and sciences honors program.

### Undergraduate and graduate credit in minor field

**ENGL 501. Writing Children's Literature.** (3) I, II, S. Writing magazine- or book-length prose or material for or to be presented to children. Pr.: ENGL 125 or 200.

**ENGL 502. Writing Literary Non-Fiction.** (3) I, II, S. An introduction to the genres of literary non-fiction and practice in writing those forms. Pr.: ENGL 125 or 200.

**ENGL 516. Written Communication for the Sciences.** (3) I, II, S. Theory and intensive writing practice for students in the basic and applied sciences. Pr.: Junior standing and ENGL 125 or 200. Will not substitute for ENGL 415.

**ENGL 535. Literature of Aging.** (3) I, II, S. Concerned with the problems of and the responses to aging as reflected in fiction, drama, and poetry. Pr.: ENGL 125 or 200.

**ENGL 545. Literature for Adolescents.** (3) I, II, S. Selecting, reading, and evaluating books for adolescents. For those seeking junior and senior high school certification and students of guidance for adolescents. Pr.: ENGL 125 or 200.

**ENGL 562. Playwriting.** (3) I, II, S. Theoretical study and practical application of techniques of playwriting with regard to plot, characters, and production; emphasis on the one-act form. Same as THTRE 562.

**ENGL 580. Selected World Literature.** (3) I, II, S. This course primarily addresses writing by authors whose native origins lie elsewhere than in Europe or the United States. The content of the course varies from instructor to instructor. The course may examine literature from several countries and regions, concentrate upon literature for one coun-

try or region, or focus on a topic which transcends national or regional boundaries. Works studied will have been written in English or translated into English. Pr.: ENGL 120 or 125.

**ENGL 599. Special Research in English.** (Var.) I, II, S. Individual investigation in authors, genres, periods of literature, or language. Background of preparation needed for investigation undertaken.

### Undergraduate and graduate credit

**ENGL 604. Expository Writing Workshop.** (3) I, II, S. Course emphasizes style analysis of modern non-fiction prose in the sciences, social sciences, and humanities. Extensive student writing on assignments appropriate to germane topics. Pr.: Junior standing.

**ENGL 605-660. Readings Courses.** Readings courses are designed primarily for advanced undergraduates although graduate students may also enroll in them. These courses constitute a sequence of period studies covering the chronological range of English and American literature. Within these historical periods, the specific course contents will vary by semester and instructor. They may emphasize literary figures and movements, historical and cultural contexts, or different genres and forms within the periods. Each semester's offerings will be specifically described before each enrollment period in university and department publications. The courses require junior standing and are repeatable with change of subject matter.

**ENGL 605. Readings in Medieval Literature.** (3) I, II, S.

**ENGL 610. Readings in Renaissance Literature.** (3) I, II, S.

**ENGL 620. Readings in Seventeenth Century British Literature.** (3) I, II, S.

**ENGL 625. Readings in Eighteenth Century British Literature.** (3) I, II, S.

**ENGL 630. Readings in Nineteenth Century British Literature.** (3) I, II, S.

**ENGL 635. Readings in Twentieth Century British Literature.** (3) I, II, S.

**ENGL 640. Readings in Early American Literature.** (3) I, II, S.

**ENGL 645. Readings in Nineteenth Century American Literature.** (3) I, II, S.

**ENGL 650. Readings in Twentieth Century American Literature.** (3) I, II, S.

**ENGL 655. Readings in American Ethnic-Minorities Literature.** (3) I, II, S.

**ENGL 660. Readings in Major Authors.** (3) I, II, S.

**ENGL 661. Advanced Creative Writing: Prose Fiction.** (3) I, II, S. Advanced writing of prose fiction. Repeatable once. Pr.: ENGL 410 or instructor permission.

**ENGL 663. Advanced Creative Writing.** (3) I, II, S. Advanced writing of poetry. Repeatable once. Pr.: ENGL 410 or instructor permission.

**ENGL 670-695. Topics Courses.** Topics courses are designed primarily for advanced undergraduates although graduate students may enroll in them. These courses address topics not confined to a single period in a national literature. Specific course content will vary by semester and instructor. It may emphasize cross-national subjects, literary criticism, the development of a theme or genre over time, new perspectives from social, intellectual, or cultural studies, or non-traditional texts and topics. Each semester's offerings will be described more specifically in university and department publications before each enrollment period. The courses require junior standing and are repeatable with change of subject matter.

**ENGL 670. Topics in British Literature.** (3) I, II, S.

**ENGL 680. Topics in American Literature.** (3) I, II, S.

**ENGL 690. Topics in Literature for the Young.** (3) I, II, S.

**ENGL 695. Topics in Literature.** (3) I, II, S.

**ENGL 700. Old English.** (3) I, II, S. The elements of Old English grammar, with readings in prose and poetry. Pr.: Instructor permission.

**ENGL 705. Theory and Practice of Cultural Studies.** (3) I, II, S. An overview of selected approaches to the study of culture and of their current application in English studies, including psychoanalytic, feminist, marxist, and structuralist approaches. Pr.: Junior standing.

**ENGL 710-759. Studies Courses.** Studies courses are designed primarily for graduate students, although advanced undergraduate students may also enroll in them. Their specific contents will vary by semester and instructor, but the courses will reflect concerns with literary and rhetorical forms and genres; with specific authors, periods, or literary movements; with perspectives from social, intellectual, and cultural studies; or with literary themes; or with language or linguistics. Each semester's offerings will be described more specifically in university and department publications before each enrollment period. The courses require junior standing and are repeatable with change of subject matter.

**ENGL 710. Studies in a Literary Genre.** (3) I, II, S.

**ENGL 720. Studies in a Major Author.** (3) I, II, S.

**ENGL 730. Studies in a Literary Period.** (3) I, II, S.

**ENGL 740. Studies in a Literary Theory.** (3) I, II, S.

**ENGL 755. Studies in Composition and Rhetoric.** (3) I, II, S.

**ENGL 757. Studies in Language and Linguistics.** (3) I, II, S.

**ENGL 759. Studies in Technical Communications.** (3) I, II, S.

**ENGL 760. American Humor and Satire.** (3) I, II, S. Emphasizes works produced in the nineteenth and twentieth centuries.

**ENGL 761. Creative Writing Workshop: Short Fiction.** (3) I, II, S. Advanced writing of short prose fiction. Repeatable twice for credit. Pr.: ENGL 661 or instructor permission.

**ENGL 762. Advanced Playwriting.** (3) I, II, S. Same as THTRE 762.

**ENGL 763. Creative Writing Workshop: Poetry.** (3) I, II, S. Advanced writing of poetry. Repeatable twice. Pr.: ENGL 663 or instructor permission.

**ENGL 771. Creative Writing Workshop: Novel.** (3) I, II, S. Repeatable twice. Pr.: ENGL 661 or instructor permission.

**ENGL 790. History of the English Language.** (3) I, II, S. The development of British and American English from Indo-European origins to the present. Pr.: Senior standing or instructor permission.

**ENGL 795. Literary Criticism.** (3) I, II, 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.

**ENGL 799. Problems in English.** (Var.) I, II, S. Independent study in major authors, genres, and periods of English and American literature and language. Pr.: Background of courses needed for problem undertaken.

## Linguistics courses

### Undergraduate and graduate credit

**ENGL 600. Principles of Linguistics.** (3) I, II. The scientific study of language, with examples from English, Spanish, French, German, and others. Overview of language origins, phonetics, phonology, syntax, semantics, language acquisition, dialects, language change, and writing systems. Same as LING 600 and LG 600.

**ENGL 601. General Phonetics.** (3) I or II, in alternate years. Description and classification of speech sounds according to point and manner of articulation. Transcription in the International Phonetic Association Alphabet. Includes sounds of English, French, Spanish, German, and others. Same as LING 601 and LG 601.

**ENGL 602. Historical Linguistics.** (3) I or II, in alternate years. Internal and comparative reconstruction of earlier forms of languages. Genetic relationships in language families, and various typological considerations. Includes French, Spanish, and others. Same as LING 602 and LG 602.

**ENGL 603. Topics in Linguistics.** (3) I or II, in alternate years. Seminar on a special topic in linguistics. Topic to be announced for semester in which offered. Repeatable for credit on a different topic. Same as LING 603 and LG 603.

## Geography

M. D. Nellis,\* Head

Professors Kromm,\* Nellis,\* Seamon,\* Siddall,\* and White,\* Associate Professors Bussing,\* Seyler,\* and Smith,\* Assistant Professors DeBres,\* Goodin,\* Martin,\* and Paul,\* Adjunct Professor Lulla; Emeritus: Professor Self and Stover.\*

Geographers, in studying the differences in human activities from one place to another, and human impact and responses to the environment, deal with vital questions about current national and international situations.

Geographers also may pursue a more theoretical inquiry into the major problems of human society by examining spatial structure and processes using various techniques of mathematical and cartographic analysis of spatial phenomena, computer mapping, geographic information systems, and remote sensing.

A typical and traditional problem in geography concerns human impact on the land. 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 factors such as technology, population density, legal structure, affluence, cultural traditions, and environment.

### Geography (B.A. or B.S.)

Students of geography may pursue a traditional major in geography or choose the geography-pre-planning option. The bachelor of science or the bachelor of arts degree may be earned for either option.

Requirements for a major in geography:

GEOG 100	World Regional Geography .....	3
	or	
GEOG 200	Human Geography .....	3
GEOG 220	Environmental Geography I .....	4
GEOG 221	Environmental Geography II .....	4
GEOG 440	Geography of Natural Resources .....	3
GEOG 450	Geography of Economic Behavior .....	3
GEOG 470	Cartography .....	3
STAT 330	Elementary Statistics for the Social Sciences (or its equivalent) .....	3
One course at 500 or 600 level (except GEOG 505 or 506)		
One course at 700 level (except GEOG 700, 702, 705, or 708)		
Additional courses at the 490 level or above to total 30 hours in geography.		

Although the major requirements for the B.A. or B.S. degrees are the same, college requirements differ as described earlier in the College of Arts and Sciences section.

Students may pursue a general program in geography, or may choose to develop a concentration in either environmental studies or com-

munity studies. Other concentrations may be developed to reflect the particular interests of a student. For example, a student may earn a teaching certificate while working toward a degree in geography.

Another curriculum leads to the bachelor of science degree in secondary education. For information concerning this program see the College of Education section of this catalog.

### Geography: pre-planning option (B.A. or B.S.)

Geography is an appropriate discipline for students who wish to pursue a career in a planning-related field or desire to take graduate training in planning. The geography pre-planning option provides a broad interdisciplinary background and a core curriculum in geography. Completion of the requirements will also yield a certificate in community planning from the Department of Regional and Community Planning.

The courses for the pre-planning option include all of those required for a geography major, and GEOG 750 Urban Geography, which will count as part of the 30 hours needed for a degree. In addition, students must take:

Select one of the following (3 hours):

GEOG 700	Quantitative Analysis in Geography .....	3
GEOG 702	Computer Mapping .....	3
GEOG 705	Remote Sensing/Environment .....	3

Select one of the following (3 hours):

ECON 555	Urban and Regional Economics .....	3
POLSC 718	Urban Politics .....	3
SOCIS 531	Urban Sociology .....	3

From the Department of Regional and Community Planning (15 hrs.):

PLAN 315	Introduction to Planning	
	or	
PLAN 715	Planning Principles .....	3
PLAN 736	Planning Implementation	
	or	
PLAN 770	Planning Law .....	3
Three additional planning courses .....		9

### Geography courses

#### Undergraduate credit

**GEOG 100. World Regional Geography.** (3) I, II. 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.

**GEOG 200. Human Geography.** (3) I, II. A geographical assessment of the way human activities shape landscapes throughout the world. The course is especially appropriate for students interested in the social and behavioral sciences.

**GEOG 201. Human Geography (Honors).** (3) I, in odd years. 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. Pr.: Membership in arts and sciences honors program.

**GEOG 220. Environmental Geography I.** (4) I, II. A basic physical geography course emphasizing the atmosphere and hydrosphere and treating related problems such as air pollution, drought, and floods. Introduces tools used by geographers in environmental analysis. Three hours lec. and one two-hour lab a week.

**GEOG 221. Environmental Geography II.** (4) I, II. Emphasizes the geosphere and biosphere, including processes, patterns, and physical background for related issues such as energy, soil erosion, and natural hazards. Introduces remote sensing as a tool for environmental study. Three hours lec. and one two-hour lab a week. Pr.: Environmental Geography I.

**GEOG 300. Geography of Tourism.** (3) II. The geography of tourism is concerned with the structure, form, use, and conservation of the landscape as well as with such spatial conditions as the location of tourist areas and the movements of people from place to place. This course addresses such concepts as the economic, environmental, social, and cultural impacts of tourism as well as examining the tourist geography of each of the world's regions, focusing on the major tourist areas.

**GEOG 310. Geography of Kansas.** (3) I. 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.

**GEOG 350. Introduction to Climatology.** (3) I. An examination of climatology on local, regional, and global scales, with emphasis on the physical processes and environmental factors which influence and control climate. Climatic change and its impact on human activities will also be explored.

**GEOG 399. Honors Seminar in Geography.** (2-3) I, in odd years. Selected topics. Open to nonmajors in the honors program.

**GEOG 440. Geography of Natural Resources.** (3) I. The distribution, significance, and environmental consequences of world agriculture, fishing, forestry, and mining, emphasizing the principles which account for the spatial variation in the extraction and consumption of natural resources.

**GEOG 450. Geography of Economic Behavior.** (3) II. The location of manufacturing industries and patterns of commercial activity. Case studies and simulations are used with emphasis on modern concepts of site selection and community development.

**GEOG 460. Future Worlds.** (3) S. 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.

**GEOG 470. Cartography.** (3) I. Theory, interpretation, design, and drafting of maps, with emphasis on presenting quantitative data.

**GEOG 490. Problems in Geography.** (Var.) I, II, S. Pr.: Consent of instructor.

**GEOG 498. Honors Tutorial in Geography.** (I-3) I, II. Individual directed research and study of a topic in geography, normally as a preliminary to writing a senior honors thesis. May be repeated once to a total of 3 hours. Pr.: Sophomore standing, membership in the honors program of the College of Arts and Sciences, and permission of the instructor.

**GEOG 499. Senior Honors Thesis.** (2) I, II, S. Open only to seniors in the arts and sciences honor program.

#### Undergraduate and graduate credit

**GEOG 500. Geography of the United States.** (3) II, in odd years. A regional analysis of the United States with special attention to the historical, political, economic, and social factors which contribute to a real differentiation within the area.

**GEOG 505. Introduction to the Civilization of South Asia I.** (3) I. Interdisciplinary survey on the development of civilization in India, Pakistan, Sri Lanka, Bangladesh, and Afghanistan, including consideration of the geographical and demographic context, philosophical and social concepts, social and political institutions, literature, and historical movements. Same as ECON 505, HIST 505, POLSC 505, SOCIO 505, ANTH 505.

**GEOG 506. Introduction to the Civilization of South Asia II.** (3) II. Interdisciplinary survey of recent and contemporary civilization of India, Pakistan, Sri Lanka, Bangladesh, and Afghanistan, including recent history, current economy, religion, culture, language and literature, ge-

ography, social and political structure and ideas. Same as ECON 506, HIST 506, POLSC 506, SOCIO 506, ANTH 506.

**GEOG 555. Cartography: MicroCAD.** (3) I. Theory and methods of thematic mapping. Features a CAD-based approach to mapping projects including choropleth, isopleth, quantitative and qualitative symbol, and catograms. Students will produce a collection of publication quality graphics. Pr.: STAT 330.

**GEOG 620. Geography of Latin America.** (3) II, in even years. 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.

**GEOG 640. Geography of Europe.** (3) I. People and their environment, their cultures, problems, and prospects in Europe west of the Soviet Union; trends of development as affected by changing political and economic factors.

**GEOG 650. Geography of Former Soviet Lands.** (3) II, in odd years. Physical limitations, resource potentials, economic capabilities, and political and nationality issues, with particular emphasis on agriculture, manufacturing, urbanization, cultural diversity, and regional development. Pr.: Six hours of social science.

**GEOG 680. Seminar in Regional Geography.** (1-3) Pr.: Consent of instructor.

**GEOG 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.: One course in statistics.

**GEOG 702. Computer Mapping.** (3) I. Familiarizes students with computer applications to mapping problems. Students will produce a series of maps on the printer and plotter using prepared programs, and in the process develop computer graphics skills to address problems in a real analysis, planning, and public administration. Pr.: One course in social science and one in natural science and junior standing.

**GEOG 705. Remote Sensing of the Environment.** (3) II. Remote sensing and its application to earth study, especially environmental problems and land use. Course employs both readings and the use of imagery. Two hours lec., two hours lab. Pr.: One course in physical science and one in biological science.

**GEOG 708. Geographic Information Systems.** (3) II. Examines both theoretical and applied dimensions of geographic information systems (GIS) in the contexts of environmental impact analysis, natural resource inventories, and community development studies. Applications of GIS concepts and procedures will be built around the use of PC Arc-Info, where case studies will be completed by teams of students. Pr.: GEOG 702 or 705.

**GEOG 709. Geographic Field Research Techniques.** (2-3) S. Explores methods and techniques employed in modern field research. Stresses research design, field data acquisition techniques, and data analysis. Pr.: GEOG 220, 221, and 440.

**GEOG 710. Geography of Hunger.** (3) I, in odd years. 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. Pr.: Six hours of social science and junior standing.

**GEOG 715. World Population Patterns.** (3) I, in even years. Geographical processes that govern population distributions, growth rates, and migrations. Emphasis on international comparisons and the implications for world society of continued differential growth rates. Pr.: Six hours of social science.

**GEOG 720. Geography of Land Use.** (3) I, in odd years. Critical factors affecting land use, scarcity, and management examined in a regional, national, and global context; land use classification systems and variation of land use patterns. Pr.: Six hours of social science and junior standing.

**GEOG 725. Geography of Water Resources.** (3) II, in even years. Interpretation and analysis of the physical ge-

ography of water and water as a resource. Evaluation of water, emphasizing quality, hazards, institutions, and selected domestic and global issues. Pr.: Six hours of social science and junior standing.

**GEOG 730. World Agricultural Systems.** (3) II, in odd years. Description and analysis of the spatial distribution of farm systems emphasizing traditional resource systems in the third world. The major objective is to analyze the interrelationships between natural and human elements in farm systems in order to gain an awareness and understanding of the complex issues involved in agricultural change and development. Pr.: Six hours of social science and junior standing.

**GEOG 740. Geography of Transportation.** (3) II, in even years. A consideration of the nature of spatial interaction, the various kinds of transport media, and the relationship between transportation and economic and social patterns. Pr.: Junior standing or consent of instructor; six hours of social science.

**GEOG 750. Urban Geography.** (3) II. A study of geographic principles relating to the distribution, function, and structure of cities; a geographic analysis and classification of urban settlements. Pr.: Six hours of social science or planning.

**GEOG 760. Human Impact on the Environment.** (3) I, in even years. The social, economic, and political implications of the impact of human activity on the natural environment. Field research in environmental impact assessment. Pr.: Six hours of social science.

**GEOG 770. Perception of the Environment.** (3) II, in even years. An examination of the way people perceive their geographic environment and the role of perception in spatial behavior. Perceptions of neighborhoods, cities, states, nations, frontier regions, and environmental processes are explored. Pr.: Six hours of social science with one course above the introductory level, and 6 hours of natural science with one course above the introductory level.

**GEOG 780. Cultural Geography.** (3) II, in even years. 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.: Six hours of social science.

**GEOG 790. Seminar in Cultural-Economic Geography.** (1-3) Pr.: Consent of instructor.

## Geology

Joseph L. Graf,\* Head

Professors Chaudhuri,\* Clark,\* Cullers,\*  
Doveton, Martin,\* Schultze,\* Twiss,\*  
Underwood,\* and West;\* Associate  
Professors Graf,\* Jones,\* and Oviatt;\*  
Assistant Professors Archer,\* Franseen,  
Maples,\* and Watney;\* Emeriti: Professors  
Chelikowsky,\* Shenkel,\* and Walters;\*  
Assistant Professor Riseman.\*

Geology includes the study of the composition, behavior, and history of the earth and of other members of the solar system. On Earth, geologists focus on interactions within and among the solid earth, hydrosphere, atmosphere, and biosphere. In addition to providing an understanding of the past history of these interactions as a context for future changes, geologists examine the environmental effects of society's actions, including pollution of ground water, surface water, and soil and the development and use of mineral, energy, and water resources.

Geologists operate in two laboratories: the earth itself (field laboratory) and the standard chemical, physical, or biological laboratory. However, geologists cannot control the variables affecting the natural processes 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 processes that may be reproduced only in part in a laboratory.

The Department of Geology offers programs of study in geology and geophysics and cooperates with the College of Education in an earth science program for high school teachers. It also 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.

Students in geology and in geophysics must have an overall average grade of C (not a C grade in each course) in their geology, other natural science, mathematics, and computer science courses.

### Geology option

In addition to the general requirements for the B.A. or B.S. degree, the following must be completed:

GEOL 100	Introductory Geology .....	3
GEOL 130	Elementary Geology Laboratory .....	1
GEOL 300	Historical Geology .....	4
GEOL 502	Mineralogy .....	3
GEOL 503	Petrology .....	3
GEOL 520	Geomorphology .....	2
GEOL 581	Paleobiology .....	4
GEOL 530	Structural Geology .....	3
GEOL 630	Stratigraphy/Sedimentology .....	4
GEOL 680	Field Geology .....	6
Geology electives (two courses at the 600 or 700 level, or one course at the 600 or 700 level and 3 hours of GEOL 599 Senior Thesis) .....		6
MATH 220	Analytic Geometry and Calculus I .....	4
PHYS 113	General Physics I .....	4
PHYS 114	General Physics II .....	4
CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4

Geology majors should consult their advisors about elective courses to meet their career and educational needs. Computer literacy is essential for all geologists. Departmental advisors can recommend electives for students desiring concentrations in energy and minerals, engineering geology, environmental geology, hydrogeology, sedimentary geology, and geochemistry. Students intending to earn advanced degrees should visit with the departmental graduate advisor concerning entrance requirements of graduate programs.

### Geophysics option

In addition to the general requirements for the B.A. or B.S. degree, the following must be completed:

GEOL 100	Introductory Geology .....	3
GEOL 130	Elementary Geology Laboratory .....	1
GEOL 300	Historical Geology .....	4
GEOL 502	Mineralogy .....	3

GEOL 503	Petrology .....	3
GEOL 520	Geomorphology .....	2
GEOL 530	Structural Geology .....	3
GEOL 581	Paleobiology .....	4
GEOL 605	Exploration Geophysics .....	3
GEOL 630	Stratigraphy/Sedimentation .....	4
GEOL 680	Field Geology .....	6
MATH 220	Analytic Geometry and Calculus I .....	4
MATH 221	Analytic Geometry and Calculus II .....	4
MATH 222	Analytic Geometry and Calculus III .....	4
MATH 240	Elementary Differential Equations .....	4
MATH 551	Applied Matrix Theory .....	3
PHYS 213	Engineering Physics I .....	5
PHYS 214	Engineering Physics II .....	5
CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
CIS 200	Fundamentals of Computer Programming .....	2
CIS 206	BASIC Language Laboratory .....	2
STAT 703	Statistical Methods for Natural Scientists .....	3

Geophysics students desiring advanced degrees should consider PHYS 522, 523, 532, and 621 in addition to the above courses as preparation for graduate programs.

## Earth science option 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	Introductory Geology .....	3
GEOL 130	Elementary Geology Laboratory .....	1
GEOL 502	Mineralogy .....	3
GEOL 520	Geomorphology .....	2
GEOG 220	Environmental Geography I .....	4
MATH 100	College Algebra .....	3
MATH 150	Plane Trigonometry .....	3
PHYS 113	General Physics I .....	4
PHYS 114	General Physics II .....	4
PHYS 191	Descriptive Astronomy .....	3
BIOL 198	Principles of Biology .....	4
CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4

See the College of Education section of this catalog for teacher certification requirements.

## Dual degree in civil engineering and geology

Engineering students interested in obtaining the stronger geology background to enhance careers in foundation, construction, or environmental engineering may receive a dual degree by completing the B.S. degree requirements in civil engineering, the general requirements for a B.A. or B.S. degree in the College of Arts and Sciences, and the following: GEOL 300, 502, 503, 520, 530, 630, and 680 (see lists above).

## Transfer students

In addition to the general instructions to transfer students, students planning to pursue one of the degree options in geology should complete as many of the following courses or their equivalents as possible:

CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
ENGL 100	Expository Writing I .....	3
ENGL 120	Expository Writing II .....	3
MATH 100	College Algebra .....	3
MATH 150	Plane Trigonometry .....	3
MATH 220	Analytic Geometry and Calculus I .....	4

MATH 221	Analytic Geometry and Calculus II .....	4
SPCH 105	Public Speaking IA .....	2
GEOL 100	Introductory Geology .....	3
GEOL 130	Elementary Geology Laboratory .....	1
GEOL 300	Historical Geology .....	4
PHYS 113	General Physics I .....	4
PHYS 114	General Physics II .....	5

## Geology courses

### Undergraduate credit

**GEOL 100. Introductory Geology.** (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.

**GEOL 101. Geology Colloquium.** (1–3) I, II. Topics in earth science chosen to illustrate current research of scientists and methods chosen to study the physical universe. At each offering of this course a syllabus will be available giving the topics to be studied and the details of administration of the course. May be repeated once. Not open to geology majors.

**GEOL 105. Oceanography.** (3) I, II. The oceans: their boundaries, contents, and processes. Three hours rec. a week.

**GEOL 110. Introductory Geology, Honors.** (3) I. Survey of earth materials, features, and processes. Higher level of sophistication and challenge than GEOL 100. Three hours rec. a week.

**GEOL 125. Natural Disasters.** (3) I, II, S. Discussion of geological phenomena such as earthquakes, volcanic eruptions, landslides, and floods, with particular emphasis on their causes, effects, and significance as hazards. Three hours rec. a week.

**GEOL 130. Elementary Geology Laboratory.** (1) I, II, S. Field and laboratory investigation of minerals, rocks; use of maps; environmental studies; erosion, transportation, sedimentation. Two hours lab a week. Pr.: GEOL 100, 105, or 125 or conc. enrollment.

**GEOL 300. Historical Geology.** (4) I, II. Physical and biological events that have occurred on planet earth throughout geologic time. Three hours rec. and three hours lab a week. Pr.: GEOL 100 or 105.

**GEOL 305. Earth Resources.** (3) I, II. Origin and geologic settings of energy, water, and mineral resources. Additional emphasis will be placed upon exploration and development. Pr.: GEOL 100 or GEOG 221.

**GEOL 310. Topics in Geology.** (1–3) I, II. Seminar discussion of subjects of current interest in geology. Pr.: A course in natural science at the 100 level or higher.

**GEOL 399. Honors Seminar in Geology.** (1–3) I, II. Selected topics. Open to nonmajors in the honors program.

**GEOL 499. Senior Honors Thesis.** (2) I, II, S. Open only to seniors in the arts and sciences honors program.

### Undergraduate and graduate credit in minor field

**GEOL 501. Independent Study in Geology.** (1–3) I, II, S. Independent reading; field or laboratory investigations, or both, of geologic problems. Pr.: GEOL 300 and junior standing.

**GEOL 502. Mineralogy.** (3) I. Crystallography; physical and chemical properties of minerals; descriptive mineralogy. Two hours lec. and three hours lab a week. Pr.: GEOL 100 or 105, 130, and CHM 230.

**GEOL 503. Petrology.** (3) II. Petrology of igneous, metamorphic, and sedimentary rocks. Two hours lec. and three hours lab a week. Pr.: GEOL 502.

**GEOL 506. Environmental Studies.** (2) I, II, S. Physical and chemical qualities of natural environments and health from a geologic perspective—detection and prediction of environmental changes, identification of sources of pollutants and their movements in soils, rocks, and waters. Pr.: GEOL 100.

**GEOL 510. Geology of Planets.** (3) I. Origin, evolution, and surficial geology of the extraterrestrial planets and satellites. Three hours rec. a week. Pr.: GEOL 100.

**GEOL 512. Earth Science.** (3) II. 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.

**GEOL 515. Geology of the National Parks.** (3) On sufficient demand. Stratigraphy, structure, and geological history that produced the scenery of the national parks. Selected national monuments also will be studied. Pr.: GEOL 100 or 105.

**GEOL 520. Geomorphology.** (2) I, II. Laboratory exercises in reading and interpreting topographic maps and aerial photographs; field studies of landforms and surficial deposits, with an emphasis on earth-surface processes. One hour rec. and three hours lab a week. Pr.: GEOL 100.

**GEOL 530. Structural Geology.** (3) II. Mechanics of the earth's crust; origin and interrelation of structures of the earth. Two hours rec. and three hours lab a week. Pr.: GEOL 503.

**GEOL 540. Ice Ages and Environmental Change.** (3) I. Studies of the recent geologic past, especially of the last major ice age to the present. Causes of glaciation and climatic change, ways of reconstructing past geologic environmental and geologic environments changes during the time when human civilization developed, including recent historic time. Three hours rec. a week. Pr.: GEOL 100 or GEOG 221.

**GEOL 581. Paleobiology.** (4) I. Biological principles applied to fossils; introduction to contributions of pro- and eukaryotic organisms, especially algae and marine invertebrates to earth history. Two hours rec. and six hours lab a week. Pr.: GEOL 300 and 503; MATH 220; PHYS 114.

**GEOL 599. Senior Thesis.** (1–3) I, II. Directed research and preparation of a senior thesis. May be repeated once to a maximum of 3 hours credit. Open only to seniors in geology or geophysics.

### Undergraduate and graduate credit

**GEOL 601. Geologic Presentation.** (1) I, II. Application of oral communication techniques to the effective presentation of geologic concepts. One hour rec. a week. Pr.: GEOL 530 and SPCH 105.

**GEOL 602. Mineral Exploration.** (3) I, II. Geological, geochemical, and geophysical prospecting techniques and their application in the exploration for metallic mineral deposits. Three hours rec. a week. Pr.: GEOL 503.

**GEOL 605. Exploration Geophysics.** (3) I. Seismic, gravity, magnetic, and electrical methods used in geophysical exploration for petroleum accumulations and for mineral deposits. Three hours rec. a week. Pr.: PHYS 214; GEOL 530.

**GEOL 608. Optical Mineralogy-Petrography.** (3) I. Identification of minerals and rocks as crushed fragments and in thin section. Two hours lec. and one four-hour lab a week. Pr.: GEOL 503 and PHYS 214 or 114.

**GEOL 610. Sedimentary Geochemistry.** (3) I, II. Geochemical principles and processes in deposition and diagenesis of sediments; different chemical pathways in the exogenic cycle. Two hours rec. and three hours lab a week. Pr.: GEOL 503 and MATH 220.

**GEOL 611. Hydrogeology.** (3) I, 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.

**GEOL 630. Stratigraphy-Sedimentation.** (4) II. Description, classification, correlation, chronology, and paleogeography of sedimentary rock systems and the depositional environments in which they formed. Three hours rec. and three hours lab a week. Pr.: GEOL 581.

**GEOL 680. Field Geology.** (6) S. Geologic mapping projects along the Colorado Front Range using Brunton compass, aerial photographs, topographic maps, and plane table; special problems in stratigraphy, structure, and petrology. Five six-day weeks in the field. Pr.: GEOL 503, 520, and 530.

**GEOL 702. Economic Geology.** (3) I. Geology and origin of metallic mineral deposits and of some nonmetallic deposits. Three hours rec. a week. Pr.: GEOL 503.

**GEOL 703. Economic Geology Laboratory.** (1) I. Laboratory activities related to metallic and nonmetallic mineral deposits, including detailed studies of selected deposits. Pr.: GEOL 702 or conc. enrollment.

**GEOL 704. Paleocology.** (3) I. 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 581.

**GEOL 705. Geobiology.** (3) II. Discussion and critique of current and classic research in geobiology. Three hours rec. a week. Pr.: GEOL 581.

**GEOL 711. Water Resources Geochemistry.** (2) II. Geochemistry of ground and surface waters; emphasis on mineralogic and hydrologic controls on inorganic constituents and properties. Two hours rec. a week. Pr.: GEOL 503 or AGRON 705 or 755.

**GEOL 712. Advanced Geochemistry.** (3) II. Application of chemical principles to igneous, metamorphic systems; emphasis on equilibria, oxidation-reduction, crystal chemistry, and thermodynamics. Three hours lec. a week. Pr.: GEOL 503 and CHM 500 or 585.

**GEOL 720. Quaternary Geology.** (3) II. Quaternary stratigraphy as the framework for studying the geomorphic, climatic, archaeological, and biological changes of the last two million years, with emphasis on the North American record. Three hours rec. a week and one field trip a semester. Pr.: GEOL 630.

**GEOL 730. Petroleum Geology.** (3) I, II. Origin, migration, and accumulation of petroleum; stratigraphy and structure of important fields. Three hours rec. a week. Pr.: GEOL 530 and 630.

**GEOL 740. Regional Geology.** (3) I. Structure and stratigraphy of the major tectonic units of North America. Pr.: GEOL 530, 630.

**GEOL 770. Subsurface Methods.** (3) II. Principles and applications of subsurface geology. Two hours rec. and three hours lab a week. Pr.: GEOL 530 or conc. enrollment.

**GEOL 790. Problems in Geology.** (Var.) I, II, S. Work is offered in mineralogy, paleobiology, paleocology, stratigraphy, structural geology, igneous, metamorphic, and sedimentary petrology, geomorphology, planetary geology, hydrogeology, geochemistry, and isotope geology. Pr.: Background of courses needed for problem undertaken.

## History

Donald J. Mrozek,\* Head

Professors Frey,\* Gray,\* Hamscher,\* Higham,\* Holl,\* Jones,\* Kren,\* Linder,\* and McCulloh,\* Associate Professors Daly,\* Donovan,\* Feyerharm, and Knupfer,\* Assistant Professors Adamo, Breen,\* Parillo,\* Sherow,\* Watson,\* Williams,\* and Zschoche,\* Emeriti: Professors Carey,\* Socolofsky,\* and Wilcoxon,\* Associate Professor Crawford,\* Ferguson,\* Page.\*

The history program appeals not only to majors but to all students seeking a rewarding educational experience. The curriculum includes courses in traditional and nontraditional 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 how it is expressed.

Undergraduate advisors in the history department maintain up-to-date information regard-

ing requirements of graduate and professional schools and relevant course offerings in history and other departments.

## Transfer students

Normally the history department will accept transfer credit for history courses taught at accredited institutions of higher education. In the case of students transferring from community colleges, only courses equivalent to those taught at the freshman-sophomore level at K-State (courses numbered HIST 100 through HIST 299) may receive credit for the history major.

## History

Students may earn a B.A. or a B.S. in history using one of the following three options:

### History major

Requirements for a history major consist of a minimum of 36 hours in history including HIST 101 The Rise of Europe; HIST 102 The Modern Era; and HIST 586 The Junior Seminar. At least 18 hours of those courses must be numbered 300 or above. The courses must be distributed as follows:

I. The 18 hours of courses numbered 300 or above must include a minimum of 6 hours in each of the following two categories:

A. History of nation-states, diplomacy, politics, or military affairs;

B. Social, economic, cultural or agricultural history; history of science, technology, or religion.

II. Courses taken at any level must also include the following chronological and geographical distribution. (Courses taken to fulfill this requirement may also satisfy the requirements in section I above.)

A. Six hours (in addition to HIST 101) in courses whose primary chronological emphasis is prior to 1800;

B. Six hours in U.S. history;

C. Three hours in non-Western or non-U.S. history.

### Double majors and teacher certification

Students earning double majors may satisfy the requirements with 30 hours in history. The remaining 6 hours will be waived by the completion of an additional major. The required courses and the topical, chronological, and geographical distribution apply to the 30 hours of course work in history.

Students majoring in history may also prepare for teacher certification in social studies at the secondary level. They must meet the same requirements as students earning double majors (30 hours in history rather than 36). They should select their courses in consultation with advisors in both the history department and the College of Education to ensure that they meet the requirements of both programs. (See the College of Education section of this catalog for social science certification requirements.) Students seeking certification with a major in history must also include HIST 599 Senior Seminar for Secondary Teachers among their courses.

### Advanced program in history

Certain highly qualified students may elect to define their own programs for the major in consultation with a committee of three faculty members chosen by the student and approved by the head. This program of study should be broadly conceived, not narrowly circumscribed. This option is available only to students seeking a B.A. degree in history. To enter this program a student must have a grade point average of 3.5 at the end of the freshman year or later, submit two letters of recommendation and a statement of purpose, and receive approval from the undergraduate studies committee.

A student selecting this option must enroll prior to his or her senior year and meet the following minimum requirements:

Write a senior thesis (6 hours credit over one or two semesters);

Pass an oral examination over a specific body of historical knowledge, the scope of which will be defined by the student in consultation with the faculty committee;

Enroll in 30 hours of history courses (24 hours for double majors and teacher education students) including the Junior Seminar to be selected by the student in consultation with the faculty committee. Students are encouraged to supplement regular course offerings with tutorial instruction.

## History courses

### Undergraduate credit

**HIST 100. Introduction to History.** (3) I, II. 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.

**HIST 101. Western Civilization: The Rise of Europe.** (3) I, II, S. Major trends in Western history from the beginnings of European civilization to the end of the seventeenth 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.

**HIST 102. Western Civilization: The Modern Era.** (3) I, II, S. Principal developments in Western civilization from the beginning of the eighteenth 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.

**HIST 103. Overseas European Studies.** (2-3) Intersession only, in alternate years. Selected aspects of European history and culture with readings, lectures, and discussions which will relate historical events to places visited.

**HIST 105. Western Civilization: The Rise of Europe (Honors).** (3) I, in alternate years. Course description same as HIST 101.

**HIST 106. Western Civilization: The Modern Era (Honors).** (3) II, in alternate years. Course description same as HIST 102.

**HIST 200. Topics in History for Freshmen and Sophomores.** (1-3) In alternate years. Exploration of the historical dimensions of a particular topic or theme. Topics vary. May be repeated once.

**HIST 250. Russian Culture and Civilization.** (3) I, in alternate years. Russia's past and present in the light of principle ideologies with emphasis upon fine arts, literature, music, religion, politics, and education. Equal time will be

given to the Tsarist and the Soviet periods. Knowledge of Russian language is not required. Same as MLANG 250.

**HIST 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.

**HIST 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.

**HIST 297. Honors Introduction to the Humanities I.** (3) I. Study of selected major works of history, literature, and philosophy which have been of central importance in the Western cultural tradition. Considerable emphasis is placed on classroom discussion and writing interpretive essays. Limited to entering freshmen students. Pr.: Consent of instructor. Same as ENGL 297, MLANG 297, PHILO 297.

**HIST 298. Honors Introduction to the Humanities II.** (3) II. Continuation of HIST 297. Pr.: HIST 297 or consent of instructor. Same as ENGL 298, MLANG 298, PHILO 298.

**HIST 350. Gandhi and the Indian Revolution.** (3) II, in alternate years. An introduction to Mahatma Gandhi, his life and career in India, England, and South Africa, his techniques of nonviolent struggle, and the revolution which destroyed the British Empire and created the new countries of India and Pakistan.

**HIST 398. Sophomore Honors Seminar in History.** (3) In alternate years. Selected topics in history. May be repeated once for credit. Pr.: Membership in honors program or consent of instructor.

**HIST 401. Technology, Science, and History.** (3) II, in alternate years. A nontechnical historical survey of the more significant interactions of technology and science with life and thought in the Western world.

**HIST 459. History of Dance in Its Cultural Setting.** (3) II, in alternate years. 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. Same as DANCE 459.

**HIST 498. Senior Thesis.** (3–6) I, II, S. May be repeated once to a maximum of 6 hours credit. Pr.: Senior standing.

**HIST 499. Senior Honors Thesis in History.** (2) I, II, S. Open only to seniors in the arts and sciences honors program.

### Undergraduate and graduate credit in minor field

**HIST 503. Overseas European Studies.** (2–3) Inter-session only, in alternate years. Selected aspects of European history and culture with reading, lectures, and discussions which will relate historical events to the places visited. Pr.: Sophomore standing.

**HIST 504. History of Hinduism.** (3) I, in alternate years. Examines one of the world's oldest religions from its origins to the present. Covers the fundamental ideas and practices of Hinduism and the development of related religions such as Buddhism, Jainism, and Sikhism. Pr.: Sophomore standing.

**HIST 505. Introduction to the Civilization of South Asia I.** (3) In alternate years. Interdisciplinary survey of the development of civilization in India, Pakistan, Sri Lanka, Bangladesh, and Afghanistan, including consideration of the geographical and demographic context, philosophical and social concepts, social and political institutions, literature and historical movements. Same as ECON 505, POLSC 505, SOCIO 505, ANTH 505.

**HIST 506. Introduction to the Civilization of South Asia II.** (3) In alternate years. Interdisciplinary survey of recent and contemporary civilization in India, Pakistan, Sri Lanka, Bangladesh, and Afghanistan, including recent history, current economy, religion, culture, language and literature, geography, social and political structure and ideas. Same as ECON 506, POLSC 506, SOCIO 506, ANTH 506.

**HIST 508. Introduction to Modern East Asia.** (3) In alternate years. The history of China, Japan, and surrounding countries including the arrival of Europeans in the sixteenth century, reactions to Western imperialism, the rise of nationalism, and revolution. The impact of the two world wars, the era of post war developments, communism in China, democracy in Japan, and the end of Western colonialism are also examined. Pr.: Sophomore standing.

**HIST 509. Japan Since 1550.** (3) I, in alternate years. Japan from reunification in the sixteenth century through the Tokugawa and Imperial eras to the postwar recovery. Emphasis on understanding modern Japan as the product of traditional culture, the Meiji Restoration, and World War II. Pr.: Sophomore standing.

**HIST 510. World War I.** (3) I, in alternate years. Examines the origins, events and consequences of the “war to end all wars.” The impact and influence of the war on colonialism, imperialism, and popular culture will be discussed. Pr.: Sophomore standing.

**HIST 511. Environmental History.** (3) I, in alternate years. An introduction to environmental history as an academic specialization through selected reading and topical lectures. The course emphasizes the study of people in nature through time; it stresses people's response to environmental change through three broadly defined periods: pre-industrial, modern industrial, and contemporary. Pr.: Sophomore standing.

**HIST 512. Women in European History.** (3) I, in alternate years. A study of women in primitive European societies, in preindustrial times, and in the industrial era. Emphasis will be upon the position and role of women within the society. Pr.: Sophomore standing.

**HIST 513. Battles and Leaders.** (3) I, in alternate years. 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.

**HIST 514. World War II.** (3) I, in alternate years. Origins, conduct, and consequence of World War II. Films from the TV series “The World at War” form an integral part of the course. Pr.: Sophomore standing.

**HIST 515. History of Sport.** (3) In alternate years. 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 KIN 515. Pr.: Sophomore standing.

**HIST 516. History of Science I.** (3) I, in alternate years. Scientific activity and thought from antiquity to the end of the sixteenth century, with emphasis on Greek, late medieval, and Renaissance science. No background in science required. Pr.: Sophomore standing.

**HIST 517. History of Science II.** (3) II, in alternate years. Science in the seventeenth and eighteenth centuries, with emphasis on Galileo, Newton, philosophies of science, scientific societies, and developments in the physical, biological, and earth sciences, including the relations of science with technology, medicine, religion, exploration, and the enlightenment. No background in science required. Pr.: Sophomore standing.

**HIST 518. Science in the Modern Age.** (3) I, in alternate years. Science since the eighteenth century, including major developments in the physical, biological, and earth sciences, and the relations of science to scientific societies, technology, medicine, exploration, religion, and archaeology. No background in science required. Pr.: Sophomore standing.

**HIST 519. Science in America.** (3) I, in alternate years. 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.

**HIST 520. Death and Dying in History.** (3) I, II, in alternate years. Examines European and American attitudes toward death and dying in various historical periods. Topics include: death and dying in the European Middle Ages and in nineteenth and twentieth century America, the impact of the Nazi Holocaust on modern opinions about death, sui-

cide as a historical problem, the fear of cancer in modern times, and others. Pr.: Sophomore standing.

**HIST 521. History of Christianity.** (3) I, in alternate years. A history of the Christian religion from the era of Jesus Christ to the present with special emphasis on people and ideas. Pr.: Sophomore standing.

**HIST 522. Religion in American History.** (3) II, in alternate years. A study of the impact of religion on American culture and of American culture on religion, the Social Gospel and related issues, and the interrelationship of Christianity and politics. Pr.: Sophomore standing.

**HIST 523. A History of the Occult and Witchcraft.** (3) In alternate years. A study of the history of the occult and witchcraft in Western civilization with special attention to religious, intellectual, and social issues and influences. Pr.: Sophomore standing.

**HIST 524. The History of Baseball in American Culture.** (3) In alternate years. The history of baseball from its origins in the early nineteenth century to the present, with emphasis on the major leagues and their collateral organizations but also with attention to semi-pro and amateur baseball and to the Old Negro Leagues. The history of the game will be examined in the context of American history with special reference to social issues, politics, religion, literature, music, and the media. Pr.: Sophomore standing.

**HIST 525. Colonial America.** (3) In alternate years. About 1450 to 1763. Includes the European background of North American colonization, the rivalry for new world empire, seventeenth century English colonial foundations, and development of the various colonial societies. Pr.: Sophomore standing.

**HIST 526. The American Revolution.** (3) In alternate years. Eighteenth 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.

**HIST 527. The Early National Period.** (3) In alternate years. 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.

**HIST 529. Civil War and Reconstruction.** (3) I, in alternate years. 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-nineteenth-century American leaders to deal with the complex problems of slavery and race. Pr.: Sophomore standing.

**HIST 531. The United States in the Twentieth Century.** (3) In alternate years. Examines the creation of modern America, 1890 to the present. Emphasis on the social and cultural roots, and political consequences, of Progressivism, World War I, the Great Depression, World War II, the Sixties, and Post-Vietnam America. Pr.: Sophomore standing.

**HIST 533. Topics in the History of the Americas.** (1–3) In alternate years. 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.

**HIST 536. The American West.** (3) I, in alternate years. Primary emphasis on the nineteenth century when Americans were rapidly spreading across the continent. Also examines the earlier developments of the frontier and considers the twentieth century role of the trans-Mississippi region. Pr.: Sophomore standing.

**HIST 537. History of the Indians of North America.** (3) In alternate years. A discussion of Indian-white relations from 1492 to the present. Special emphasis given to federal government policy and the cultural decline of the native people of North America. Also includes an examination of Indian reservations and urban Indians.

**HIST 538. The Great Plains.** (3) II, in alternate years. Concentration on the one-fifth of North America identified as the Great Plains; the development of that region in historic times. Pr.: Sophomore standing.

**HIST 539. African-American History.** (3) In alternate years. An overview of the African-American experience from the seventeenth century through the civil rights movement. Emphasizes social, legal, economic, political, and intellectual aspects of black history as well as African-American contributions to American life and culture. Pr.: Sophomore standing.

**HIST 541. Women in American History.** (3) II, in alternate years. 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.

**HIST 543. The United States and World Affairs, 1776–Present.** (3) I, in alternate years. History of U.S. foreign policy since 1776. Stresses the continuity and intellectual foundations of foreign policy. Emphasizes territorial and foreign commercial expansion and America's response to war and revolution in the twentieth century. Pr.: Sophomore standing.

**HIST 544. History of U.S.–Soviet Relations Since 1917.** (3) II, in alternate years. History of U.S.–Soviet relations since 1917 with emphasis on WWI and the New Diplomacy; from nonrecognition to recognition, 1921–1933; the Grand Alliance and WWII; origins of the cold war; economic and atomic diplomacy; the Cuban missile crisis; and prospects for detente. Pr.: Sophomore standing.

**HIST 545. War in the Twentieth Century.** (3) In alternate years. 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 twentieth century, including civil wars, “total war,” and guerrilla warfare. Pr.: Sophomore standing.

**HIST 546. History of American Military Affairs.** (3) In alternate years. 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.

**HIST 548. American Business History.** (3) In alternate years. 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.

**HIST 552. Studies in American Social History.** (3) In alternate years. Exploration in depth of one specific topic in American social history, such as the impact of immigration, the development of cities, the history of labor and the rise of unions, development of the family, of education, or of medicine. Topics vary. May be repeated for credit. Pr.: Sophomore standing.

**HIST 553. History of American Culture.** (3) II, in alternate years. Main emphasis is on political, religious, and social thought and ideology, 1620 to present. Pr.: Sophomore standing.

**HIST 555. American Constitutional History.** (3) II, in alternate years. 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 offers insight into the relationship of constitutional-legal institutions to American society. Pr.: Sophomore standing.

**HIST 557. History of American Agriculture.** (3) In alternate years. 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.

**HIST 558. History of Kansas.** (3) I, II. Land, people, and cultural developments in Kansas, from the earliest written records to the present. Provides the student with an intimate understanding of the state of Kansas. Pr.: Sophomore standing.

**HIST 560. Latin American Nations.** (3) In alternate years. 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 50 years. Pr.: Sophomore standing.

**HIST 561. Colonial Hispanic America.** (3) In alternate years. 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.

**HIST 562. Modern Mexico.** (3) In alternate years. Brief survey of lines of national development, 1821–1910, and major emphasis on the twentieth-century revolution and its reforms (1910–1940) as well as its subsequent implications. Pr.: Sophomore standing.

**HIST 563. Topics in Comparative History.** (1–3) In alternate years. Investigation in detail of a particular theme, event, or problem in comparative history. Topics vary. May be repeated once for credit. Pr.: Sophomore standing.

**HIST 564. The Russian Revolutions and the Soviet System.** (3) In alternate years. 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 de-Stalinization: prospects for the Soviet system. Pr.: Junior standing.

**HIST 565. History and Culture of Greece.** (3) In alternate years. 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.

**HIST 566. History and Culture of Rome.** (3) In alternate years. 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.

**HIST 567. Europe in the Middle Ages.** (3) In alternate years. Europe from the fall of the Roman Empire to the thirteenth 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.

**HIST 568. The Renaissance.** (3) In alternate years. The Italian Renaissance as a major phase in the history of Western civilization and its spread to northern Europe. Pr.: Sophomore standing.

**HIST 569. The Reformation.** (3) In alternate years. 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.

**HIST 570. Europe in the Seventeenth Century.** (3) I. In alternate years. Surveys the economic, social, political and intellectual history of western Europe in the seventeenth 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.

**HIST 571. Revolutionary Europe.** (3) In alternate years. 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.

**HIST 572. Nineteenth Century Europe.** (3) In alternate years. 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.

**HIST 573. Twentieth Century Europe.** (3) In alternate years. 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 antidemocratic and nondemocratic 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.

**HIST 574. Europe since World War II.** (3) In alternate years. Postwar European society, politics, economy, and culture. The effects of total war on the population; restoration and reconstruction. The influence of the U.S. and U.S.S.R. on Europe. Capitalism, socialism, and communism in technological society. European unity movements and their conflicts with traditional values.

**HIST 576. European International Relations to 1815.** (3) In alternate years. The nature, evolution, and function of the diplomatic system for the Ancient World to 1815. Analyzes the Greek and Roman diplomatic tradition, international relations during the Medieval, Renaissance, and Early Modern periods, and the works of various theorists. Sophomore standing.

**HIST 577. European International Relations Since 1815.** (3) II, in alternate years. The nature, evolution, and functions of the European diplomatic system from 1815 to the present. Focuses on the Vienna settlement, the Eastern Question, the Crimean War, Italian and German unification, origins of World War I, international developments between the two world wars, the cold war, and the post-cold war era. Includes analysis of major theorists. Sophomore standing.

**HIST 578. Central Europe, 1500–1914.** (3) In alternate years. The diplomatic, military, political, cultural, and social aspects of the Hapsburg empire in Central Europe from its foundation to its dissolution in the twentieth century. Pr.: Sophomore standing.

**HIST 579. The British Isles to 1603.** (3) In alternate years. English, Scottish, and Irish culture in the medieval and pre-modern periods. Early folk societies, feudalism, the church in society and politics, the origins of representative institutions and the religious reformations are studied topically. Pr.: Sophomore standing.

**HIST 580. The British Isles Since 1603.** (3) In alternate years. English society and politics in modern times with reference also to Scotland and Ireland. Emphasis on topics such as the three orders of society (king, lords, and commons), the churches and religion, the appearance of parliamentary sovereignty, the industrial revolution, and the extension of democratic institutions. Pr.: Sophomore standing.

**HIST 582. Modern Eastern Europe.** (3) In alternate years. Eastern Europe as an ethnically diverse region between the Germanic lands and Russia, emphasizing the impact of both external and internal forces upon the political, socioeconomic, 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 conscious-

ness and the continuing struggle for political independence. Pr.: Junior standing.

**HIST 583. History of France, 1400–1715.** (3) In alternate years. 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.

**HIST 584. History of France since 1715.** (3) In alternate years. 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 eighteenth 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.

**HIST 585. Medieval Religion and Politics.** (3) In alternate years. 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.

**HIST 586. Junior Seminar.** (3) I, II. An undergraduate seminar that focuses on the intellectual principles of the historical discipline as well as the fundamental research techniques and writing skills used by historians. Each section of the Junior Seminar will center on a particular topic or historical problem. The students will prepare a research paper on a relevant subject of their choice. All history majors must take this seminar to complete the requirements for their degree.

**HIST 587. Nineteenth-Century Imperial Germany.** (3) In alternate years. 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.

**HIST 588. Rise and Fall of Nazi Germany.** (3) In alternate years. 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.

**HIST 590. History through Film.** (3) I, in alternate years. A study of full-length, major production films to show how films can enhance, distort, or obscure our understanding of the past. Emphasizes historical development, using motion pictures as social documents.

**HIST 591. History of Russia to 1801.** (3) In alternate years. 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.

**HIST 592. Grandeur and Decline of Imperial Russia.** (3) In alternate years. Russia in the nineteenth 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.

**HIST 593. The Vietnam War.** (3) In alternate years. This course examines the origins, actions and consequences of the Indochina wars fought by the French, Japanese, and Americans during the last century. Particular emphasis is placed on America's experience in Southeast Asia. Videos

from the PBS series: "Vietnam; A Television History," are used in the course. Pr.: Sophomore standing.

**HIST 596. Holocaust: The Destruction of the European Jews.** (3) I, in alternate years. Analysis of the attempts by the National Socialist government of Germany to exterminate the Jewish population of Europe. Major issues discussed will include: nineteenth-century antidemocratic and antisemitic movements; Hitler's concept of antisemitism and personal sources of Hitler's genocidal policy; evolution of the genocidal policy and its implementation; Jewish resistance and collaboration; long-range consequences of the Holocaust. Pr.: Sophomore standing.

**HIST 597. Topics in European History.** (1–3) In alternate years. 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.

**HIST 598. Topics in Non-Western History.** (1–3) On sufficient 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.

**HIST 599. Senior Seminar for Secondary Teachers.** (3) II. Analysis of the historical content of teaching materials currently in use at the secondary level in public schools to determine the historical validity of the materials. Pr.: Sophomore standing.

### Undergraduate and graduate credit

**HIST 648. Naval History.** (3) I or II, in alternate years. Ships, technological developments, navies, tactics, warfare, strategy, and the interrelationship between naval thinking and national and international politics. Pr.: Junior standing or consent of instructor.

**HIST 649. Introduction to the History of Aviation.** (3) In alternate years. The development of aviation since the Wrights, providing a world view of man's conquest of the air in both human and technological terms including the development of military, commercial, and general aviation. Pr.: Junior standing or consent of instructor.

**HIST 650. Internship in History.** (3) I, II, S. Practical professional experience involving at least three weeks in an archive, museum, historical library, or business. Student projects must be approved in advance and a report submitted at the end of the work period. May be repeated once for credit. Pr.: Junior standing.

**HIST 703. Overseas European Studies.** (2–3) Inter-session only, in alternate years. Short-term, intensive, and in-depth study of various aspects of European history and culture with readings, lectures, discussions, and on-the-spot experiences which will relate historical events to the places visited. Pr.: Senior or graduate standing.

**HIST 798. Readings in History.** (1–3) Students will read on a central theme, attend weekly discussions, and write a final report.

**HIST 799. Problems in History.** (Var.) Intensive study of a particular phase of history. Students will attend weekly discussions and write a major research paper on their findings.

## Journalism and Mass Communications

Carol Oukrop,\* Director  
Paul Parsons,\* Associate Director

Professors Marsh,\* Oukrop,\* and Parsons,\*  
Associate Professors Chastain, Daly, Grimes,\*  
MacFarland,\* Pearce,\* and Prince,\* Assistant  
Professors Adams,\* El-Ghori,\* Freeland,  
Hause, Johnson, Lubbers,\* Murray,  
Neibergall, Pardun, and Puntney.

The study of mass communications provides students with the tools to function effectively

in an information-intensive society, whether as creators or consumers of information.

Students follow a general course of study in the College of Arts and Sciences and a specialized professional curriculum in the A.Q. Miller School of Journalism and Mass Communications. The general college curriculum prepares students to be knowledgeable persons in a complicated world. The professional curriculum educates students in skills, theory, law, ethics, and other essentials for a mass communications career.

The program offers a hands-on education that provides students with practical experience. Students can serve on the staffs of the *Kansas State Collegian*, the student newspaper published five days a week, and the *Royal Purple* yearbook. Twice, the *Collegian* and the *Royal Purple* have simultaneously won the prestigious national Pacemaker Awards, making K-State the only school in the nation ever to do so. Majors also have access to campus radio station KSDB-FM and to television studio and field equipment for producing programming for cable television and the university's low-power TV station. The school also has a photo lab and two Macintosh writing, editing, and graphics labs.

The school is national headquarters of the Journalism Education Association for high school journalism educators and has created the Huck Boyd National Center for Community Media. The school offers more than \$35,000 in scholarships each year to its outstanding majors, and students participate in the Society of Collegiate Journalists, the Advertising Club, the Public Relations Student Society of America, the Society of Professional Journalists, Women in Communications Inc., and Mass Communicators of Many Cultures.

The program is housed in Kedzie Hall, with radio-television studios and offices in McCain Auditorium and in Bob Dole Hall.

### Entrance requirements

To become a major, a student must have a 2.5 GPA based on at least 30 hours at the 100-level or above. A transfer student must have a 2.5 GPA on transferable course work, plus a 2.5 GPA on at least 12 hours at K-State, for a total of 30 hours. If a transfer student does not have a transferable 2.5 GPA, the student must compile a 2.5 GPA on 30 hours at K-State to become a major.

While a waiting eligibility to become a major, all freshmen and all transfer students with a 2.5 GPA from other institutions are eligible to be a pre-major. When students complete 30 hours at the 100-level (or transfer students complete their first semester at K-State), they either become a major or they need to find a new academic home.

## Mass communication major

Requirements for a mass communication major consist of 39 credit hours in the School of Journalism and Mass Communications and a total of 126 hours. National accreditation standards require all mass communication graduates to complete at least 90 hours of course work outside the school (although MC 235 Mass Communication in Society will count toward the 90 hours).

A student must fulfill the general requirements of the College of Arts and Sciences for either the B.A. or the B.S. degree, in addition to completing ECON 110 Principles of Macroeconomics and completing at least 65 hours in the basic liberal arts and sciences.

Beyond this, a student selects a 15-hour outside concentration in another department. Two of the outside concentration courses must be advanced (500-level or above, or requiring a prerequisite course that the student has taken). Up to two of the courses also may apply toward general arts and sciences requirements.

To graduate, a student must achieve a 2.5 GPA in courses within the school.

Students in the A.Q. Miller School of Journalism and Mass Communications must complete the requirements of one of the school's sequences in journalism, advertising, public relations, and radio-television.

A curriculum guide for majors is available in the K-State Union Bookstore.

### Print journalism

MC 235	Mass Communication in Society .....	3
MC 400	News and Feature Writing .....	3
MC 440	Editing and Design .....	3
MC 500	Advanced News and Feature Writing ..	3
MC 540	Advanced Editing and Design .....	3
MC 565	Law of Mass Communications .....	3
MC 595	Mass Communication Research .....	3

Select one of the following:

MC 600	Public Affairs Reporting .....	3
MC 535	Photojournalism .....	3

Select one of the following:

MC 650	Newspaper Management .....	3
MC 710	History of Journalism .....	3
MC 720	Ethics in Mass Communications .....	3
MC 730	Seminar in Future of the Media .....	3

Electives (at least 3 hours at 500-level or above) ..... 12  
39

### Electronic journalism

MC 235	Mass Communication in Society .....	3
MC 400	News and Feature Writing .....	3
MC 500	Advanced News and Feature Writing ..	3
MC 505	Electronic News Reporting .....	3
MC 585	Advanced Electronic News Reporting ..	3
MC 565	Law of Mass Communications .....	3
MC 595	Mass Communication Research .....	3

Select one of the following:

MC 550	Journalism Internship .....	3
MC 570	Audio II .....	3
MC 580	Video II .....	3
MC 600	Public Affairs Reporting .....	3

Select one of the following:

MC 685	Electronic Media Management .....	3
MC 715	History of Electronic Media .....	3
MC 720	Ethics in Mass Communications .....	3
MC 730	Seminar in Future of the Media .....	3

Electives (at least 3 hours at 500-level or above) ..... 12  
39

### Advertising

MC 235	Mass Communication in Society .....	3
MC 320	Principles of Advertising .....	3
MC 420	Advertising Writing .....	3
MC 545	Advertising Media Planning .....	3
MC 555	Advertising Techniques .....	3
MC 565	Law of Mass Communications .....	3
MC 595	Mass Communication Research .....	3
MC 640	Advertising Campaigns .....	3

Select one of the following:

MC 520	Newspaper Advertising Sales .....	3
MC 525	Electronic Media Advertising Sales ....	3

Electives (at least 3 hours at 500-level or above) ..... 12  
39

### Public relations

MC 235	Mass Communication in Society .....	3
MC 325	Fundamentals of Public Relations .....	3
MC 400	News and Feature Writing .....	3
MC 440	Editing and Design .....	3
MC 500	Advanced News and Feature Writing ..	3
MC 565	Law of Mass Communications .....	3
MC 595	Mass Communication Research .....	3
MC 635	Public Relations Techniques .....	3
MC 645	Public Relations Campaigns .....	3
MC 550	Public Relations Internship .....	1-3

Electives (at least 3 hours at 500-level or above) ..... 9-11  
39

### Radio-television

MC 235	Mass Communication in Society .....	3
MC 410	Writing for the Electronic Media .....	3
MC 470	Audio I .....	3
MC 480	Video I .....	3
MC 490	Junior Seminar in Electronic Media ....	3
MC 595	Mass Communication Research .....	3

Select one of the following:

MC 570	Audio II .....	3
MC 580	Video II .....	3

Select one of the following:

MC 525	Electronic Media Advertising Sales ....	3
MC 655	Electronic Media Programming .....	3
MC 685	Electronic Media Management .....	3

Select one of the following:

MC 565	Law of Mass Communications .....	3
MC 612	Gender Issues and the Media .....	3
or any 700-level course in the school .....		3

MC 550 Radio-TV Internship ..... 1-3

Electives (at least 3 hours at 500-level or above) ..... 9-11  
39

## Credit through quiz-out

Any student may apply to test out of professional practice courses in journalism and mass communications by presenting to the school's director a portfolio, tapes, or other suitable evidence of performance that would allow assessment of course-related experience. After review of the material, the director may refer the application to the appropriate instructor who will determine the number of credit hours, if any, and the method of examination or evaluation to be employed to determine whether credit shall be given. Such credit shall be granted on a Credit/No Credit basis. No more than 12 semester hours may be earned through quiz-out and at least 24 of the student's journalism credit hours must be K-State resident hours.

## Transfer course work

Students may transfer a maximum of 12 semester hours in the major. Courses in

journalism and mass communications above the 12-hour maximum may not be accepted as electives outside the major and will not be accepted as part of the graduation requirement. No journalism and mass communications course will transfer to K-State without a grade of C or better.

The school will not honor an accumulation of credits in courses which consist of laboratory work only. The school will review the work presented by transfer students and may accept a maximum of 3 credit hours for all such work, equivalent to courses such as Publications Practice.

No transfer credit will be given for Editing and Design, Advanced News and Feature Writing, or Law of Mass Communications unless such work was taken at a college or university accredited by the Accrediting Council on Education for Journalism and Mass Communications.

## Mass communications courses

**MC 010. Pre-Major Orientation.** (1) An orientation to studies in mass communications for pre-majors. Provides an overview of the curriculum electives, extracurricular activities in mass communications, the advising process, and career options.

### Undergraduate credit

**MC 235. Mass Communication in Society.** (3) A historical, social, legal, economic, and technological study of mass communication and its role and impact in society. Open to majors and nonmajors.

**MC 305. Radio-Television and Society.** (3) Influence of electronic media in today's culture. Examination of the dynamics of telecommunications including production techniques. Open to majors and nonmajors.

**MC 320. Principles of Advertising.** (3) An examination of the advertising field and its relationship to marketing and journalism. Open to majors and nonmajors.

**MC 325. Fundamentals of Public Relations.** (3) Contemporary persuasive social science principles, processes, and issues involved in the management of communications between an organization and its publics. Open to majors and nonmajors.

**MC 330. Desktop Publishing.** (1-2) Intersession only. Introduction to computer applications used in the practice of mass communications.

**MC 350. Topics in Mass Communications.** (1-3) Selected topics in the study of mass communication practices and principles. May be repeated for credit when topic varies.

**MC 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.

**MC 365. KSDB Audition.** (0) Production of music, news, and/or sports audio tapes to be evaluated by faculty in preparing students for an on-air position with KSDB-FM.

**MC 399. Honors Seminar in Mass Communications.** (3) Pr.: Honors students only; consent of supervising instructor.

**MC 400. News and Feature Writing.** (3) Instruction in information gathering and writing techniques for the various media. Pr.: MC 235, a 2.5 GPA upon completion of 30 or more hours, and ability to type 30 words a minute.

**MC 410. Writing for the Electronic Media.** (3) Study of forms and the preparation of written material for news, commercial announcements, and promotion for the electronic media, and of the regulations concerning advertising copy. Pr.: MC 235 and a 2.5 GPA upon completion of 30 or more hours.

**MC 420. Advertising Writing.** (3) Fundamentals of writing for the various media to solve advertising problems. Setting communication goals within the context of writing to persuade and inform mass audiences. Pr.: MC 235 and 320, and a 2.5 GPA upon completion of 30 or more hours.

**MC 430. Photography I.** (3) Basic camera and laboratory techniques of photography. Pr.: 2.5 GPA upon completion of 30 or more hours.

**MC 440. Editing and Design.** (3) Survey of graphic arts principles, fundamentals of the editing process, and the relationship to the elements of newspaper design and the total editing function. Pr.: MC 400 with grade of C or better and a 2.5 GPA upon completion of 30 or more hours.

**MC 460. KSDB Participation.** (1–3) Supervised participation in the university's student FM radio station, emphasizing music announcing, board production, recorded production, news and sports play-by-play, and FCC operating regulations. Pr.: MC 365.

**MC 470. Audio I.** (3) Basic instruction in audio for radio and TV, emphasizing laboratory experiences. Pr.: MC 400, 410, or 420 with grade of C or better, and a 2.5 GPA upon completion of 30 or more hours.

**MC 480. Video I.** (3) Basic instruction in video production for broadcast TV, cable, and corporate video, emphasizing laboratory experiences. Pr.: MC 400, 410, or 420 with grade of C or better, and a 2.5 GPA upon completion of 30 or more hours.

**MC 485. Video Participation.** (1–3) Supervised participation in program production for entertainment, news, and corporate videos. Scripted, supervised group projects. Three hours of lab participation a week required for each hour of credit. Pr.: MC 480.

**MC 490. Junior Seminar in Electronic Media.** (3) Current issues in electronic media, including regulation, law, technology, and programming. Preparation for careers in the electronic media. Pr.: MC 410 with grade of C or better, and a 2.5 GPA upon completion of 30 or more hours.

**MC 499. Seminar Honors Thesis.** (2) Pr.: Honors students only; consent of supervising instructor.

### Undergraduate and graduate credit in minor field

**MC 500. Advanced News and Feature Writing.** (3) Intensive course emphasizing reportorial principles and practices. Students serve as reporters for the *Kansas State Collegian*, writing for an audience of 20,000 readers daily. Pr.: MC 440 with grade of C or better.

**MC 505. Electronic News Reporting.** (3) Practical experience in gathering, writing, editing, producing, and presenting news for the electronic media, and study of related issues. Pr.: MC 500 with grade of C or better.

**MC 510. Yearbook Editing and Management.** (2) Planning, editing, layout, writing, and financing a publication.

**MC 520. Newspaper Advertising Sales.** (3) Basics of retail advertising applied to newspapers including sales, design, copy writing, production, budgeting, and legal and ethical issues. Pr.: MC 320 with grade of C or better, and a 2.5 GPA upon completion of 30 or more hours.

**MC 525. Electronic Media Advertising Sales.** (3) Retail advertising applied to radio, television, and cable systems. Retail ad campaigns, media buying, selling techniques. FTC and FCC ad regulations covered. Pr.: MC 320 or MKTG 400 with grade of C or better, and a 2.5 GPA upon completion of 30 or more hours.

**MC 530. The Ethnic Media in America.** (3) Consideration of the growth, development, and current status of the ethnic media in the United States. Pr.: Junior standing.

**MC 535. Photojournalism.** (1–3) The materials, principles, and processes of photography directed toward visual reporting in newspapers, magazines, and other media. Content and credit vary. Potential topics include documentary picture story, essay, and sequence; spot news, feature, and sports photography; combining words and pictures effectively; marketing techniques; legal restrictions. Lectures, demonstrations, and laboratory. Pr.: MC 400 and 430 with grades of C or better. May be repeated for a maximum of 4 semester hours.

**MC 540. Advanced Editing and Design.** (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. Students work on the *Kansas State Collegian* about six hours each week. Pr.: MC 500 with grade of C or better.

**MC 545. Advertising Media Planning.** (3) The selecting, scheduling, selling, and buying of the various advertising media. Pr.: MC 420 with grade of C or better.

**MC 550. Mass Communications Internship.** (1–3) The student works in a professional capacity under proper professional and faculty supervision with reports from student and supervisor required. Pr.: 12 specified semester hours of MC courses and consent of instructor.

**MC 555. Advertising Techniques.** (3) The planning, creation, and production of advertising messages for the various mass communication media. Pr.: MC 420 with grade of C or better.

**MC 560. Non-Traditional Press.** (3) A study of the changing journalistic attitudes toward objectivity in the 1960s and since. Examination of the resulting resurgence and development of alternative, minority, underground, and counterculture media. Techniques, style, impact, use, and consequences to the media and society of the new journalism will be analyzed. Pr.: 2.5 GPA upon completion of 30 or more hours.

**MC 565. Law of Mass Communications.** (3) A study of legal issues relating to mass communications. Emphasis on defamation, privacy, copyright, administrative controls, and other areas related to the mass media. Pr.: Senior standing, with a 2.5 GPA.

**MC 570. Audio II.** (3) Theory and practice of radio remotes, automation, and multichannel recording and editing in the production of commercials, dramatic narrative, and documentary programs. Pr.: MC 470 with grade of C or better.

**MC 580. Video II.** (3) Advanced techniques in video production with lectures and group projects. Emphasis on organizing video production from the viewpoint of producers and directors. Pr.: MC 480 with grade of C or better.

**MC 585. Advanced Electronic News Reporting.** (3) Reporting of issues of local importance, information-gathering techniques, in-depth writing, and electronic media news production methods. Pr.: MC 505 with grade of C or better.

**MC 595. Mass Communication Research.** (3) Formulation of mass communication research and design. Appropriate methods of data collection and data analysis. Pr.: MC 235, a 2.5 GPA upon completion of 30 or more hours, and completion of a mathematics or statistics course.

### Undergraduate and graduate credit

**MC 600. Public Affairs Reporting.** (3) Investigative reporting of local, state, and national affairs. Pr.: MC 500 with grade of C or better.

**MC 605. Supervision of School Publications.** (3) A methods course for those planning to teach secondary or community college journalism courses and advise high school or community college publications.

**MC 610. Interpretation of Contemporary Affairs.** (3) Critical questions of the day and interpretive articles and editorials that document and analyze the news. Pr.: MC 500. May be repeated once for credit when topic varies.

**MC 612. Gender Issues and the Media.** (3) The portrayal of women and men by the media, and media employment issues based on gender. Pr.: Junior standing and one course in MC or women's studies.

**MC 615. Magazine Article Writing.** (3) Preparation of feature stories and articles; techniques of market analysis, and marketing of articles written in course. Pr.: MC 500.

**MC 620. Magazine Production.** (3) The practical application of theory to writing, editing, graphic reproduction, layout, and management of magazines. Pr.: MC 500.

**MC 630. Public Relations Case Studies.** (3) Study of historic and contemporary public relations situations using a case-method approach. Attention is directed at strategic planning and implementation by public relations managers. Students establish criteria on what constitutes a public relations program and theories and norms for the selection of

objectives and strategies under varying conditions. Pr.: MC 325 with grade of C or better, and a 2.5 GPA upon completion of 30 or more hours.

**MC 635. Public Relations Techniques.** (3) Information gathering, writing, and production applications of persuasive public relations principles in print and electronic media. Pr.: MC 325 and 440 with grades of C or better.

**MC 640. Advertising Campaigns.** (3) The managerial development and execution of consumer, industrial, and institutional advertising campaigns. Pr.: MC 545, 555, and 595 with grades of C or better; senior standing.

**MC 645. Public Relations Campaigns.** (3) Advanced study of an organization's public relations needs. Includes researching the situation, analyzing audiences, and preparing strategic plans for approved clients. Pr.: MC 595 and 635 with grades of C or better, and completion of at least one course in social science methods or data analysis.

**MC 650. Newspaper Management.** (3) The management of newspapers dealing with organization, ownership, promotion, research, production, equipment, markets, personnel, legal aspects, advertising, buying and selling of newspaper properties, business practices, and news policy. Pr.: MC 540 or concurrent enrollment.

**MC 655. Electronic Media Programming.** (3) The principles, planning, and development of radio-television-cable programs, schedules, and related regulation. Pr.: MC 410 with grade of C or better, and a 2.5 GPA upon completion of 30 or more hours.

**MC 680. Readings in Mass Communications.** (1–3) Investigation of the literature of mass communications. Pr.: Minimum of 9 hours of completed course work in MC, senior or graduate standing, and consent of supervisory instructor.

**MC 685. Electronic Media Management.** (3) Management practices of broadcast, cable, and nonbroadcast facilities including regulation and sales. Pr.: MC 410 or MANGT 420 with grade of C or better, and a 2.5 GPA upon completion of 30 or more hours.

**MC 690. Problems in Mass Communications.** (1–4) Pr.: Background of courses needed for problem undertaken.

**MC 700. Propaganda and Mass Communications.** (3) History, theory, development, and impact of propaganda as a controversial mass communication strategy that influences public opinion. Pr.: Graduate standing, or senior standing with a 2.5 GPA.

**MC 710. History of Journalism.** (3) Growth and development of the news media in the United States and their economic, political, and social significance. Pr.: Graduate standing, or senior standing with a 2.5 GPA and completion of a U.S. history course.

**MC 715. History of the Electronic Media.** (3) Growth and development of the electronic media in the United States and their economic, political and social significance. Pr.: Graduate standing, or senior standing with a 2.5 GPA and completion of a U.S. history course.

**MC 720. Ethics of Mass Communications.** (3) Moral analysis, argument, and decision-making by the mass communicator, with linkage of ethics to the conduct of media professionals in the United States. Pr.: Graduate standing, or senior standing with a 2.5 GPA and completion of a philosophy course.

**MC 725. International Communications.** (3) Comparative study of world media systems and the role of mass communications in national development. Pr.: Graduate standing, or senior standing with a 2.5 GPA.

**MC 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. Pr.: Graduate standing, or senior standing with a 2.5 GPA.

**MC 740. Colloquium in Mass Communications.** (1–3) Discussion of selected topics in mass communications research and practice. May be repeated once for credit when topic varies. Pr.: Senior or graduate standing.

**MC 765. Communication Theory.** (3) An examination of major communication theories as they relate to mass communications. Pr.: Graduate standing, or senior standing with a 2.5 GPA.

**MC 770. Professional Journalism Practicum.** (1–4) For advanced students. Supervised practical work in professional journalism and mass communications. Includes laboratory investigation, field work, and internships. Pr.: MC 440 or 505 and consent of supervising instructor.

**MC 780. Research Methods in Mass Communications.** (3) Survey of research methods used in the study of the mass media. For graduate students.

## Kinesiology

Larry Noble, Head

Professors McElroy\* and Noble,\* Associate Professors Dzewaltowski,\* and Musch;\* Assistant Professors Acevedo,\* Hyllegard, and Kubitz;\* Emeriti: Professor Geyer; Associate Professors Lindley, Johnson, McKinney, and Wauthier; Instructor Poole.

Kinesiology is the multidisciplinary study of humans in a movement or physical activity context. The objective of the curricula is a greater understanding of human participation in such physical activities as exercise, sport, activities of daily living, and work. The body of knowledge includes physiological, biomechanical, psychological, sociological, maturational, historical, cultural, and learning aspects of human movement. Kinesiology provides an excellent knowledge base for professional preparation in teaching and coaching, sports medicine, exercise science, physical therapy, and other health-related professions.

## Kinesiology

Students may earn a B.A. or B.S. degree in kinesiology and a B.S. dual degree with majors in nutrition and exercise sciences.

Kinesiology majors take an 18-hour core of scientific foundation courses, many of which have prerequisites in the arts and sciences general studies offerings, and an additional 18 hours of courses numbered 300 and above. The core consists of study in biomechanical, motor control, physiological, psychological, and socio-cultural aspects of physical activity. More detailed information can be obtained from the department office.

## Emphasis in fitness promotion

This emphasis prepares students to design, implement, and administer physical fitness programs in YMCAs, private corporations, hospitals, clinics, and private athletic clubs. Included is coursework in basic nutrition, nutrition and exercise, exercise testing and prescription, adult exercise programs, and supervised field experiences.

## Dual degree in nutrition and exercise science

The Departments of Kinesiology and Foods and Nutrition offer a dual degree. This degree provides preparation for professional careers in wellness and careers that interface the roles

of nutrition and physical performance. Principles of nutrition, food science, community nutrition, clinical nutrition, concepts of personal health, and nutrition needs throughout the life cycle are included in this degree. Consult with advisors in either department for more detailed information.

## Kinesiology courses

### Undergraduate credit

**KIN 100. Adaptive Physical Activities.** (1) I, II. Exercise programs adapted to the needs of the special student. May be repeated eight times.

**KIN 101. Principles of Physical Fitness.** (1) I, II, S. Physical fitness principles that contribute to overall health. Fitness self-assessment, program design principles appropriate for the development and maintenance of optimal fitness levels, and activities appropriate for the reduction of risks associated with coronary heart disease and obesity are emphasized.

## Lifetime exercise and sport activities

### Undergraduate credit

**KIN 104. Swimming I.** (1) Beginning instruction for students who have no previous experience with swimming.

**KIN 105. Swimming II.** (1) For the beginning swimmer who has had some previous swimming experience.

**KIN 106. Swimming III.** (1) Pr.: KIN 105 or consent of instructor.

**KIN 107. Fitness Swimming.** (1) Pr.: KIN 106 or consent of instructor.

**KIN 120. Basketball.** (1)

**KIN 122. Flag Football.** (1)

**KIN 123. Soccer.** (1)

**KIN 124. Softball.** (1)

**KIN 126. Volleyball I.** (1)

**KIN 127. Volleyball II.** (1) Pr.: KIN 126 or consent of instructor.

**KIN 136. Badminton.** (1)

**KIN 140. Golf.** (1)

**KIN 143. Handball.** (1)

**KIN 144. Judo I.** (1)

**KIN 145. Judo II.** (1) Pr.: KIN 144 or consent of instructor.

**KIN 148. Racquetball.** (1)

**KIN 150. Self Defense.** (1) Instruction in selected self-defense techniques derived from judo, karate, and other martial arts.

**KIN 151. Tennis I.** (1)

**KIN 152. Tennis II.** (1) Pr.: KIN 151 or consent of instructor.

**KIN 154. Tumbling and Floor Exercise.** (1)

**KIN 160. Aerobic Dancing and Exercise.** (1)

**KIN 161. Fitness and Conditioning.** (1)

**KIN 162. Jogging.** (1)

**KIN 163. Weight Training.** (1)

The following courses may be taken by students majoring in kinesiology or other students meeting prerequisite requirements.

**KIN 200. Kinesiology: An Introductory Analysis.** (3) I. A survey of key areas of study within kinesiology emphasizing the multifaceted nature of the field; to encourage an understanding and appreciation of the disciplinary, professional, and personal perspectives of the subject.

**KIN 205. The Sporting Mind: Maximizing Performance.** (2) An introduction to the theory and application of cognitive skills and strategies for both athletes and coaches. Pr.: PSYCH 110.

**KIN 320. Motor Learning and Development.** (3) Issues of motor learning and development as they relate to the application of instructional techniques. Two hours lecture and two hours lab a week. Pr.: PSYCH 110 or EDCEP 215.

**KIN 325. Introduction to Physical Culture in the Western World.** (3). A survey of the historical and philosophical foundations of physical culture in western civilization.

**KIN 330. Biomechanics.** (3) I, II. Mechanical and anatomical aspects of overt human movement. Kinematic and kinetic principles applied to the analysis of human movement. Two hours lecture and two hours lab a week. Pr.: BIOL 240 and PHYS 115.

**KIN 335. Physiology of Exercise.** (3) I, II. The responses of the human body to exercise, emphasizing generation of energy in skeletal muscle, dynamics of muscular contraction, oxygen transport system, body composition, and training regimens. Two hours lecture and two hours lab a week. Pr.: BIOL 240.

**KIN 340. Physical Activity in Contemporary Society.** (3) I, II. Theories and research on the social significance of physical activity in American society. Includes a focus on play, games, sport, fitness, and exercise in contemporary society. Pr.: SOCIO 211.

**KIN 345. Psychological Dynamics of Physical Activity.** (3) I, II. Theories and research on the cognitive, emotional, and behavioral dynamics of physical activity and their application to changing behavior in a movement context. Pr.: PSYCH 110.

**KIN 350. The Development of Motor Control.** (3) I, II. A multi-level analysis of the neurophysiological activation of muscles, reflexes, sensory integration during movement, and theories of voluntary movement. Pr.: BIOL 240.

**KIN 398. Topics in Kinesiology.** (1–3) On sufficient demand. Study of a selected topic in an area not covered in the curriculum or involving application of theory presented in a related subject core course. May be repeated as topic varies.

**KIN 399. Sophomore Honors Seminar.** (1–3) Selected topics in kinesiology. Open to nonmajors in the honors program.

**KIN 405. Choreographing Aerobic Dance and Exercise Routines.** (2) A study of choreography and methodology in teaching aerobic dance and exercise routines in various educational settings. Emphasis upon preparation and progression of routines. Selecting music, designing routines, and methods of presenting to various age groups. Pr.: KIN 330 and 335.

**KIN 430. Practicum in Lifetime Sports.** (2) I, II. Supervised students assist in lifetime sports classes. Four hours lab a week. Pr.: Junior standing.

**KIN 435. Sport and Contemporary Society.** (3) II. An analysis of sport and its role in contemporary society. Course creates a greater awareness of the social significance of sport in society and fosters the capacity to use critical thinking in the analysis of significant sport issues. Cross-listed with Sociology, see SOCIO 435. Pr.: SOCIO 211.

**KIN 463. Laboratory Practicum in Kinesiology.** (1–2) I, II, S. Supervised students assist in laboratory. Four hours lab a week. Pr.: Junior standing and appropriate background for problem undertaken.

**KIN 498. Honors Tutorial in Kinesiology.** (1–3) I, II. Individually directed research in kinesiology, normally as a preliminary to writing a senior honors thesis. May be repeated once to a total of three hours. Pr.: Sophomore standing, membership in the honors program of the College of Arts and Sciences, and permission of instructor.

## Undergraduate and graduate credit in minor field

**KIN 510. Measurement and Research Techniques in Kinesiology.** (3) I, II. Theory and techniques of measurement and research in the psychomotor domain including the

use of statistical analyses. Pr.: KIN 200, 325, 330, 335, 340, 345, 350, STAT 320.

**KIN 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. Cross-listed with History, see HIST 515.

**KIN 520. Practicum in Exercise Science.** (1-3) I, II. Practical experiences in the fitness setting such as observation and participation in exercise testing and prescription, exercise leadership, and record keeping and program management. Pr.: Consent of instructor.

**KIN 590. Seminar in Kinesiology.** (3) II. Issues and problems involving integration of the subdisciplines of kinesiology and professional areas of application. Pr.: Completion of all or concurrent enrollment in final kinesiology core courses.

**KIN 598. Topics in Kinesiology.** (1-3) On sufficient demand. Study of a selected topic in kinesiology involving either an in-depth study or application of theory presented in a related core course. May be repeated as topic varies. Pr.: Related core course.

**KIN 599. Independent Studies in Kinesiology.** (1-3) I, II. Selected topics in kinesiology. Maximum of 3 hours applicable toward a degree. Pr.: Consent of undergraduate coordinator.

**KIN 625. Exercise Testing and Prescription.** (3) I. Benefits and risks of exercise testing and prescription with healthy populations, individuals at risk, and patients with cardiovascular and metabolic diseases. Includes experiences with exercise test technology and methods of exercise prescription. Two hours recitation and two hours lab a week. Pr.: KIN 335, proof of current CPR, BLS, and First Aid certification.

**KIN 635. Nutrition and Exercise.** (3) II. The interrelationships between diet, nutrition, and exercise. Topics covered include physical fitness, weight control, nutrient metabolism during exercise, and athletic performance. Pr.: KIN 335 and FN 132 or FN 502. Cross-listed with foods and nutrition; see FN 635.

**KIN 655. Fitness Promotion.** (3) II. The study of the implementation and promotion of preventative health programs for populations at worksites, hospitals, and community fitness settings. Pr.: KIN 335.

**KIN 700. Physical Culture in the Western World.** (3). A seminar on selected topics in the historical and philosophical foundations of physical culture in Western Civilization. Pr.: Three hours of Western Heritage.

**KIN 703. Minority Groups in Sports.** (3) The contributions by, problems of, and discrimination against minority groups in sports. Pr.: SOCIO 211, KIN 340, PSYCH 435, or HIST 539.

**KIN 718. Cinematographic and Videographic Analysis of Human Movement.** (3) On sufficient demand. Techniques and instrumentation for the analysis of overt human movement using film, videotape, and other imaging techniques. Pr.: KIN 330.

**KIN 792. Internship in Exercise Science.** (6-8) I, II, S. Supervised field experience for the exercise science major in training settings such as YMCA, YWCA, municipal recreation agency, or industrial fitness agency. May be completed with half-time assignment for 12-16 weeks or full-time assignment for 6-8 weeks. Pr.: KIN 655.

**KIN 796. Topics in Kinesiology.** (1-4) On sufficient demand. Intensive study of a selected topic in kinesiology involving either greater in-depth study, or application of theory presented in a related course. May be repeated as topic varies. Pr.: 6 hours in kinesiology 500 or above. Only 6 hours may be counted toward degree.

## Athletic training courses

The following courses will be moved to the Department of Secondary Education in the College of Education effective Fall 1995.

**KIN 555. Therapeutic Modalities in Athletic Training.** (3) II. The theory and application of the various modalities used in the treatment of athletic injuries. Practical experience will be emphasized. Pr.: KIN 315, 551, and PHYS 115.

**KIN 556. Rehabilitation and Conditioning for Athletic Injuries.** (3) II, in odd years. A study of applied rehabilitation and conditioning techniques used by athletic trainers. Pr.: KIN 315, 330, 551, 555.

**KIN 557. Seminar in Issues and Administration of Athletic Training Programs.** (3) I, in odd years. Discussion and application of various issues affecting the athletic trainer's role as administrators; specifically role delineation, budget design, legal aspects of sport, facility design, drug testing/education and employment opportunities. Pr.: KIN 315, 551.

**KIN 585. Internship in Athletic Training.** (1-4) I, II. Supervised clinical application of practical skills in athletic training. May be repeated for a total of 4 credit hours during the last four semesters in the athletic training program. Pr.: KIN 315, 551, and 555.

## Mathematics

Louis Pigno,\* Head

Professors Burckel,\* Dressler,\* Kapitanski,\* Lee,\* Miller,\* Nicholls,\* Peller,\* Pigno,\* Ramm,\* Saeki,\* Shult,\* Smith,\* Strecker,\* Stromberg,\* and Surowski;\* Adjunct Professor Arhangel'skii; Associate Professors Bennett,\* Chermak,\* Cochrane,\* Delgado,\* Herman,\* Li,\* Muenzenberger,\* Parker,\* Soibelman, and Zou;\* Assistant Professors Crane,\* Lin,\* Maginnis,\* Moore,\* Nagy,\* Wu,\* Yang,\* and Yetter;\* Emeriti: Professors Dixon,\* Fuller,\* Marr,\* Stamey,\* and Young;\* Associate Professors Mossman\* and Sloat;\* Instructors Chatelain, Ratcliffe, Sitz, and Woldt.

Mathematics is the unparalleled model of an exact science, the epitome of creative art, and a language essential to understanding our modern technological world. Mathematicians design mathematical models, solve mathematical problems, and create new mathematics.

Mathematics graduates are sought both for their specialized knowledge and for their ability to think analytically and solve problems.

## Requirements

Students may obtain either a bachelor of arts or a bachelor of science degree with a major in mathematics. For either degree, in addition to the general requirements of the university and college, mathematics majors must complete the following core courses:

MATH 220	Analytic Geometry and Calculus I .....	4
MATH 221	Analytic Geometry and Calculus II .....	4
MATH 222	Analytic Geometry and Calculus III .....	4
MATH 240	Elementary Differential Equations .....	4
CIS 200	Fundamentals of Computer Programming .....	3
CIS 203	Fundamentals of Computer Programming Laboratory .....	1
STAT 510	Introductory Probability and Statistics I .....	3
MATH 512	Introduction to Modern Algebra .....	3
MATH 511	or Introduction to Algebraic Systems .....	3

MATH 633	Advanced Calculus I .....	3
MATH 520	or Foundations of Analysis .....	3

For the B.A. degree, students must take 15 additional hours in mathematics numbered 400 or above; PHILO 510 may be substituted for 3 of these hours.

For the B.S. degree, students must take 15 additional hours in mathematics numbered 400 and above; MATH 570 may not be used to meet this requirement.

All students should enroll in MATH 199 in their first fall on campus.

Students may choose one of the following three programs, depending on their career interests.

## Applied mathematics program

Students who intend to seek employment in business, government, or industry, should take Advanced Calculus I and II (MATH 633 and 634). In addition, the following courses are recommended:

MATH 510	Discrete Mathematics .....	3
MATH 551	Applied Matrix Theory .....	3
MATH 630	Introduction to Complex Analysis .....	3
MATH 632	Elementary Partial Differential Equations .....	3
MATH 655	Elementary Numerical Analysis I .....	3
MATH 670	Mathematical Modeling .....	3
MATH 755	Dynamic Modeling Processes .....	3

Students also should take at least 6 hours of upper-division courses outside the mathematics department in areas such as computing and information sciences, engineering, physics, and statistics.

## Pre-graduate program

Students who intend to enter graduate school to work toward an advanced degree in either pure or applied mathematics should take Introduction to Modern Algebra and Advanced Calculus I (MATH 512 and 633). In addition, the following courses are recommended:

MATH 515	Introduction to Linear Algebra .....	3
MATH 560	Introduction to Topology .....	3
MATH 634	Advanced Calculus II .....	3
MATH 721	Analysis I .....	3
MATH 722	Analysis II .....	3
MATH 730	Abstract Algebra I .....	3
MATH 731	Abstract Algebra II .....	3

Students also should take courses in related scientific fields, especially computer science and statistics. Students also should take at least one foreign language, preferably French, German, or Russian.

## Teacher preparation program

Students who intend to become secondary school mathematics teachers may prepare for teacher certification while completing the requirements for a degree in mathematics. The following upper-division courses are designed particularly for such students:

MATH 511	Introduction to Algebraic Systems .....	3
MATH 520	Foundations of Analysis .....	3
MATH 521	The Real Number System .....	3
MATH 570	History of Mathematics .....	3
MATH 572	Foundations of Geometry .....	3
MATH 791	Topics in Mathematics for Secondary School Teachers .....	3

For specific certification requirements for secondary education, see the College of Education section of this catalog.

Students majoring in elementary education who wish to use mathematics as an area of concentration should consider taking their 15 hours of mathematics from among the following courses:

MATH 100	College Algebra .....	3
MATH 110	Mathematics, Its Form and Impact .....	3
MATH 312	Finite Applications of Mathematics .....	3
MATH 313	Computational Number Theory .....	3
MATH 320	Topics in Mathematics for Elementary School Teachers I .....	3
MATH 321	Topics in Mathematics for Elementary School Teachers II .....	3

## Dual majors and dual degrees

Students may major in mathematics and another discipline within the College of Arts and Sciences. The degree requirements of both departments must be met.

Students may obtain a degree in mathematics and a second degree in a field in another college such as business administration or engineering. The degree requirements of both colleges must be met and a minimum of 150 hours must be completed.

## Information for nonmajors

Most colleges and departments require at least one mathematics course. Students should check with their advisors to determine which mathematics courses to take. Advisors are provided information that will aid them in using a student's ACT score to select the appropriate entry-level mathematics course. Advisors also have access to expanded mathematics course descriptions that will help them advise students.

## Mathematics courses

**MATH 010. Intermediate Algebra.** (3) I, II, S. Review of elementary algebra; topics preparatory to MATH 100. Pr.: Two units of mathematics in grades 9–12 and a College Algebra PROB  $\geq$  C of 43 or more on the ACT assessment; or a score of at least 7 on the mathematics placement test; or a score of at least 26 on the arithmetic placement test.

### Undergraduate credit

**MATH 100. College Algebra.** (3) I, II, S. Pr.: B or better in MATH 010; or two years of high school algebra and a College Algebra PROB  $\geq$  C of 60 or more on the ACT assessment; or a score of at least 18 on the mathematics placement test.

**MATH 101. The Metric System.** (1) Intersession only, on sufficient demand. A systematic study of the metric system including historical background of various systems, structure of the metric system itself, and relation to existing systems; attention to competent use of metric terms in problem solving.

**MATH 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.

**MATH 150. Plane Trigonometry.** (3) I, II, S. Trigonometric and inverse trigonometric functions; trigonometric identities and equations; applications involving right triangles and applications illustrating the laws of sines and cosines. Pr.: C or better in MATH 100; or two years of high

school algebra and a score of 25 or more on Enhanced ACT mathematics; or a score of at least 20 on the mathematics placement exam.

**MATH 199. Freshman Mathematics Seminar.** (1) I. Topics of special interest to freshmen in mathematics, including orientation to the mathematics curriculum, possible careers in mathematics, and cultural and professional aspects of mathematics.

**MATH 205. General Calculus and Linear Algebra.** (3) I, II. Introduction to calculus and linear algebra concepts that are particularly useful to the study of economics and business administration with special emphasis on working problems. Pr.: MATH 100 with C or better grade (College Algebra in the preceding semester is recommended).

**MATH 210. Technical Calculus I.** (3) I. A condensed course in analytic geometry and differential calculus with an emphasis on applications. Pr.: B or better in MATH 100 and C or better in MATH 150; or three years of college preparatory mathematics including trigonometry and a Calculus I PROB  $\geq$  C of 55 or more on the ACT assessment; or a score of at least 26 on the mathematics placement test.

**MATH 211. Technical Calculus II.** (3) II. A continuation of MATH 210 to include integral calculus with an emphasis on application. Pr.: C or better in MATH 210.

**MATH 220. Analytic Geometry and Calculus I.** (4) I, II, S. Analytic geometry, differential and integral calculus of algebraic and trigonometric functions. Pr.: B or better in MATH 100 and C or better in MATH 150; or three years of college preparatory mathematics including trigonometry and Calculus I PROB  $\geq$  C of 55 or more on the ACT assessment; or a score of at least 26 on the mathematics placement test.

**MATH 221. Analytic Geometry and Calculus II.** (4) I, II, S. Continuation of MATH 220 to include transcendental functions, techniques of integration, and infinite series. Pr.: C or better in MATH 220.

**MATH 222. Analytic Geometry and Calculus III.** (4) I, II, S. Continuation of MATH 221 to include functions of more than one variable. Pr.: C or better in MATH 221.

**MATH 240. Elementary Differential Equations.** (4) I, II, S. Elementary techniques for solving ordinary differential equations and applications to solutions of problems in science and engineering. Pr.: C or better in MATH 222.

**MATH 309. Intuitive Geometry.** (2) Intersession only. Measurement, triangles, quadrilaterals, nonmetric geometry, similarity, volumes, elementary coordinate geometry. Pr.: Consent of instructor.

**MATH 312. Finite Applications of Mathematics.** (3) II. Systems of equations, vector operations, linear algebra, and linear programming. Practice in setting up, solving, and interpreting mathematical models which arise in social sciences and business. Pr.: MATH 100.

**MATH 313. Computational Number Theory.** (3) I, II, S. Topics in number theory selected from: divisibility, primes, modular arithmetic and special types of numbers. Emphasis is on computations. Primarily for prospective elementary school teachers of mathematics. Pr.: Sophomore standing, MATH 100.

**MATH 320. Mathematics for Elementary School Teachers I.** (3) I, II. Mathematical problem solving and reasoning, development of whole number concepts and the whole number system, computation and estimation with whole numbers, number patterns and number theory, integers, fractions and rational numbers, decimals and real numbers.

**MATH 321. Mathematics for Elementary School Teachers II.** (3) I, II. Continuation of MATH 320 to include probability, statistics, geometric figures and patterns, measurement, geometric constructions, concepts of algebra, and coordinate geometry. Pr.: MATH 320.

**MATH 398. Sophomore Seminar.** (3) II. Seminar in mathematics for honors students. Pr.: Membership in honors program.

**MATH 399. Seminar in Mathematics.** (Var.) On sufficient demand. Primarily for honors students. Pr.: Consent of instructor.

**MATH 498. Senior Honors Thesis.** (2) I, II, S. Open only to seniors in the arts and sciences honors program.

**MATH 499. Undergraduate Topics in Mathematics.** (Var.) I, II, S. Reading courses in advanced undergraduate mathematics. Pr.: Background of courses needed for topic undertaken and consent of instructor.

### Undergraduate and graduate credit in minor field

**MATH 506. Introduction to Number Theory.** (3) II. Divisibility properties of integers, prime numbers, congruences, multiplicative functions. Pr.: MATH 221.

**MATH 510. Discrete Mathematics.** (3) I, II, S. Combinatorics and graph theory. Topics selected from counting principles, permutations and combinations, the inclusion/exclusion principle, recurrence relations, trees, graph coloring, Eulerian and Hamiltonian circuits, block designs, and Ramsey Theory. Pr.: Sophomore standing and MATH 221.

**MATH 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.

**MATH 512. Introduction to Modern Algebra.** (3) I, II. Introduction to the basic algebraic systems, viz., groups, rings, integral domains, fields, elementary number theory. Special emphasis will be given to methods of theorem proving. Pr.: MATH 222.

**MATH 515. 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.

**MATH 520. 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.

**MATH 521. 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.

**MATH 551. Applied Matrix Theory.** (3) I, II. Matrix algebra, solutions to systems of linear equations, determinants, vector spaces, linear transformations, eigenvalues, linear programming, approximation techniques. Pr.: MATH 205 or 220.

**MATH 560. Introduction to Topology.** (3) An introduction to the basic topological concepts. Topological spaces, metric spaces, closure, interior, and frontier operators, subspaces, separation and countability properties, bases, subbases, convergence, continuity, homeomorphisms, compactness, connectedness, quotients and products. The course will include a brief introduction to proof techniques and set theory. Other topics in topology also may be included. Pr.: MATH 222.

**MATH 570. History of Mathematics.** (3) II. A survey of the development of mathematics from ancient to modern times. Cannot be used as part of the advanced mathematics needed for the B.S. degree in mathematics. Pr.: MATH 220.

**MATH 572. Foundations of Geometry.** (3) Euclidean, non-Euclidean, and finite geometries; role of axioms; practice proving theorems in a formal system; synthetic, metric, and transformation approaches to Euclidean geometry. Pr.: MATH 221.

**MATH 591. Topics in Mathematics for Teachers.** (1–3) I, II, S. Topics of importance for teachers of mathematics. May be repeated for credit. Pr.: Consent of instructor.

### Undergraduate and graduate credit

**MATH 615. Advanced Engineering Mathematics I.** (3) I. Vector calculus; higher dimensional calculus; topics in ordinary differential equations; complex analysis. Pr.: MATH 240 and 551.

**MATH 616. Advanced Engineering Mathematics II.** (3) II. Fourier series; Fourier and Laplace transforms; basic partial differential equations; basic calculus of variations. Pr.: MATH 240 and 615.

**MATH 630. Introduction to Complex Analysis.** (3) I, II. Complex analytic functions and power series, complex in-

tegrals. Taylor and Laurent expansions, residues, Laplace transformation, and the inversion integral. Pr.: MATH 240.

**MATH 632. Elementary Partial Differential Equations.** (3) I. Orthogonal functions, Fourier Series, boundary value problems in partial differential equations. Pr.: MATH 240.

**MATH 633. Advanced Calculus I.** (3) I. Functions of one variable: limits, continuity, differentiability, Riemann-Stieltjes integral, sequences, series, power series, improper integrals. Pr.: MATH 222.

**MATH 634. Advanced Calculus II.** (3) II. Functions of several variables: partial differentiation and implicit function theorems, curvilinear coordinates, differential geometry of curves and surfaces, vectors and vector fields, line and surface integrals, double and triple integrals, Green's Theorem, Stokes' Theorem, and Divergence Theorem. Pr.: MATH 633.

**MATH 640. Ordinary Differential Equations I.** (3) I. First order equations and applications, second order equations and oscillation theorems, series solutions and special functions, Sturm-Liouville problems, linear systems, autonomous systems and phase plane analysis, stability, Liapunov's method, periodic solutions, perturbation and asymptotic methods, existence and uniqueness theorems. Pr.: MATH 240.

**MATH 641. Ordinary Differential Equations II.** (3) II. Continuation of MATH 640. Pr.: MATH 640.

**MATH 655. Elementary Numerical Analysis I.** (3) I. Error analysis, root finding, interpolation, approximation of functions, numerical integration and differentiation, systems of linear equations. Pr.: MATH 221, a computer language, and either MATH 515 or 551.

**MATH 656. Elementary Numerical Analysis II.** (3) II. A continuation of MATH 655. Linear programming, numerical solutions of differential equations, and the use of standard packages for the solution of applied problems. Pr.: MATH 655 and 240.

**MATH 670. Mathematical Modeling.** (3) Introduction of modeling procedures. Case studies in mathematical modeling projects from physical, biological, and social sciences. Pr.: Four mathematics courses numbered 500 or above.

**MATH 689. Combinatorial Analysis.** (3) II, in alternate years. Permutations, combinations, inversion formulae, generating functions, partitions, finite geometries, difference sets, and other topics. Pr.: MATH 512.

**MATH 700. Set Theory and Logic.** (3) An introduction to logic, mathematical proof, and elementary set theory; elementary logic, the basic constructions of set theory, relations, partitions, functions, cartesian products, disjoint unions, orders, and a construction of the natural numbers; also ordinal and cardinal numbers, the Axiom of Choice, and transfinite induction. Special emphasis will be given to proving theorems. Pr.: MATH 511 or 512.

**MATH 701. Elementary Topology I.** (3) I. Introduction to axiomatic topology including a study of compactness, connectedness, local properties, separation axioms, and metrization. Pr.: MATH 633.

**MATH 702. Elementary Topology II.** (3) II. Path connectedness, fundamental groups, covering spaces, introduction to topological and differentiable manifolds. Pr.: MATH 701.

**MATH 704. Introduction to the Theory of Groups.** (3) Introduction to abstract group theory; to include permutation groups, homomorphisms, direct products, Abelian groups, Jordan-Hölder and Sylow theorem. Pr.: MATH 512.

**MATH 706. Theory of Numbers.** (3) II. Divisibility, congruences, multiplicative functions, number theory from an algebraic viewpoint, quadratic reciprocity, Diophantine equations, prime numbers. Pr.: MATH 221 and either 511 or 512.

**MATH 710. Introduction to Category Theory.** (3) Categories, duality, special morphism, functors, natural transformations, limits and colimits, adjoint situations, and applications. Pr.: MATH 701 and 730.

**MATH 711. Category Theory.** (3) Set valued functors and concrete categories, factorization structures, algebraic and topological functors, categorical completions, Abelian categories. Pr.: MATH 710.

**MATH 713. Advanced Applied Matrix Theory.** (3) A development of the concepts of eigenvalues by considering applications in differential equations and quadratic forms. A discussion of the Jordan canonical form, functions of matrices, vector and matrix norms, and various related numerical methods. Pr.: MATH 551 or 515.

**MATH 721. Analysis I.** (3) I, II, S. Metric spaces, limits, continuity, sequences and series, connectedness, compactness, Baire category, uniform convergence, theorems of Stone-Weierstrass and Arzela. Pr.: MATH 240 or graduate standing.

**MATH 722. Analysis II.** (3) II. Lebesgue and Riemann-Stieltjes integration on the real line, differentiation on the real line, elementary transcendental functions. Pr.: MATH 721.

**MATH 730. Abstract Algebra I.** (3) I. Groups, rings, fields, vector spaces and their homomorphisms. Elementary Galois theory and decomposition theorems for linear transformations on a finite dimensional vector space. Pr.: MATH 512 or consent of instructor.

**MATH 731. Abstract Algebra II.** (3) II. Continuation of MATH 730. Pr.: MATH 730 or consent of instructor.

**MATH 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 722 or equiv.

**MATH 755. Dynamic Modeling Processes.** (3) Topics to include equilibrium and stability, limit cycles, reaction-diffusion, and shock phenomena, Hopf bifurcation and cusp catastrophes, chaos and strange attractors, bang-bang principle. Applications from physical and biological sciences and engineering. Pr.: MATH 240 and 551.

**MATH 760. Probability Theory.** (3) An introduction to the mathematical theory of probability. Material covered includes combinatorial probability, random variables, independence, expectations, limit theorems, Markov chains, random walks, and martingales. Pr.: MATH 633 and STAT 510.

**MATH 772. Elementary Differential Geometry.** (3) 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.

**MATH 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.

## Military Science

Major George H. Stelljes, Jr., Head

Assistant Professors Captain West, Captain Wedge, and Captain Payne; Instructors Master Sergeant Kidwell and Sergeant First Class Westendorf; Staff Sergeant Wise; Supply Technician Hebert; Cadet Records Clerk Sain.

The Army Reserve Officers' Training Corps program emphasizes the leadership and management skills required for success in military or civilian careers. Students find that the student-faculty interaction improves self-confidence and overall academic performance.

Army ROTC prepares students to serve as officers in the Army, Army National Guard, and Army Reserve.

The courses are open to all students. Students, both undergraduate and graduate, with two years remaining at K-State are eligible to pursue an officer's commission through Army

ROTC. Military science courses are credit-awarding courses and fulfill elective credit requirements in any degree program. Cadets may pursue any curriculum offered by the university.

The military science curriculum consists of the basic course, normally completed during the freshman and sophomore years, and the advanced course, oriented toward the junior and senior years. Texts and other materials required in ROTC courses are provided without cost.

### Basic course

The basic course consists of a series of four 2-hour courses open to all students that may be counted as electives. Enrollment in basic course classes does not obligate a student to military service. Freshmen will normally enroll in MSCI 110 and 111. Sophomores will normally enroll in MSCI 210 and 211.

### Advanced course

The Army ROTC advanced course is structured to develop the leadership potential of students choosing to pursue an officer's commission. Prerequisites for the advanced course may be satisfied in a number of ways; specific questions on individual eligibility should be addressed to the department staff.

Students accepted into the advanced course agree to complete the curriculum and to accept an Active Army, Army Reserve, or Army National Guard commission, if offered. Each advanced course cadet receives a \$100-per-month allowance during the school year in return for this agreement. A six-week advanced summer camp, with pay, is an integral part of the advanced course and normally is completed between the junior and senior years. Airborne, Air Assault, and the Northern Warfare training courses are U.S. Army schools available to qualified volunteers in addition to other training opportunities.

### Basic camp

A six-week ROTC basic summer camp, with pay, is available. This allows ROTC participation by students who have not taken basic course classes. Application should be made to the Department of Military Science early in the spring semester. Students will attend ROTC Basic Camp during the summer. Satisfactory completion of the ROTC Basic Camp earns 4 hours academic credit and satisfies all prerequisites for entry into the advanced course. Attendance at the ROTC Basic Camp does not incur any military obligation.

### Discharge of duty

Federal laws provide that ROTC graduates may discharge their military obligation in one of two ways: (1) two to four years of active duty with the remainder of the statutory eight-year obligation completed with the Army

Reserve or National Guard organizations; or (2) three to six months active duty for training with the remainder of an eight-year obligation completed with Army Reserve or National Guard organizations. Preferences indicated by the graduate for a particular form of service are normally respected. Members of Army National Guard and Army Reserve units may enter the Simultaneous Membership Program. This program allows cadets to serve with a National Guard or Army Reserve unit while in Army ROTC, receiving both financial assistance and valuable experience.

## Scholarships

The Army provides three- and four-year scholarships to selected high school and college students. These scholarships provide full tuition and fees, an allowance for books and supplies, and \$100 per school month. The scholarships are available on a competitive basis to all students, regardless of present enrollment in Army ROTC, who wish to receive commissions as officers. They must have two years remaining towards undergraduate or graduate programs. These scholarships, applied for during the spring semester, become effective the following fall. In addition to the Army ROTC scholarships, the Kansas Army National Guard offers one-, two-, three-, or four-year scholarships to selected high school and college students. The Kansas Army National Guard ROTC Scholarship is for Kansas residents and pays in-state tuition only.

## Voluntary organizations

The department sponsors two voluntary organizations, a student chapter of the Association of the United States Army, KSU Battalion Honor Guard, and the ROTC Ranger Company. The AUSA chapter engages in professional and community service activities including United Way campaign support, field trips, and food drives. The Honor Guard performs both university and non-university ceremonies as well as home football and basketball games. The ROTC Ranger Company provides additional tactical training and leadership experience. It supplements ROTC classroom instruction and field training to better prepare cadets for Advanced Camp and to be Army officers.

## Recommended courses

In recognition of leadership's many facets, the department requires that students enrolled in ROTC select from a number of university courses that complement the leadership program. One course each in written communication skills, human behavior, military history, computer literacy, and math are required. Students receiving Army ROTC scholarships are required to take one semester of an Indo-European or Asiatic language. In addition to the required courses, one course each in national security policy and management is rec-

ommended. The majority of these courses may be applied as elective classes for the student's degree requirements. A list of acceptable courses is available at the Department of Military Science.

## Basic course

### Undergraduate credit

**MSCI 102. Basic Riflery and Introduction to Military Science.** (1) I, II. Basic riflery and three-position match shooting, including a brief introduction to the Army ROTC program.

**MSCI 110. Military Science 1A—Introduction to Military Environment I.** (2) I. Introduction to Army ROTC, including the study of survival skills, with a weekly leadership lab. Topics include: first aid, mountaineering, map reading, military customs and courtesies.

**MSCI 111. Military Science 1B—Introduction to Military Environment II.** (2) II. Introduction to leadership including small unit tactics, weapons, military geography, radio procedures, and land navigation, with a weekly leadership lab.

**MSCI 106. Basic Military Skills.** (1) I, II. Students will be exposed to a variety of skills practiced in the military to include: tactics, effective communications, map reading, weapons employment, and survival.

**MSCI 107. Rappel Master Skills.** (1) I, II. Students will be exposed to all the skills needed to conduct a rappelling session from a fixed facility. Skills to be taught will include: proper knots, anchoring techniques, rappel master duties and responsibilities, and safety, equipment inspection, correct rappel procedures, and overall supervision of rappelling. Instructor permission required.

**MSCI 210. Military Science 2A—Introduction to Military Leadership.** (2) I. An introduction to the role of the U.S. Army, Army Reserve, and National Guard. Includes the customs and traditions of the service, the Army rank structure, branches of the Army, and military life. It includes leadership labs to introduce the student to Army drill and ceremonies, and physical fitness requirements.

**MSCI 211. Military Science 2B—Leadership and Military Skills.** (2) II. Military geography, map reading, and land navigation. Concepts of military leadership to include conducting military inspections, and a weekly leadership lab.

**MSCI 250. Military Science 2C.** (4) S. A six-week basic course summer camp taught off campus at Fort Knox, Kentucky. Camp content includes lectures, demonstrations, practical exercises in leadership, and other military-related skills. Pr.: Two years remaining on campus after completion of camp, meeting the physical standards, and permission of the professor of military science.

## Advanced course

### Undergraduate credit

**MSCI 310. Military Science 3A—Leadership and Small Unit Tactics I.** (3) I. Military communications, advanced leadership and management, small unit tactics, preparation for summer camp, and a weekly leadership lab. Pr.: Completion of basic course or acceptable equiv.

**MSCI 311. Military Science 3B—Leadership and Small Unit Tactics II.** (3) II. Military communications, advanced leadership and management, small unit tactics, preparation for summer camp, and a weekly leadership lab. Pr.: Completion of MSCI 310.

**MSCI 305. Leadership Studies and Practical Applications.** (3) I, II. Study of small unit tactics, practical application of leadership skills, individual projects in preparation for Advanced Camp and a weekly leadership lab. Pr.: Completion of basic course or acceptable equiv.

**MSCI 307. Military Fitness and Physical Training.** (3) I, II. Strenuous physical conditioning in preparation for third year cadets' attendance at summer advanced camp. Pr.: Instructor permission only.

**MSCI 410. Military Science 4A—Military Management I.** (3) I. Administrative and staff operations and procedures,

military law, career planning, ethics, and a weekly leadership lab. Pr.: Completion of MSCI 310 and 311.

**MSCI 411. Military Science 4B—Military Management II.** (3) II. Administrative and staff operations and procedures, military law, career planning, ethics, and a weekly leadership lab. Pr.: Completion of MSCI 310 and 311.

**MSCI 405. Management Studies and Practical Applications.** (3) I, II. Advanced study of military ethics, practical application of management skills, individual projects in preparation for commissioning and a weekly leadership lab. Pr.: Completion of two 300-level military science courses.

**MSCI 510. Military Science 5A—Transition to Officer-ship I.** (3) Administrative and staff operations and procedures. Study of staff interactions and group effort towards a common objective. Pr.: Completion of MSCI 310, 311, 410.

**MSCI 511. Military Science 5B—Transition to Officer-ship II.** (3) Administrative and staff operations and procedures advanced study of staff interactions and group effort towards a common objective. Pr.: Completion of MSCI 510.

**MSCI 550. Military Science 6A—Advanced Military Research Techniques I.** (3) Study and analysis of leadership dimensions, individual projects studying historical military leaders through an analysis of their leadership style and skill through the sixteen leadership dimensions. Pr.: Completion of MSCI 510 and 511.

**MSCI 551. Military Science 6B—Advanced Military Research Techniques II.** (3) Advanced study and analysis of leadership dimensions, individual projects studying historical military leaders through an analysis of their leadership style and skill through the sixteen leadership dimensions. Pr.: Completion of MSCI 550.

## Modern Languages

Bradley Shaw,\* Head

Professors Corum,\* Dehon,\* and Ossar,\* Associate Professors Alexander,\* Benson,\* Kolonosky,\* McGraw,\* Shaw,\* and Tunstall,\* Assistant Professors Binkowski, Clark, Garavito,\* Ihrie,\* Miller,\* Oropesa,\* and Sauter,\* Instructors Driss and Pigno.

All regular courses offered by the Department of Modern Languages may be taken by non-majors on an A/Pass/F basis, subject to the provisions of the university policy. Language laboratories are offered only on a Credit/No-Credit basis.

Students majoring in languages should enroll for the bachelor of arts degree.

Within the modern language major, French, German, and Spanish are offered; in highly unusual cases, a major in classics or Russian may be arranged.

For a language major, 30 hours in a single language above the level of I and II must be completed. Students majoring in a language must take the two survey courses in the literature of that language. In French or German, the student must also take three literature courses at the 700 level. In Spanish the student must take at least one course from three of the following four groups: 751, 752, 755; 761, 764, 775; 756, 757, 763; 760, 771, 772. A minimum 2.0 GPA in courses taken as part of the major is required for graduation.

Students preparing for graduate school or for high school teaching should consider taking the corollary course in linguistics, LG 600. Six hours in the history of the country 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 before or at the beginning of the first semester of language study. If there is any doubt as to proper placement, the head of the Department of Modern Languages should be consulted.

Students wishing to acquire retroactive credit for language proficiency gained before coming to K-State should consult with the head of the Department of Modern Languages.

## Programs abroad

The department sponsors summer study programs in Cuernavaca, Mexico, and cooperates with German exchange programs in Germany, Austria, and Switzerland. All inquiries should be addressed to the head of the department.

## Honors program courses

### Undergraduate credit

**MLANG 297. Honors Introduction to the Humanities I.** (3) I. Study of selected major works of history, literature, and philosophy which have been of central importance in the Western cultural tradition. Considerable emphasis is placed on classroom discussion and writing interpretive essays. Limited to entering freshman students. Pr.: Consent of instructor. Same as ENGL 297, HIST 297, PHIL 297.

**MLANG 298. Honors Introduction to the Humanities II.** (3) II. Continuation of MLANG 297. Pr.: MLANG 297 or consent of instructor. Same as ENGL 298, HIST 298, PHIL 298.

**MLANG 399. Honors Seminar in Modern Languages.** (1–3) I, II. Reading and discussion of selected masterpieces of European literature in English translation. Open to non-language majors in the honors program.

**MLANG 499. Senior Honors Thesis.** (2) I, II, S. Open only to seniors in the arts and sciences honors program.

## Modern language courses

### Undergraduate and graduate credit in minor field

**FREN 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.

**GRMN 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.

**LATIN 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.

**MLANG 507. European Literature in Translation.** (3) Selected readings in English from the major authors of Europe and the Spanish-speaking world.

**RUSSN 504. Russian Literature in Translation: The Nineteenth Century.** (3) Survey of the principal writers of tsarist Russia with emphasis upon Turgenev, Dostoevsky, Tolstoy, and Chekhov.

**RUSSN 508. Russian Literature in Translation: The Soviet Period.** (3) The development of Russian literature

since the Revolution, with emphasis upon Mayakovsky, Sholokov, Pasternak, and Solzhenitsyn.

**SPAN 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.

## Arabic courses

### Undergraduate credit

**ARAB 181. Arabic I.** (4) Introduction to the structure of modern Arabic. Essentials of grammar, speaking, reading, and writing.

**ARAB 182. Arabic II.** (4) Continuation of Arabic I. Pr.: ARAB 181 or equiv.

**ARAB 281. Arabic III.** (4) Further development of language skills. Pr.: ARAB 182 or equiv.

**ARAB 282. Arabic IV.** (3) Continuation of Arabic III. Pr.: ARAB 281 or equiv.

### Undergraduate and graduate credit in minor field

**ARAB 540. Special Studies in Arabic.** (Var.) Pr.: Consent of the department head and instructor involved.

## French courses

**FREN 001. Orientation for Summer School Program in Paris.** (0)

### Undergraduate credit

**FREN 109. French I.** Language laboratory. Strongly recommended for students taking French I. Conc. enrollment in French I required. For Credit/No Credit only. Credit given only upon receiving a passing grade for the conc. section of French I.

**FREN 110. French II.** (1) Language laboratory. Strongly recommended for students taking French II. Conc. enrollment in French II required. For Credit/No Credit only. Credit given only upon receiving a passing grade for the conc. section of French II.

**FREN 111. French I.** (4) Introduction to the structure of modern French, emphasizing the spoken language with practice in the language laboratory.

**FREN 112. French II.** (4) Continuation of French I, completion of basic presentation of the structure of French. Emphasis on spoken language, use of language lab. Pr.: FREN 111 or equiv.

**FREN 211. French III.** (4) Intensive review of the structure of the French language. Reading and discussion of French prose. Pr.: FREN 112 or equiv.

**FREN 212. Elementary French Conversation IIIA.** (2) Course not open to fluent speakers of French. Normally to be taken conc. with French III. Pr.: FREN 112 or equiv.

**FREN 213. French IV.** (3) Reading and discussion of modern French prose and review of the more difficult points of French grammar. Pr.: FREN 211 or equiv.

**FREN 214. French Conversation IVA.** (2) Continued practice in conversational French. Not open to fluent speakers of French. Normally to be taken conc. with French IV. Pr.: FREN 211 or equiv.

**FREN 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.

**FREN 510. 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.

### Undergraduate and graduate credit in minor field

**FREN 511. Masterpieces of French Literature I.** (3) The reading and discussion of major works of French literature from the Middle Ages to the end of the eighteenth century. Pr.: FREN 213 or equiv.

**FREN 512. Masterpieces of French Literature II.** (3) The reading and discussion of major works of French literature from the early nineteenth century to the present. Pr.: FREN 213 or equiv.

**FREN 513. French Composition and Grammar.** (3) Review in depth of the structure of the language. Intensive practice in written and conversational French. Pr.: FREN 213 or equiv.

**FREN 514. French Civilization.** (3) Introduction to French culture with special emphasis on social and historical developments since World War II. Pr.: 18 hours of college French or equiv.

**FREN 516. Readings in French.** (3) Practice in reading a variety of literary, journalistic, and specialized texts. Pr.: FREN 213 or equiv.

**FREN 517. Commercial French.** (3) Advanced grammar necessary for adequate oral and written expression in international business and diplomatic situations, including specialized terminology, conversation and discussion, and translation. Pr.: FREN 213.

**FREN 518. Advanced French Conversation.** (3) II. Practice in spoken French, with emphasis on idiomatic expression. Course not open to students whose primary language is French and whose competence has been demonstrated in the language at this level. Pr.: FREN 213.

**FREN 519. Special Studies in French.** (Var.) Pr.: Consent of department head and instructor involved.

### Undergraduate and graduate credit

**FREN 709. Medieval French Literature.** (3) An introduction to literary forms, style, and thought from the eleventh century to the fifteenth century in France. Readings in modern French include Chanson de Roland, Chretien de Troyes, Roman de la Rose, etc. Pr.: 21 hours of college French or equiv.

**FREN 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.

**FREN 711. Seventeenth-Century French Literature I.** (3) I. Various literary forms of the French baroque period. Reading of representative texts by Corneille, Pascal, Descartes, and others. Pr.: 21 hours of college French or equiv.

**FREN 712. Seventeenth-Century French Literature II.** (3) II. Various literary forms of the French classical period. Reading of representative texts by Moliere, Racine, Lafayette, La Fontaine, and others. Pr.: 21 hours of college French or equiv.

**FREN 713. Eighteenth-Century French Literature.** (3) Critical study of the literature of the Enlightenment. Pr.: 21 hours of college French or equiv.

**FREN 714. Nineteenth-Century French Literature I.** (3) A study of preromanticism and romanticism. Pr.: 21 hours of college French or equiv.

**FREN 715. Nineteenth-Century French Literature II.** (3) A study of realism, naturalism, and symbolism. Pr.: 21 hours of college French or equiv.

**FREN 716. Twentieth-Century French Literature I.** (3) The study of major themes and trends in the novel, drama, and poetry as reflected in representative works of such authors as Proust, Mauriac, Cocteau, Claudel, Valery, and others. Pr.: 21 hours of college French or equiv.

**FREN 717. Twentieth-Century French Literature II.** (3) Reading and analysis of recent innovations in literary theory and practice as found in the works of such authors as Sartre, Camus, Beckett, Ionesco, Robbe-Grillet, Sarraute, and others. Pr.: 21 hours of college French or equiv.

**FREN 718. The French Novel.** (3) The development of the novel from the seventeenth century to the present, seen through selected masterworks. Pr.: 21 hours of college French.

**FREN 719. Advanced Spoken and Written French.** (3) II. An advanced, intensive study of French prose style. Introduction to the techniques of translation from English to French. Intensive practice in oral style and diction. Pr.: 21 hours of college French.

**FREN 720. Seminar in French.** (3) A seminar with variable topics. Pr.: Senior standing or consent of the instructor.

**FREN 742. French Literature in Second Language Learning.** (3) Analysis of literary texts from French-speaking countries within their cultural context. The development of interpretive skills and application to the French curriculum will be emphasized. Pr.: 24 credits at 200 or above in French, or equivalent.

**FREN 743. French-Speaking Cultures in Second Language Learning.** (3) Emphasis on the study of French culture and applications to the French curriculum, including the development of materials. Pr.: 24 credits at 200 or above in French, or equivalent. Cross-listed with EDSEC 743.

**FREN 799. Problems in Modern Languages.** (Var.)

## German courses

**GRMN 002. Orientation for Summer School Program in Germany.** (0)

### Undergraduate credit

**GRMN 119. German II.** (1) Language laboratory. Strongly recommended for students taking German I. Conc. enrollment in German I required. For Credit/No Credit only. Credit given only upon receiving a passing grade for the conc. section of German I.

**GRMN 120. German III.** (1) Language laboratory. Strongly recommended for students taking German II. Conc. enrollment in German II required. For Credit/No Credit only. Credit given only upon receiving a passing grade for the conc. section of German II.

**GRMN 121. German I.** (4) Introduction to the structure of modern German. Practice of the spoken language with additional experience in the language lab.

**GRMN 122. German II.** (4) Continuation and conclusion of the introduction to modern German, reading of selected prose texts. Pr.: GRMN 121 or equiv.

**GRMN 221. German III.** (4) Reading and discussion of a selection of modern German prose and review of the structure of German. Pr.: GRMN 122 or equiv.

**GRMN 222. Elementary German Conversation IIIA.** (2) Practice in beginning conversational German. Course not open to fluent speakers of German. Course normally taken conc. with German III. Pr.: GRMN 122 or equiv.

**GRMN 223. German IV.** (3) Reading and discussion of modern German prose and review of the more difficult points of German grammar. Pr.: GRMN 221 or equiv.

**GRMN 224. German Conversation IVA.** (2) Continued practice in conversational German. Course not open to fluent speakers of German. Normally taken conc. with German IV. Pr.: GRMN 221 or equiv.

**GRMN 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.

### Undergraduate and graduate credit in minor field

**GRMN 521. Introduction to German Literature I.** (3) Literary movements of the nineteenth century are introduced through the reading and discussion of texts in various forms and by representative authors. Pr.: GRMN 223 or equiv.

**GRMN 522. Introduction to German Literature II.** (3) Discussion of significant works of twentieth-century prose, poetry, and drama. Special emphasis is placed on the literature of recent decades. Pr.: GRMN 223 or equiv.

**GRMN 523. German Composition.** (3) A study of German syntax and exercises in composition. Pr.: GRMN 223 or equiv.

**GRMN 524. German for Reading Knowledge I.** (3) The grammar and syntax of German and the reading of basic material selected from modern German texts. Not for fulfillment of humanities distribution requirement.

**GRMN 525. German for Reading Knowledge II.** (3) Continued reading of material from modern German texts.

Not for fulfillment of humanities distribution requirement. Pr.: GRMN 524 or equiv.

**GRMN 526. Business German.** (3) Advanced grammar necessary for adequate oral and written expression in international business and diplomatic situations, including specialized terminology, conversation and discussion, and translation. Pr.: GRMN 523.

**GRMN 527. Advanced German Conversation.** (3) Intensive practice in conversation. Course not open to students whose primary language is German and whose competence has been demonstrated in the language at this level. Pr.: GRMN 223 or equiv.

**GRMN 529. Special Studies in German.** (Var.) Pr.: Consent of department head and instructor involved.

**GRMN 530. German Civilization.** (3) II. The political and cultural development of the German-speaking people and their role and influence in the history of the Western world. Pr.: 18 hours of college German.

### Undergraduate and graduate credit

**GRMN 721. German Classicism.** (3) I. Reading and discussion of late eighteenth-century texts, including works by Goethe, Schiller, Hoelderlin, etc. Pr.: 21 hours of college German or equiv.

**GRMN 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.

**GRMN 723. Goethe and Faust.** (3) I. The writings of Goethe and his masterpiece, Faust. Pr.: 21 hours of college German or equiv.

**GRMN 724. German Prose and Drama of the Nineteenth Century.** (3) II. 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.

**GRMN 725. Early Twentieth-Century German Literature.** (3) II. A study of the drama and lyric of naturalism, neoclassicism, neo-romanticism, and expressionism. Pr.: 21 hours of college German.

**GRMN 726. German Literature since 1945.** (3) I. A discussion of the postwar writings of the Gruppe 47, Swiss playwrights, and others. Pr.: 21 hours of college German.

**GRMN 727. The Modern German Novel.** (3) II. Theory of the German novel with examples from authors such as Mann, Hesse, Grass, and others. Pr.: 21 hours of college German.

**GRMN 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.

**GRMN 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.

**GRMN 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.

**GRMN 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.

**GRMN 733. The Enlightenment and Storm and Stress.** (3) A study of representative texts from various movements in German literature and culture of the eighteenth century, including Empfindsamkeit and Rococo. Such authors as Gottsched, Klopstock, Lessing, Lichtenberg, Wieland, and the young Goethe and Schiller will be discussed. Pr.: 21 hours of college German.

**GRMN 734. Literature of the German Democratic Republic.** (3) A study of the literary developments within the German Democratic Republic. The course will consider the writers' role in a socialist society and their impact upon the cultural scene. Readings will include representative works from all genres. Pr.: 21 hours of college German.

**GRMN 740. German Literature in Second-Language Learning.** (3) Analysis of literary texts from German-speaking countries within their cultural context. The development of interpretive skills and application to the German curriculum will be emphasized. Pr.: 24 credits of 200 or above in German or equiv.

**GRMN 741. German Culture in Second-Language Learning.** (3) Emphasis on the study of German culture and application to German curriculum including the development of materials. Pr.: 24 credits of 200 and above in German or equiv. Same as EDSEC 741.

**GRMN 799. Problems in Modern Languages.** (Var.)

## Italian courses

### Undergraduate credit

**ITAL 129. Italian II.** (1) Language laboratory. Strongly recommended for students taking Italian I. Conc. enrollment in Italian I required. For Credit/No Credit only. Credit given only upon receiving a passing grade for the conc. section of Italian I.

**ITAL 130. Italian III.** (1) Language laboratory. Strongly recommended for students taking Italian II. Conc. enrollment in Italian II required. For Credit/No Credit only. Credit given only upon receiving a passing grade for the conc. section of Italian II.

**ITAL 131. Italian I.** (4) Introduction to the structure of modern Italian.

**ITAL 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.: ITAL 131 or equiv.

**ITAL 231. Italian III.** (4) Grammar review and reading selections from Italian literature. Pr.: ITAL 132 or equiv.

**ITAL 232. Italian IV.** (3) Selective review of grammar and reading of examples of modern Italian literature. Pr.: ITAL 231 or equiv.

**ITAL 520. Special Studies in Italian.** (Var.) Pr.: Consent of department head and instructor involved.

## Japanese courses

### Undergraduate credit

**JAPAN 191. Japanese I.** (4) I. Basic introduction to the structure of the Japanese language, emphasizing oral skills and the development of reading and writing skills.

**JAPAN 192. Japanese II.** (4) II. Continuation of Japanese I, completion of the basic presentation of structural and linguistic principles of the Japanese language.

**JAPAN 291. Japanese III.** (4) I. Intensive review of the structure of spoken and written Japanese, and the development of basic skills. Pr.: JAPAN 192 or equiv. course.

**JAPAN 292. Japanese IV.** (3) II. Continuation of Japanese III, with emphasis on conversation and reading skills. Pr.: JAPAN 291 or equiv. course.

**JAPAN 293. Japanese IVA: Intermediate Reading and Writing Lab.** (2) II. To be taken simultaneously with JAPAN 292. Designed to enhance the student's vocabulary, reading comprehension, and writing skills. Using Kanji ideographic characters in various situations, also reading authentic Japanese literature with Kanji, Hiragana, and Katagana. Pr.: JAPAN 291 or equiv. course

## Latin courses

### Undergraduate credit

**LATIN 105. Latin and Greek for Scientists.** (1) I. The course is designed specifically to provide students of the biological sciences with a background in Latin and Greek roots of scientific terms. Emphasis on prefixes, suffixes, and word derivations. No prior knowledge of either Latin or Greek is required. Course may not be applied toward the fulfillment of either language or humanities requirements for any degree.

**LATIN 141. Latin I.** (4) An introductory study of the structure of Latin.

**LATIN 142. Latin II.** (4) Continuation and completion of the study of the structure of Latin. Pr.: LATIN 141.

**LATIN 241. Latin III.** (4) Review of Latin grammar and reading of an anthology of Roman prose and poetry. Pr.: LATIN 142.

**LATIN 242. Latin IV.** (3) Continuation of the study of Latin syntax and grammar, based upon the reading of Roman prose and poetry. Pr.: LATIN 241.

**LATIN 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.

### Undergraduate and graduate credit in minor field

**LATIN 549. Special Studies in Latin.** (Var.) Pr.: Consent of the department head and instructor involved.

## Linguistics courses

### Undergraduate and graduate credit in minor field

**LG 730. Foundations of Semiotics.** (3) II. The general theory of signs; detailed classification of signs and examination of several semiotic systems such as language, literature, culture, and society. The semiotics of communication and signification. Pr.: Senior standing.

### Undergraduate and graduate credit

**LG 600. Principles of Linguistics.** (3) Same as LING 600 and ENGL 600.

**LG 601. General Phonetics.** (3) Same as LING 601 and ENGL 601.

**LG 602. Historical Linguistics.** (3) Same as LING 602 and ENGL 602.

**LG 603. Topics in Linguistics.** (3) Same as LING 603 and ENGL 603.

**LG 783. Phonology I.** (3) Same as LING 783 and ENGL 783.

**LG 785. Syntax I.** (3) Same as LING 785 and ENGL 785.

**LG 792. Field Methods in Linguistics.** (3) Same as LING 792.

## Portuguese courses

### Undergraduate credit

**PORT 163. Portuguese I.** (4) I. Introduction to the structure of the Portuguese language, stressing Brazilian usage, and emphasizing oral and written skills.

**PORT 164. Portuguese II.** (4) II. Continuation of Portuguese I, completion of the basic presentation of structural and linguistic principles of the Portuguese language. Pr.: PORT 163 or equiv. course.

**PORT 266. Portuguese III.** (4) I. Intensive review of syntax and a comprehensive structural review of modern Portuguese, stressing Brazilian usage, with emphasis on composition and conversation. Pr.: PORT 164 or equiv.

**PORT 267. Portuguese IV.** (3) II. Reading and discussion of selections from contemporary prose, emphasizing Brazilian writings, and review of grammatical structures as needed. Pr.: PORT 266 or equiv.

### Undergraduate and graduate credit in minor field

**PORT 572. Special Studies in Portuguese.** (1-3) Pr.: 15 hours of Portuguese and consent of instructor.

## Russian courses

### Undergraduate credit

**RUSSN 149. Russian II.** (1) Language laboratory. Strongly recommended for students taking Russian I. Conc. enrollment in Russian I required. For Credit/No Credit only. Credit given only upon receiving a passing grade for the conc. section of Russian I.

**RUSSN 150. Russian III.** (1) Language laboratory. Strongly recommended for students taking Russian II.

Conc. enrollment in Russian II required. For Credit/No Credit only. Credit given only upon receiving a passing grade for the conc. section of Russian II.

**RUSSN 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.

**RUSSN 152. Russian II.** (4) II. Continuation of the study of Russian grammar and oral communication. Pr.: RUSSN 151 or equiv.

**RUSSN 250. Russian Culture and Civilization.** (3) Russia's past and present in the light of principal ideologies with emphasis upon fine art, literature, music, religion, politics, and education. Equal time will be devoted to the Tsarist and Soviet periods. Knowledge of Russian is not required. Same as HIST 250.

**RUSSN 251. Russian III.** (4) I. Completion of the study of Russian grammar. Reading of selected prose on the intermediate level. Pr.: RUSSN 152 or equiv.

**RUSSN 252. Russian IV.** (3) II. Intensive review of Russian grammar. Exercises in reading selected modern Russian texts in the original. Pr.: RUSSN 251 or equiv.

**RUSSN 504. Russian Literature in Translation: The Nineteenth Century.** (3) Survey of principal writers of Tsarist Russia with emphasis upon Turgenev, Dostoevsky, Tolstoy, and Chekhov.

**RUSSN 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.

### Undergraduate and graduate credit in minor field

**RUSSN 551. Russian V.** (3) Reading of Russian short stories of the nineteenth and twentieth centuries, including works by Pushkin, Lermontov, Dostoevsky, and Chekhov.

**RUSSN 552. Survey of Russian Literature.** (3) A history of Russian literature from its beginnings until the present, with emphasis on the works of the nineteenth century, including those of Pushkin, Lermontov, Gogol, Turgenev, Dostoevsky, and Tolstoy.

**RUSSN 553. Russian Conversation and Composition.** (3) Discussion in Russian. Extensive practice in writing Russian compositions.

**RUSSN 559. Special Studies in Russian.** (Var.) Pr.: Consent of department head and instructor involved.

## Spanish courses

**SPAN 003. Orientation for Summer School Abroad Program in Cuernavaca, Mexico.** (0)

### Undergraduate credit

**SPAN 159. Spanish II.** (1) Language laboratory. Strongly recommended for students taking Spanish I. Conc. enrollment in Spanish I required. For Credit/No Credit only. Credit given only upon receiving a passing grade for the conc. section of Spanish I.

**SPAN 160. Spanish III.** (1) Language laboratory. Strongly recommended for students taking Spanish II. Conc. enrollment in Spanish II required. For Credit/No Credit only. Credit given only upon receiving a passing grade for the conc. section of Spanish II.

**SPAN 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.

**SPAN 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.: SPAN 161 or equiv.

**SPAN 261. Spanish III.** (4) An intensive review of syntax and a comprehensive structural review of Spanish, with emphasis on composition and conversation. Pr.: SPAN 162 or equiv.

**SPAN 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 conc. with Spanish III.

**SPAN 263. Spanish IV.** (3) Reading and discussion of selections from contemporary prose, and review of grammatical structures as needed. Pr.: SPAN 261 or equiv.

**SPAN 264. Elementary Spanish Conversation IVA.** (2) Continuation of Elementary Spanish Conversation IIIA. Should be taken conc. with Spanish IV.

**SPAN 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.

### Undergraduate and graduate credit in minor field

**SPAN 563. Introduction to the Literature of Spanish America.** (3) Reading and analysis of representative works of Spanish-American literature from the colonial period to the present. Pr.: SPAN 263 or equiv.

**SPAN 564. Spanish Composition and Grammar.** (3) I. The grammar and syntax of modern Spanish. Course not open to those students whose primary language is Spanish and whose competence has been demonstrated in the language at this level. Pr.: SPAN 263 or equiv.

**SPAN 565. Spanish Civilization.** (3) I. Survey of Spanish culture and civilization from its beginnings to the present; emphasis on Spanish contributions over the centuries in the humanistic field. Pr.: SPAN 263 or equiv.

**SPAN 566. Hispanic-American Civilization.** (3) II. Survey of Spanish-American culture and civilization from 1492 to the present. Pr.: SPAN 263 or equiv.

**SPAN 567. Introduction to the Literature of Spain.** (3) Reading and analysis of representative works of Spanish literature from its beginnings to the present. Pr.: SPAN 263 or equiv.

**SPAN 569. Special Studies in Spanish.** (Var.) Pr.: Consent of department head and instructor involved.

**SPAN 571. Advanced Spanish Conversation.** (3) II. Intensive practice in conversation. Course not open to those students whose primary language is Spanish and whose competence has been demonstrated in the language at this level. Pr.: SPAN 263 or equiv.

**SPAN 573. Spanish for Professions.** (3) Advanced grammar necessary for adequate oral and written expression in selected professional disciplines (such as business, health professions, and human services), including specialized terminology, conversation and discussion, and translation. Pr.: SPAN 564 or equiv.

**SPAN 574. Hispanic Readings.** (3) Practice in reading a variety of literary, journalistic, and specialized texts. Pr.: SPAN 263 or equiv.

### Undergraduate and graduate credit

**SPAN 751. Spanish-American Narrative to 1950.** (3) Development of the narrative in Spanish America from the colonial period to the mid-twentieth century. Analysis and discussion of representative authors from various regions. Pr.: 21 hours of college Spanish or equiv.

**SPAN 752. Contemporary Spanish-American Narrative.** (3) Analysis and discussion of the narrative since approximately 1950, including such outstanding writers as Borges, Cortazar, Fuentes, Garcia Marquez, and Vargas Llosa. Pr.: 21 hours of college Spanish or equiv.

**SPAN 755. Spanish-American Poetry and Drama.** (3) Analysis and discussion of Spanish-American poetry and drama, with emphasis on twentieth-century theater. Readings of selected major poets and leading playwrights from various regions of Spanish America. Pr.: 21 hours of college Spanish or equiv.

**SPAN 756. Nineteenth-Century Spanish Literature.** (3) The reading and study of nineteenth-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.

**SPAN 757. Perez Galdos and the Generation of '98.** (3) Reading and analysis of works by Perez Galdos and such members of the Generation of '98 as Unamuno, Benavente, and Machado, within the historical and cultural framework

of the late nineteenth and early twentieth centuries. Pr.: 21 hours of college Spanish or equiv.

**SPAN 760. Advanced Spoken and Written Spanish.** (3) Intensive review of grammatical structure and refinement of standard Spanish usage. Extensive practice in composition and conversation, and translations from English into Spanish. Pr.: 21 hours of college Spanish or equiv.

**SPAN 761. Medieval and Renaissance Literature.** (3) Reading and interpretation of the principal literary works of Medieval and Renaissance Spain, from the jarchas and the Poema de Mio Cid to the crónicas and La Celestina, studied within the historical and cultural context of each. Pr.: 21 hours of college Spanish or equiv.

**SPAN 763. Twentieth-Century Spanish Literature.** (3) The major writers and directions of twentieth-century literature in Spain. Analysis and discussion of the works of such representative authors as Unamuno, Jiménez, Guillén, Lorca, Cela, Buero Vallejo, and Delibes. Pr.: 21 hours of college Spanish.

**SPAN 764. Spanish Literature of the Golden Age.** (3) Reading and analysis of the works of such major writers as Lope de Vega, Tirso de Molina, Calderón de la Barca, Garcilaso, Fray Luis de León, San Juan de la Cruz, Gongora, and Quevedo, as well as selected works from the picaresque tradition. Pr.: 21 hours of college Spanish or equiv.

**SPAN 771. Introduction to Spanish Translation.** (3) Translation theory and practice as applied to Spanish. Translations from Spanish to English and English to Spanish, involving unique problems related to science, business, reporting, and literature. Pr.: 21 hours of college Spanish or equiv.

**SPAN 772. The Hispanic World Today.** (3) An investigation of selected social, political, and humanistic aspects of contemporary Hispanic culture. Pr.: 21 hours of college Spanish or equiv.

**SPAN 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.

**SPAN 777. Hispanic Cultures in Second-Language Learning.** (3) Emphasis on the study of Spanish culture and applications to the Spanish curriculum, including the development of materials. Pr.: 24 credits in Spanish at 200 or above or equiv. Same as EDCI 771.

**SPAN 778. Spanish and Spanish-American Literature in Second-Language Learning.** (3) Analysis of literary texts from Spanish-speaking countries, with emphasis on the development of interpretive skills and application to the Spanish curriculum. Pr.: 24 credits in Spanish at 200 or above or equiv.

**SPAN 779. Seminar in Spanish.** (3) A seminar with variable topics. Pr.: Senior standing or consent of the instructor.

**SPAN 799. Problems in Modern Languages.** (Var.)

## South Asian languages courses

### Undergraduate credit

**URDU 171. Hindi/Urdu I.** (4) I. Introduction to the structure of Hindi and Urdu, two languages which are nearly identical in the grammatical structure of their everyday spoken style. Hindi is the dominant language of northern India. Urdu is the national language of Pakistan, also understood throughout the Hindi area.

**URDU 172. Hindi/Urdu II.** (4) II. Continuation of Hindi/Urdu I with introduction of the Devanagari (Hindi and Sanskrit) script. Pr.: URDU 171.

**URDU 273. Hindi/Urdu III.** (4) I. Continuation of Hindi/Urdu II with gradual transition to more formal styles of language. Pr.: URDU 172.

**URDU 274. Hindi/Urdu IV.** (4) II. Continuation of Hindi/Urdu III with readings in Hindi or Urdu literature according to needs of students. Pr.: URDU 273.

### Undergraduate and graduate credit in minor field

**URDU 575. Hindi/Urdu V.** (4) I, II, S. Individual study in Hindi or Urdu. Readings, composition, or conversational

practice relevant to the student's interests and disciplinary needs. May be repeated for credit. Pr.: URDU 274.

### Undergraduate and graduate credit

**URDU 799. Problems in Modern Languages.** (Var.)

## Music

Jack Flouer,\* Head

Professors R. Edwards,\* Flouer,\* Funkhouser,\* Jackson,\* Langenkamp,\* Sloop,\* Sutton,\* and Walker;\* Associate Professors A. Cochran,\* Fallin,\* Littrell,\* Mortenson,\* Parker,\* Polich, Sidorfsky,\* and Tracz; Assistant Professors Brumbelee, M.L. Cochran, Cooper, J. Edwards, Houser, Kull, Royse, and Strain; Instructor Wingfield; Adjunct Betton; Emeriti: Professors Brookhart,\* Shull,\* Steinbauer,\* W. Walker,\* and White;\* Associate Professors Finck; Assistant Professors Caine\* and M. Walker.\*

The Department of Music is a member, with institutional accreditation, of the National Association of Schools of Music.

Curricula in music education and performance with majors in music theatre, composition, voice, piano, organ, strings, woodwind, percussion, 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 performance do not require prerequisites for those not majoring in music; however, availability of instructor and fees for nonmajors are factors in securing performance instruction. 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 performance as an elective.

## Entrance requirements

### New and transfer students

Preliminary placement examinations in piano, the performance major, and theory must be taken by all students majoring in music regardless of the curriculum selected. Students will be advised as to the most appropriate field of concentration and the proper level of study as a result of examination.

Divisional hearings will determine the number of upper-level hours that will be accepted for transfer students.

Students who, on the basis of auditions in their major performance area, have been determined by the faculty to perform at a level lower than that acceptable for MUS 255 will not be allowed to declare a major in music. They will be required to enroll in MUS 251 Pre-Applied Study until such time that their proficiency level is acceptable for MUS 255.

If, on the basis of audition, a music major is determined by the faculty to lack sufficient

proficiency to be a member of a major performing ensemble that student must enroll in Voice Class. A maximum of two semesters of Voice Class may be substituted for the major ensemble requirements.

## Bachelor of arts

120 hours required for graduation

The bachelor of arts with a major in music emphasizes the liberal arts tradition. The program provides enough flexibility in electives for students to meet other preprofessional requirements, and it thus may appeal to students whose professional goals do not terminate with music. The minimum requirement in music is 48 hours, including the following:

MUSIC 201	Styles II, Textures of Music .....	4
MUSIC 202	Styles III, The Classical Period .....	4
MUSIC 213	Styles IV, The Romantic Period .....	4
MUSIC 218	Aural Skills Proficiency .....	0
MUSIC 398	Musical Style of the Baroque .....	4
MUSIC 406	Musical Style to 1600 (Medieval and Renaissance) .....	4
MUSIC 407	Musical Style of the Twentieth Century .....	4

Recital attendance is required for seven semesters (transfer students' records will be evaluated). The major program of music leading to the degree bachelor of arts may be elected with an emphasis in the areas of music literature, composition, or performance.

The music literature area requires 8 hours of electives in music history and music literature. In addition, 8 semester hours in a single performance area are required, of which half must be from the 400 level.

The composition area calls for MUSIC 521 (three hours), 615, 616, 714, 3 semester hours in music literature, and 8 semester hours of piano, of which half must be from the 400 level.

The performance area calls for MUSIC 615 and 616 plus 16 hours of an instrument or voice, of which half must be from the 400 level.

Participation in a music organization (instrumental or choral, depending on the major performance area) is required each semester, and the piano proficiency requirement must be passed before graduation.

## Bachelor of music

129–134 hours required for graduation

A four-year program is offered with concentrations in piano, organ, voice, strings, wind or percussion instruments, music theatre, and composition.

The general education requirements for this degree are listed in the College of Arts and Sciences section of this catalog.

The basic requirements for all options are:

### Basic requirements

MUSIC 201	Styles II, Textures of Music .....	4
MUSIC 202	Styles III, The Classical Period .....	4

MUSIC 213	Styles IV, The Romantic Period .....	4
MUSIC 218	Aural Skills Proficiency .....	0
MUSIC 398	Musical Styles of the Baroque Period ...	4
MUSIC 406	Musical Styles to 1600 (Medieval and Renaissance) .....	4
MUSIC 407	Musical Styles of the Twentieth Century .....	4
MUSIC 473	Seminar in Comprehensive Musicianship .....	2
MUSIC 417	Conducting .....	2
Music elective .....		2
Junior recital .....		0
Senior recital .....		0
MUSIC 050	Recital Attendance (7 semesters) .....	0
MUSIC 060	Piano Proficiency .....	0

#### Additional requirements for music theatre option

MUSIC 255	Voice .....	8
MUSIC 455	Voice .....	11
MUSIC 285	Italian Diction .....	1
MUSIC 287	German Diction .....	1
MUSIC 465	French Diction I .....	1
Major performing organization .....		4
MUSIC 475	Opera Workshop .....	4
MUSIC 492	Methods and Materials of the Studio ...	2
MUSIC 207	Piano Class II .....	1
MUSIC 255	Piano .....	1
Music electives .....		2
THTRE 260	Stage Movement .....	3
THTRE 560	Advanced Stage Movement .....	3
THTRE 261	Fundamentals of Acting .....	3
THTRE 361	Intermediate Acting .....	3
THTRE 761	Advanced Acting .....	3
THTRE 267	Fundamentals of Stage Costuming and Design .....	3
THTRE 368	Fundamentals of Technical Production .....	3
MUSIC 650	History of the Opera .....	3
THTRE 211	Drama Participation .....	2
DANCE 165	Ballet .....	2
Dance electives .....		2
Secondary modern language .....		4

#### Additional requirements for vocal performance

MUSIC 255	Voice .....	8
MUSIC 455	Voice .....	14
Piano Class or Piano .....		4
MUSIC 474	Problems in Musical Style and Music Pedagogy .....	2
MUSIC 615	Canon and Fugue .....	2
MUSIC 616	Twentieth Century Counterpoint .....	2
MUSIC 492	Methods and Materials of the Studio ...	2
Major performing organization each semester .....		4
Diction .....		4
Vocal ensemble or Opera Theatre .....		4
Additional music electives .....		3
Primary modern language (1 additional courses) .....		4
Secondary modern language (1 course) .....		4

#### Additional requirements for instrumental performance

(piano, organ, strings, wind, and percussion instruments):		
MUSIC 255 .....		8
MUSIC 455 .....		14
Major performing organization each semester .....		4
Instrumental ensemble .....		4
Secondary performance area .....		4
MUSIC 474	Problems in Musical Style and Music Pedagogy .....	2
MUSIC 714	Advanced Orchestration .....	2
Additional music electives .....		3
Additional non-music electives .....		10

#### Additional requirements for composition

Major performance area (If piano is major area then 4 hours of a secondary performance area) .....		4
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MUSIC 255 and/or 455	Piano .....	8
MUSIC 474	Problems in Musical Style and Music Pedagogy .....	2
MUSIC 714	Advanced Orchestration .....	2
MUSIC 521	Composition .....	12
MUSIC 615	Canon and Fugue .....	2
MUSIC 616	Twentieth Century Counterpoint .....	2
MUSIC 631	Technology of the Electronic Music Studio .....	2
MUSIC 632	Digital Sound Synthesis .....	2
Major performing organization each semester .....		7
Additional music electives .....		10
Additional non-music electives .....		10

### Bachelor of music education

136–139 hours required for graduation, depending on emphasis

The program of study leading to this degree is a nine-semester curriculum designed to prepare music teachers for grades K–12. With careful planning and enrollment during summer session(s) all requirements may be completed in four years. Within this curriculum there are two emphases—vocal/choral music, and instrumental music.

#### Professional educational requirements

DED 102  
EDCEP 215, 315, 525  
EDCIP 410, 455  
EDSP 323  
EDETC 318  
EDSEC 376, 477, 582  
ENGL 100 and 120 (or ENGL 110 and 125), SPCH 106, and EDAF 215 are required before admittance to EDAF 315. See education requirements for admittance to teacher education.

#### Music requirements for all options

**Comprehensive musicianship:**  
MUSIC 200, 201, 202, 213, 218, 398, 406, 407, 417, and 473

**Music education:**  
MUSIC 511, 512, and 670

**Performance:**  
MUSIC 060, 501 or 502, and study of the major instrument or voice and enrollment in a major choral or instrumental organization each semester except the professional semester. In addition, at least one semester in a small ensemble is required.

#### Additional music requirements for instrumental emphasis

**Performance:**  
MUSIC 203, 204, 206, 207, and 9 semester hours chosen according to the major instrument from: MUSIC 232, 233, 234, 235, 427, 428, and 429

Enrollments in major organizations must include at least two semesters in a choral organization; upon the recommendation of the advisor, one additional semester of individual or class instruction in voice may be substituted.

#### Additional requirements for vocal/choral emphasis

**Performance:**  
If voice is the major performance area, MUSIC 232, 233, 234, 235, 285, and 287 or 465; 4 hours of keyboard. If keyboard is the major performance area, MUSIC 203, 204, 232, 233, 234, 235, 350 (two semesters), 410, and 450

Enrollments in major organizations must include at least two semesters in an instrumental organization; upon the recommendation of the advisor, one semester of advanced instrumental techniques classes may be substituted.

Requirements in general education are stated earlier in the College of Arts and Sciences section.

### General regulations for all performance areas

As a part of performance requirements, studio and divisional seminars and general student recitals are held regularly. Each student is required to perform at least once a semester either in a studio seminar or in a student recital. All private study for credit will culminate in a jury exam each term.

Each division faculty maintains the right to advise students to discontinue performance study in that particular curriculum if the students have not demonstrated the necessary degree of progress.

For specific divisional requirements, each student should request a copy of detailed policies.

### Required recital attendance

Attendance at a minimum of 15 recitals or concerts per semester for seven semesters is required for graduation. Transfer students' records will be evaluated.

### Fees for private music lessons

University students enrolled in the bachelor of music, bachelor of music education, bachelor of arts in music degrees with a major in music, or bachelor of arts or bachelor of science in theatre (music theatre option) are exempt from fees for private music lessons and music practice facilities.

University students not majoring in one of these music curricula may take private music instruction (pending availability of staff and facilities) by paying fees as listed in the Fees section of this catalog.

### Comprehensive musicianship courses

#### Undergraduate credit

The musical styles courses are required of all undergraduate music majors and coordinate the many facets of the student's musical training. The structure of this program removes the traditional division between history and theory and integrates the student's study by stylistic periods, prefaced by a concentrated introduction to musical textures and basic technical skills. Included in each course are lectures in theory and history as well as laboratory work in performance, conducting, keyboard application, aural skills, analysis, and creative writing.

Styles courses are governed by the philosophy that all musicians need practical skills in performance, composition, and analysis; music students should recognize a coherent link between all facets of musical training (including those requirements outside the styles courses); and all musical studies should, as closely as possible, relate to one's own time.

**MUSIC 200. Styles I, Elements of Music.** (3) I, II. The musical language and its relationship between mind and ear. Formation of interval, scale, and chord patterns; basic notational procedures.

**MUSIC 201. Styles II, Textures of Music.** (4) I, II. 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. Pr.: MUSIC 200 or tested knowledge of basic music theory.

**MUSIC 202. Styles III, The Classical Period.** (4) I, II. History and performance practices of the late eighteenth century. Diatonic chord structures and nonharmonic tones, introduction to modulation. Scoring for the piano; small forms. Pr.: MUSIC 201.

**MUSIC 213. Styles IV, The Romantic Period.** (4) I, II. Historical survey of the nineteenth century. Chromatic harmony, modulations, score reading, and large homophonic forms. Composition for piano with voice or solo instrument. Pr.: MUSIC 202.

**MUSIC 218. Aural Skills Proficiency.** (0) I, II. Required for graduation of all music majors. Pr.: MUSIC 213 or conc. enrollment.

**MUSIC 398. Musical Styles of the Baroque Period.** (4) II. Historical survey from 1600 to 1750; counterpoint with emphasis on invention, canon, and fugue; scoring for strings. Pr.: MUSIC 213.

**MUSIC 406. Musical Styles to 1600 (Medieval and Renaissance).** (4) I. Historical survey, modal counterpoint, early notational systems, performance practice, improvisational frameworks, development of instruments and forms. Pr.: MUSIC 213.

**MUSIC 407. Musical Style of the Twentieth Century.** (4) I. Modern music; contemporary practice and aesthetics; polytonality, serial techniques, electronic music. Pr.: MUSIC 398.

**MUSIC 473. Seminar in Comprehensive Musicianship.** (2) II, S. A study of music technology and computer applications; popular and non-Western styles. Pr.: MUSIC 213. Required for music education and performance majors.

**MUSIC 474. Problems in Musical Style and Music Pedagogy.** (2) I, II, S. Individual projects relating to a specific style or pedagogical problem of the performance major or minor. Pr.: MUSIC 213.

## Music history, literature, and theory courses

### Undergraduate credit

**MUSIC 100. Music Fundamentals.** (3) I, II, S. Elementary instruction in the theory of music.

**MUSIC 150. Music Listening Laboratory.** (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, faculty artists, and special guests. Limited to nonmusic majors.

**MUSIC 220. Topics in Music.** (1–3) Offered on demand. Exploration of the musical dimensions of a particular topic or theme. Topics vary. May be repeated once.

**MUSIC 245. Introduction to American Music.** (3) I, II, S. An introduction to the functions of music in American society and the elements of music, including a survey of the development of various types and styles of music in America. For nonmusic majors only.

**MUSIC 250. Introduction to Music.** (3) I, II, S. Elements of music as represented in selected masterpieces of the standard concert repertoire, designed to heighten the perception and the enjoyment of the listener who has limited musical knowledge. For nonmusic majors only.

**MUSIC 310. History of Musical Instruments.** (2) Offered on demand, only in intersessions, through TELENET, or off-campus. The development of musical instruments in each period of Western music. Pr.: MUSIC 150 or 250.

**MUSIC 385. History of the American Popular Song.** (2) Offered on sufficient demand. The vigor and musical inventiveness of this unique American art form including the melodic, rhythmic, and harmonic aspects of the songs of

Jerome Kern, Irving Berlin, George Gershwin, and others. Pr.: MUSIC 150 or MUSIC 250.

**MUSIC 390. Special Studies in Music.** (1–3) I, II, S. Pr.: Background of courses needed for studies undertaken.

**MUSIC 399. Honors Seminar.** (3) II. On sufficient demand. For selected sophomores.

**MUSIC 420. History of Jazz.** (3) On sufficient demand. Survey of jazz styles and personalities. For music majors and nonmajors. Pr.: MUSIC 150, 250, or equiv.

**MUSIC 424. Jazz in Kansas City and the Southwest.** (2–3) Offered on demand, only in intersessions, through TELENET, or off-campus. The history and development of jazz styles in Kansas City and the southwestern United States, emphasizing the influence on styles of other geographic areas. Pr.: MUSIC 150.

**MUSIC 425. Topics in Jazz.** (Var.) Offered on sufficient demand. Big bands; jazz pianists and styles; survey of combo jazz styles, etc. Pr.: MUSIC 150.

**MUSIC 470. Songwriting.** (3) Offered on sufficient demand. Composition of original small song forms including preparation of lead sheet and vocal score using guitar chord symbols. Pr.: MUSIC 100. For nonmusic majors only.

**MUSIC 498. Honors Tutorial in Music.** (1–3) I, II. Individual directed research and study of a topic in music, normally as a preliminary to writing a senior honors thesis. May be repeated once to a total of 3 hours. Pr.: Sophomore standing, membership in the honors program of the College of Arts and Sciences, and permission of the instructor.

**MUSIC 499. Senior Honors Thesis.** (2) I, II, S. Open only to seniors in the arts and sciences honors program.

### Undergraduate and graduate credit

**MUSIC 570. Musical Comedy.** (3) On sufficient demand. The history of operetta and music comedy from Offenbach to the present. Offered jointly by Departments of Music and Speech. Same as THTRE 570.

**MUSIC 601. Western Music before 1750.** (2–3) II, alternate S. A survey of the development of Western music from early Greek civilization to 1750. Pr.: MUSIC 398 and 406.

**MUSIC 614. Harmony and Tonal Counterpoint.** (1) Recommended for graduate students in music who desire additional work in the harmonic aspects of 18th-century counterpoint. Concurrent enrollment in MUSIC 615 required.

**MUSIC 615. Canon and Fugue.** (2) I, S. Counterpoint in eighteenth century style. Pr.: MUSIC 398, consent of instructor.

**MUSIC 616. Twentieth-Century Counterpoint.** (2) II, S. Contrapuntal devices used by twentieth-century composers; serial techniques. Pr.: MUSIC 398, consent of instructor.

**MUSIC 620. Music Calligraphy and Score Preparation.** (2) Tools and procedures for professional preparation of music manuscript in facsimile editions. Computer applications for typesetting and music publishing. Pr.: MUSIC 201.

**MUSIC 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 521, consent of instructor.

**MUSIC 632. Digital Sound Synthesis.** (2) On sufficient demand. Exploration of real-time interactive systems. Theory and application pertaining to the creation of instruments and scores using additive and FM techniques. Team projects. Pr.: MUSIC 631.

**MUSIC 650. History of the Opera.** (3) On sufficient demand. A study of selected masterpieces of musical drama, with emphasis on the relationship of music and drama, and on the unique qualities of opera as a collective artwork. Pr.: MUSIC 201 or 250. Same as THTRE 671.

**MUSIC 702. Style Analysis.** (2–3) On sufficient demand. Training in a comprehensive, systematic analytical approach to all style periods, and in verbalizing analytical perceptions. Pr.: MUSIC 407.

**MUSIC 704. Symphonic Literature.** (3) II. The development of orchestral music from the late Baroque to the pre-

sent, with emphasis on selected symphonies of the late eighteenth and nineteenth centuries. Pr.: MUSIC 407.

**MUSIC 705. Chamber Music Literature.** (3) II, in alternate years. A selected survey of masterpieces of small ensemble music from 1750 to the present. Special emphasis on the string quartet. Pr.: MUSIC 407.

**MUSIC 706. Song Literature.** (3) II, in alternate years. Survey, by historical period and national style, of major solo vocal works. Pr.: MUSIC 407.

**MUSIC 708. Choral Literature.** (3) II, in alternate years. A study of standard choral masterpieces in both large and small forms from 1450 to the present. Pr.: MUSIC 407.

**MUSIC 711. Practical Composition and Arranging.** (2) On sufficient demand. Explanation of styles and techniques applicable to contemporary commercial music. Practical arranging for the stage band. Pr.: MUSIC 213 or consent of instructor.

**MUSIC 714. Advanced Orchestration.** (2) On sufficient demand. The study of 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 407 or consent of instructor.

**MUSIC 737. Organ Literature.** (3) I, in alternate years. A survey of significant compositions from the Renaissance to the present, with emphasis on performance practice. Pr.: MUSIC 407.

**MUSIC 738. Piano Literature.** (3) I, in alternate years. Selective survey of music for piano from 1750 to the present. Pr.: MUSIC 407.

**MUSIC 740. Studies in Music Literature.** (3) On sufficient demand. Study of the repertoire of a selected musical genre or medium of performance. Pr.: MUSIC 407.

**MUSIC 766. Seminar in the Life and Works of an Individual Composer.** (3) I. Study of the career and achievements of a selected composer of major stature. Pr.: MUSIC 407.

**MUSIC 767. Topics in American Music.** (3) On sufficient demand. Studies of the various genres of American music. Pr.: MUSIC 407.

**MUSIC 799. Problems in Music.** (Var.) I, II, S. Individual guided work in a selected area. Pr.: Six hours graduate credit in music.

## Music education courses

### Undergraduate credit

**MUSIC 232. Woodwind Techniques and Materials.** (1) I. A beginning course in the fundamentals of playing and methods for teaching woodwind instruments. For music majors only, and not open to woodwind majors.

**MUSIC 233. Brass Techniques and Materials.** (1) II. A beginning course in the fundamentals of playing and methods for teaching brass instruments. For music majors only, and not open to brass majors.

**MUSIC 234. String Techniques and Materials.** (1) I. A beginning course in the fundamentals of playing and methods for teaching stringed instruments. For music majors only, and not open to string majors.

**MUSIC 235. Percussion Techniques and Materials.** (1) II. The fundamentals of playing and methods of teaching percussion instruments. For music majors only, and not open to percussion majors.

**MUSIC 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.

**MUSIC 427. Advanced String Techniques and Materials.** (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.

**MUSIC 428. Advanced Woodwind Techniques and Materials.** (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.

**MUSIC 429. Advanced Brass Techniques and Materials.** (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.

### Undergraduate and graduate credit

**MUSIC 511. Music in the Schools, K–6.** (4) II. The music curriculum in grades K–6, including a study of the musical characteristics of children and materials and techniques for teaching instrumental, vocal, and general music at this level. Pr.: Admission to teacher education and junior standing in music.

**MUSIC 512. Music Program in Junior/Senior High Schools.** (4) I. Organization and administration of the comprehensive music program in junior and senior high schools; including the study of vocal and instrumental ensemble development, as well as techniques and materials for other types of music classes. Pr.: Admission to teacher education and junior standing in music.

**MUSIC 670. Advanced Studies in Music Education.** (2) I, II, S. Advanced undergraduate studies of various topics related to the teaching of music in grades K–12. May be repeated for credit when topics vary. Pr.: MUSIC 511 or 512.

## Workshops in music

### Undergraduate credit

**MUSIC 489. Workshop in Music.** (1–2) S. Specialized interest areas for undergraduate students only. Pr.: Consent of instructor.

## Organizations and ensembles

### Undergraduate credit

**MUSIC 111. Concert Choir.** (1) I, II. Admission by audition.

**MUSIC 115. Marching Band.** (1) I, II. Admission by audition.

**MUSIC 116. Concert Band.** (1) II. Open to all interested wind and percussion performers without audition.

**MUSIC 117. Symphonic Wind Ensemble.** (1) I, II, S. A select performing organization. Admission by audition.

**MUSIC 120. Chamber Singers.** (1) I, II, S. Admission by audition.

**MUSIC 121. Collegiate Chorale.** (1) I, II, S. Open to all interested singers. Audition determines membership in other choral organizations.

**MUSIC 125. K-State Singers.** (1) I, II. Admission by audition. (Not open to music majors.)

**MUSIC 130. Symphony Orchestra.** (1) I, II, S. Admission by audition.

**MUSIC 131. Theatre Orchestra.** (1) I, II. Admission by audition.

**MUSIC 135. Men's Glee Club.** (1) I, II. Admission by audition.

**MUSIC 140. Women's Glee Club.** (1) I, II. Admission by audition.

**MUSIC 280. Lower-Division Ensemble Performance.** (1) I, II, S. Instruction is offered each semester in the following areas: brass, chamber music, concert jazz, jazz combo, strings, winds, and vocal ensemble. Admission is by audition and students may enroll in more than one ensemble simultaneously.

**MUSIC 298. Jazz Improvisation I.** (1) I, II. Fundamentals of jazz harmony with emphasis on simple chord progressions, blues scales, and some modes. Performance of improvised solos based on "standards" and original. May be repeated once for credit. Pr.: Consent of instructor.

**MUSIC 299. Jazz Improvisation II.** (1) I, II. Continuation of Jazz Improvisation I, with emphasis on more complex chord progressions, altered scales, and other

modes. May be repeated once for credit. Pr.: MUSIC 298 or consent of instructor.

**MUSIC 350. Studio Accompanying.** (1) On sufficient demand. Piano student assigned to studio instructor. Accompanies lessons for at least two hours a week. Ensemble credit for pianists. Pr.: Consent of instructor.

**MUSIC 351. Recital Accompanying.** (1) On sufficient demand. Piano student assigned to a music major preparing for graduation recital. Pianist accompanies student in lessons and presents the formal public program as course requirement. Pr.: Consent of instructor.

**MUSIC 400. Concert Choir.** (1) I, II. Admission by audition.

**MUSIC 401. Concert Band.** (1) I, II, S. Open to all interested wind and percussion performers without audition.

**MUSIC 402. Symphonic Wind Ensemble.** (1) I, II. A select performing organization. Admission by audition.

**MUSIC 403. Collegiate Chorale.** (1) I, II, S. Open to all interested singers. Audition determines membership in other choral organizations.

**MUSIC 404. Symphony Orchestra.** (1) I, II, S. Admission by audition.

**MUSIC 408. Men's Glee Club.** (1) I, II. Admission by audition.

**MUSIC 409. Women's Glee Club.** (1) I, II. Admission by audition.

**MUSIC 411. Marching Band.** (1) I, II. Admission by audition.

**MUSIC 414. Theatre Orchestra.** (1) I, II. Admission by audition.

**MUSIC 415. Chamber Singers.** (1) I, II, S. Admission by audition.

**MUSIC 475. Opera Workshop.** (Var.) 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 SPCH 475.

**MUSIC 480. Upper-Division Ensemble Performance.** (1) I, II, S. Instruction is offered each semester in the following areas: brass, chamber music, concert jazz, jazz combo, strings, winds and vocal ensemble. Admission is by audition and students may enroll in more than one ensemble simultaneously.

**MUSIC 490. Collegium Musicum.** (1) I, II, S. An ensemble devoted primarily to the performance of music written before 1700. Authentic instruments used when possible. Pr.: Consent of instructor.

## Performance classes

### Undergraduate credit

**MUSIC 050. Recital Attendance.** (0) I, II.

**MUSIC 060. Piano Proficiency.** (0) I, II, S. Required for graduation of all music majors.

**MUSIC 103. Voice Class I.** (1) I, II. A beginning course in the basics of singing for nonmusic majors.

**MUSIC 104. Voice Class II.** (1) I, II. Singing technique skills beyond the basics to include performance skills for nonmusic majors. Pr.: MUSIC 103.

**MUSIC 203. Vocal Technique I.** (1) I, II. A beginning course in the basics of singing and teaching skills. For music education majors whose emphasis is instrumental music.

**MUSIC 204. Vocal Techniques II.** (1) I, II. Singing and teaching skills beyond the basics and presentation of materials suitable for private and public school instruction at the secondary level. For music education majors whose emphasis is instrumental music. Pr.: MUSIC 203.

**MUSIC 206. Piano Class I.** (1) I, II, S. For freshmen and transfer music students with no piano background. Sections also available for nonmusic majors and nondegree students.

**MUSIC 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.

**MUSIC 208. Guitar Class I.** (1) I, II. Beginning-level group instruction in guitar performance.

**MUSIC 209. Guitar Class II.** (1) I, II. Intermediate-level instruction in guitar performance.

**MUSIC 260. Beginning Recorder Playing.** (2) Offered on demand, only in intersessions. Learning to play the recorder; for those without previous recorder playing background. Pr.: MUSIC 100 or consent of instructor.

**MUSIC 285. Italian Diction.** (1) I. Rules for pronouncing and translating Italian vocal texts.

**MUSIC 287. German Diction.** (1) I. Rules for pronouncing and translating German vocal texts.

**MUSIC 391. Keyboard Pedagogy.** (2) II. A systematic study of pedagogy which examines effective teaching methods and aids in the development of a philosophy of professional teaching. Pr.: Keyboard majors with conc. enrollment in MUSIC 455.

**MUSIC 410. Vocal Techniques III.** (1) I. Improved singing technique with an emphasis on pedagogy and Italian diction. For music education majors whose emphasis is piano or organ. Pr.: MUSIC 203.

**MUSIC 417. Conducting.** (2) I. 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. For music majors only. Required before admission to student teaching. Pr.: MUSIC 406.

**MUSIC 450. Vocal Techniques IV.** (1) I. More advanced singing skills. Practicum in teaching private singing lessons. For music education majors whose emphasis is piano or organ. Pr.: MUSIC 410.

**MUSIC 465. French Diction I.** (1) I. Rules for pronouncing and translating French vocal texts.

**MUSIC 467. French Diction II.** (1) II. Rules for pronouncing and translating French vocal texts.

**MUSIC 492. Methods and Materials for the Studio.** (2) I, II, S. Methods of teaching fundamental techniques; selection of teaching materials outlining courses of study. For undergraduate students in performance curricula. Taught in divisions according to the major. Practical application through supervised studio teaching. Pr.: MUSIC 391, or consent.

### Undergraduate and graduate credit

**MUSIC 501. Half Recital.** (0) I, II, S. Public performance; vocal or instrumental with suggested performing time of 25 minutes.

**MUSIC 502. Full Recital.** (0) I, II, S. Public performance; vocal or instrumental with suggested performing time of 50 minutes.

## Studio performance

### Undergraduate credit

**MUSIC 251. Pre-Performance Study.** (Var.) I, II, S. For students who do not meet standards for regular performance study.

**MUSIC 255. Lower-Division Performance.** (Var.) I, II, S. Instruction is offered every semester in voice and each of the following instruments: baritone, bassoon, clarinet, double bass, early winds, flute, french horn, guitar, harp, harpsichord, oboe, organ, percussion, piano, saxophone, trombone, trumpet, tuba, viola, viola da gamba, violin, and violoncello. Students may enroll in more than one instrument simultaneously and may earn 1 to 4 hours per semester in each instrument.

**MUSIC 455. Upper-Division Performance.** (Var.) I, II, S. Instruction is offered every semester in voice and each of the following instruments: baritone, bassoon, clarinet, double bass, early winds, flute, french horn, guitar, harp, harpsichord, oboe, organ, percussion, piano, saxophone, trombone, trumpet, tuba, viola, viola da gamba, violin, and violoncello. Students may enroll in more than one instrument

simultaneously and may earn 1 to 4 hours per semester in each instrument.

**MUSIC 521. Composition.** (Var.) I, II, S.

### Undergraduate and graduate credit

**MUSIC 641. Secondary Performance Area.** (I–2) For graduate students who wish to study an instrument (or voice) other than the major performance area. Pedagogical methods and fundamentals are stressed.

## Philosophy

James R. Hamilton, Head

Professors Reagan,\* and Smith;\* Associate Professors Exdell,\* Hamilton,\* and Scheer,\* Assistant Professors Doyle, O'Neil,\* Superson, and Smolkin; Emeritus: Professors Miller,\* and Tilghman.\*

Philosophy is the study of the intellectual foundations of virtually every area of human thought and endeavor. Over the centuries philosophers have examined, for example, the nature and justification of moral values, religious and scientific explanations of the world, the rationality of social institutions, and the nature of reasoning and argument.

The program in philosophy gives students an understanding of traditional philosophical subjects such as these. It also helps students develop critical habits of thinking and skill in understanding complex issues. Consequently, philosophy is an appropriate subject around which to organize a general education for any purpose.

The Department of Philosophy offers a variety of options within the major program to provide flexibility in organizing a course of studies with philosophy at its center.

There are five degree options: traditional philosophy, philosophy/pre-law, philosophy/pre-business, philosophy/pre-ministry, and philosophy/interdisciplinary.

### Core curriculum

All philosophy majors must take the philosophy core of five courses:

Two courses in the history of philosophy:  
PHILO 300 History of Ancient Philosophy  
PHILO 301 History of Modern Philosophy

One course in logic:  
PHILO 110 Introduction to Formal Logic  
or  
PHILO 220 Symbolic Logic I

And the following two courses:  
PHILO 305 Philosophical Topics and Methods  
PHILO 555 Ethical Theories

Students in the traditional philosophy option must take PHILO 220.

### Traditional philosophy option

(B.A. only)

36 hours in philosophy

This option is for students who are interested in a traditional liberal arts course of study or who desire to do graduate study in philosophy.

Philosophy course requirements:

Core curriculum .....	15
Philosophy courses numbered 400 and above .....	9
Philosophy courses numbered 600 and above .....	9
Philosophy elective .....	3
	<hr/> 36

### Pre-law options

(B.A. or B.S.)

While no one major is given preference by law school admission committees, law schools recognize the value of philosophy for refining skills in expression, comprehension, and critical thinking. According to the *Pre-Law Handbook*, "the free and spirited consideration of philosophical questions is almost the model for legal training."

The Department of Philosophy offers two degree options for students planning to study law: a double-major option, intended as a complement to a second major in another department, and a single-major option, which does not require a second major.

#### Double-major option

27 hours in philosophy plus second major

Philosophy course requirements:

Core curriculum .....	15
PHILO 525 Social/Political Philosophy .....	3
PHILO 535 Philosophy of Law .....	3
One applied ethics course (PHILO 492, 565, 575, 585, 590, 595) .....	3
Philosophy course numbered 400 and above .....	3
	<hr/> 27

Additional requirements:

Completion of another major in a department in the College of Arts and Sciences.

#### Single-major option

36 hours in philosophy

Philosophy course requirements:

Core curriculum .....	15
PHILO 525 Social/Political Philosophy .....	3
PHILO 535 Philosophy of Law .....	3
One applied ethics course (PHILO 492, 565, 575, 585, 590, 595) .....	3
Philosophy courses numbered 600 and above .....	9
Philosophy elective .....	3
	<hr/> 36

### Philosophy/Pre-business

The pre-business option is for students who plan to do further work in a college of business leading to a master's in business administration. For requirements for admission to the M.B.A. program at K-State, see the College of Business Administration section of this catalog.

Philosophy course requirements:

Core curriculum .....	15
PHILO 525 Social/Political Philosophy .....	3
or	
PHILO 535 Philosophy of Law .....	
PHILO 545 Philosophy of Economics .....	3
Philosophy course numbered at least 400 .....	6
	<hr/> 27

Students may combine a philosophy/pre-business degree with an undergraduate degree in the College of Business Administration. Under university requirements, a student must complete a total of at least 150 hours in order to receive dual degrees.

## Philosophy/Pre-ministry

(B.A. only)

This is a nonsectarian program for students who are interested in the religious ministry as a profession. Students in this program will be advised on other courses outside philosophy recommended by most American schools of theology.

Philosophy course requirements:

Core curriculum .....	15
PHILO 515 Philosophy of Religion .....	3
PHILO 635 Metaphysics .....	3
Philosophy courses numbered 400 and above .....	9
	<hr/> 30

Other requirements:

Three courses in other disciplines, as approved by the department, in which religion is studied.

## Interdisciplinary option

(B.A. or B.S.)

30 hours in philosophy plus second major

This option is for students who wish to combine a major in philosophy with a major in another discipline. Each student completing a degree under this option must have a faculty advisor in the Department of Philosophy who supervises the student's program. Philosophy courses other than the core curriculum must be approved by this advisor. Students must complete an independent study course (PHILO 680 Problems in Philosophy) focusing on the relationship of philosophy to the student's other major and write a substantial research paper.

Philosophy course requirements:

Core curriculum .....	15
PHILO 680 Problems in Philosophy .....	3
Philosophy courses numbered 400 and above .....	12
	<hr/> 30

Additional requirements: Completion of a second major, as appropriate; student's program must be approved by a faculty advisor in the Department of Philosophy.

## Philosophy courses

### Undergraduate credit

**PHILO 100. Introduction to Philosophical Problems.**

(3) I, II, S. An introduction to some of the main problems of philosophy, such as the nature of morality, knowledge, mind and body, political authority, and the existence of God.

**PHILO 105. Introduction to Critical Thinking.** (3) I, II.

An introduction to the values of the Western intellectual tradition. Emphasizes the concepts of truth and reasoning and their application to science, ethics, and everyday life. Open only to freshmen and sophomores.

**PHILO 110. Introduction to Formal Logic.** (3) I, II, S.

An elementary investigation of the concept of arguments introducing the basic symbolic techniques of contemporary logic. The presentation is at a more elementary level than that of Symbolic Logic I.

**PHILO 115. Introduction to Philosophy of Religion.** (3)

I, II. Raises the philosophical problems of the meaning of religious language, the existence and nature of God, the distinction between reason and faith, between knowledge and belief, and between revelation and science.

**PHILO 120. Introduction to the Philosophy of Art and Literature.** (3) I, II.

An introduction to philosophical problems concerning the concept of art, aesthetic value, and art appreciation and criticism. For students of art, architecture, literature, music, and theater.

**PHILO 125. Introduction to Philosophy of Science.** (3) I, II, S. Examines the nature of science and how it differs from pseudo-sciences such as astrology, and raises questions about the nature of reality and social value of science.

**PHILO 130. Introduction to Ethics.** (3) I, II, S. Examines philosophical issues arising in and about morality. Topics may include the nature of moral judgments, moral knowledge, moral justification, and the relation of morality to religion. Topics may be approached by a study of contemporary moral problems, by reading of classical philosophical texts, or by both methods.

**PHILO 135. Introduction to Social and Political Philosophy.** (3) I, II, S. Examines the concepts of justice, the ideal society, and the relation between the state and the individual. Classical and contemporary views on civil disobedience, the enforcement of morals, punishment, and the relation between politics and economics are discussed.

**PHILO 140. Introduction to Philosophy of Mind.** (3) I, II. Examines problems about the relation between mind and body, the existence of a "soul," the concepts of "insanity" and "the unconscious," parapsychology, and major schools of modern psychology such as behaviorism, Freudianism, and existentialist psychiatry.

**PHILO 145. Introduction to Philosophical Classics.** (3) I, II. An introduction to philosophy through the careful reading of selected works of a major influence in the history of philosophy.

**PHILO 150. Introduction to the Philosophy of Feminism.** (3) I, II. Philosophical issues pertaining to sexual equality, masculinity, femininity, and parenting, as well as contemporary topics such as pornography, prostitution, sexual harassment, and rape.

**PHILO 215. Honors Introduction to Philosophy.** (3) I, II. An introduction to the main problems in philosophy. For students in the honors program.

**PHILO 297. Honors Introduction to the Humanities I.** (3) I. Study of selected major works of history, literature, and philosophy which have been of central importance in the Western cultural tradition. Considerable emphasis is placed on classroom discussion and writing interpretive essays. Limited to entering freshman students. Pr.: Consent of instructor. Same as ENGL 297, HIST 297, MLANG 297.

**PHILO 298. Honors Introduction to the Humanities II.** (3) II. Continuation of PHILO 297. Pr.: PHILO 297 or consent of instructor. Same as ENGL 298, HIST 298, MLANG 298.

**PHILO 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.

**PHILO 301. History of Modern Philosophy.** (3) II. The development of philosophical ideas from the Renaissance to the nineteenth century.

**PHILO 305. Philosophical Topics and Methods. I, II.** This course is intended to provide philosophy majors, relatively early in their course of studies, with the special knowledge and skills needed to do philosophical research. It will acquaint students with library resources, the mechanics of paper writing, the major branches of philosophy, important philosophical vocabulary, the techniques of close reading, and techniques of argument. Pr.: One course in philosophy.

**PHILO 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.

**PHILO 399. Honors Seminar in Philosophy.** (3) I, 1979.

**PHILO 492. Computers and Society.** (1-2) II. A study of ethical issues raised by the impact of computers and associated technologies on society, including such topics as ethics of computer use, computer fraud, protection of privacy; legal, moral, and public policy-making responsibilities of computer professionals. Pr.: Junior standing plus conc. enrollment in CIS 492; CIS 520.

**PHILO 499. Senior Honors Thesis.** (2) I, II, S. Open only to honor students in the arts and sciences honors program.

## Undergraduate and graduate credit in minor field

**PHILO 510. Symbolic Logic II.** (3) On sufficient demand. An advanced study of logical systems and problems in logical theory. Pr.: PHILO 220 or 110.

**PHILO 515. Philosophy of Religion.** (3) II, in alternate years. 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.

**PHILO 525. Social-Political Philosophy.** (3) I or II. 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.

**PHILO 535. 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. Pr.: One course in philosophy or junior standing.

**PHILO 545. Philosophy of Economics.** (3) I, II. An examination of the moral and conceptual foundations of modern economic systems. Considers such topics as the relations between "economics rationality" and the quality of life, the just distribution of wealth, the nature of property rights, and the value of technology in society. Pr.: One course in philosophy or junior standing.

**PHILO 555. Ethical Theories.** (3) I. 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.

**PHILO 565. Medical Ethics.** (3) I, II. A detailed examination of selected moral issues which confront the medical professional and of the main points of the Hippocratic Oath. Topics frequently dealt with include: experimentation on human subjects, informed consent, abortion, euthanasia, conflict of interest, confidentiality of patients' records and conversations. Pr.: Junior standing.

**PHILO 575. 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.

**PHILO 580. Existentialism.** (3) I or II. A study of prominent thinkers in the existentialist tradition. Pr.: One course in philosophy or permission of instructor.

**PHILO 585. Engineering Ethics.** (3) I or II. An examination of the principles of ethics as applied to cases arising in the practice of the various branches of engineering. Pr.: PHILO 130 or junior standing.

**PHILO 590. Business Ethics.** (3) I or II. An examination of the principles of ethics as applied to situations and practices in modern American business. Pr.: PHILO 130 or junior standing.

**PHILO 595. Environmental Ethics.** (3) II. This course explores humanity's ethical responsibilities to the natural world and examines the philosophical principles underlying controversies over the proper balance between development and wilderness, and the cultural and the natural. Pr.: One course in philosophy or junior standing.

## Undergraduate and graduate credit

**PHILO 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.: PHILO 300.

**PHILO 605. Studies in Seventeenth and Eighteenth Century Philosophy.** (3) II. A detailed study of a selected philosopher, school, or problem drawn from the history of philosophy in the seventeenth and eighteenth centuries. Pr.: PHILO 301.

**PHILO 610. Recent European Philosophy.** (3) I or II. An examination of important issues and movements in twentieth century European philosophy. Emphasis upon existentialism and phenomenology. Pr.: One course in philosophy.

**PHILO 620. The Development of Analytical Philosophy.** (3) I or II. The history of analytical philosophy in the first four decades of the twentieth century. A study of the work of Moore, Russell, the early Wittgenstein, and the logical positivists. Pr.: One course in philosophy.

**PHILO 625. The Philosophy of Language.** (3) I or II, in alternate years. Philosophical problems concerning the nature of language and such concepts as meaning and truth. Pr.: PHILO 110 or 220.

**PHILO 630. Recent British-American Philosophy.** (3) I or II. A detailed study of selected philosophical writings of current interest in Great Britain and the United States. Pr.: One course in philosophy.

**PHILO 635. Metaphysics.** (3) I or II, in alternate years. A critical examination of theories about things and their qualities, causality, space, and time. Both traditional and contemporary sources may be used, but emphasis will be placed on the latter. Pr.: One course in philosophy.

**PHILO 640. Epistemology.** (3) I or II, in alternate years. An examination of philosophical problems about the nature of our knowledge of the world. Pr.: One course in philosophy.

**PHILO 645. The Philosophy of Science.** (3) I or II, in alternate years. Philosophical problems concerning science, its methods, laws, and theories. Pr.: One course in philosophy.

**PHILO 650. Philosophy of the Social Sciences.** (3) I or II, in alternate years. An examination of the possibility of a science of human beings 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 consent of instructor.

**PHILO 655. The Philosophy of Mind.** (3) I, in alternate years. 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 consent of instructor.

**PHILO 660. Advanced Ethics.** (3) I or II. Detailed examination of selected topics in contemporary ethical theory. Pr.: PHILO 555 or consent of instructor.

**PHILO 665. Philosophy of Feminism.** (3) I or II. An in-depth analysis of important recent feminist contributions to social and political philosophy, epistemology, aesthetics, and ethics. Topics such as power, work, love, reproductive freedom, and education will be considered. Pr.: One course in philosophy.

**PHILO 670. Aesthetics.** (3) On sufficient demand. A study of selected topics in aesthetics and the philosophy of art. Pr.: PHILO 120 or consent of instructor.

**PHILO 680. Problems in Philosophy.** (Var.) I, II, S. Independent study for qualified students. Pr.: Background of courses required for problem undertaken.

**PHILO 701. Topics in Metalogic.** (3) On sufficient demand. Selected topics in the analysis of first-order theories and the foundations of mathematics. Pr.: PHILO 510 or MATH 511.

## Physics

James C. Legg,\* Head

Professors Bhalla,\* Cocke,\* Donoghue,\* Folland,\* Gray,\* Hagmann,\* Legg,\* Lin,\* Manney,\* Rahman,\* Reay,\* Richard,\* Sorensen,\* Stanton,\* Weaver,\* and Zollman;\* Associate Professor DePaola,\* Jiang,\* and O'Shea,\* Assistant Professors Ben-Itzhak,\* Chakrabarti,\* Giese,\* Law,\* J. Lin,\* Thumm,\* and Wysin;\* Associate Research Professor Sidnell;\* Assistant Research Professors Carnes\* and Stockli,\* Emeriti: Professors Curnutte,\* Dale,\* Dragsdorf,\* and Williams;\* Associate Professor 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 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.

A major in physics equips a liberal arts student with a broad education that is uniquely adapted to our time. The physics curriculum provides a broad science background suitable for the creative application of science and mathematics to interdisciplinary problems. Although physics does not exclude the intuitive mind, the emphasis on mathematics tends to favor more analytically talented individuals.

Students 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 122	Computation and Experimentation in Physics .....	3
PHYS 223	Physics I, Mechanics and Thermodynamics .....	5
PHYS 224	Physics II, Electromagnetism and Sound .....	5
PHYS 325	Physics III, Relativity and Quantum Physics .....	5
PHYS 506	Physics Laboratory .....	3
PHYS 522	Mechanics I .....	3
PHYS 532	Electricity and Magnetism I .....	3
PHYS 636	Physical Measurements Instrumentation .....	4
CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
MATH 220	Analytic Geometry and Calculus I .....	4
MATH 221	Analytic Geometry and Calculus II .....	4
MATH 222	Analytic Geometry and Calculus III .....	4
MATH 240	Elementary Differential Equations .....	4
Science electives .....		9

The 9 hours of science electives may be selected with approval of the physics department undergraduate advisor from courses, 400 level or higher, in the Departments of Chemistry, Computing and Information Sciences, Geology, Mathematics, Physics, Statistics, the Division of Biology, the College of Engineering, and other departments as appropriate to a 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.

## Transfer students

The flexibility of the physics curriculum permits individual advisement, on the basis of studies completed, for students who transfer into the curriculum from other majors, community colleges, or other universities.

A five-year dual degree program in physics and mechanical engineering is available and similar dual degree programs can be arranged

with physics and electrical engineering, nuclear engineering, or business administration. Interested students should inquire about these programs at the Department of Physics.

## J. R. Macdonald Laboratory

K-State in cooperation with the U.S. Department of Energy, operates a major facility for the production and the acceleration of atomic ions. There are several accelerators, including a 6 MV tandem Van de Graaff, associated with this facility. The laboratory has recently built a superconducting LINAC booster accelerator which gives energies of over 100 MeV for some ions. A liquid He production plant has been installed to provide up to 500 watts of cryogenic cooling for the LINAC.

A new type of ion source called CRYEBIS has been developed and is producing high-charge, low-energy ions. At the present time it is the only ion source in the U.S. capable of producing bare argon ions. A network of MICRO-VAX work stations is available for the accumulation and analysis of data.

## Physics courses

**PHYS 017. Colloquium in Physics.** (0) I, II. Weekly lectures on topics of current interest in physics by faculty and visiting scientists.

### Undergraduate credit

**PHYS 101. The Physical World I.** (3) I, II, S. The courses The Physical World I and II are designed to present an overview of the physical sciences for students who have little or no previous physical science. The Physical World I is principally physics and atomic theory. The observations and phenomena are simple and basic. Three hours lec. a week. Open only to freshmen, sophomores, and first-semester transfer students. Not available for credit to students who have credit in PHYS 106.

**PHYS 102. The Physical World II.** (3) I, II. Continuation of PHYS 101. The Physical World II presents an overview of astronomy, geology, chemistry, and molecular biology. Three hours lec. a week. Not open to seniors. Pr.: PHYS 101.

**PHYS 103. The Physical World I Laboratory.** (1) I, II, S. Two hours lab a week. Pr. or conc.: PHYS 101.

**PHYS 104. The Physical World II Laboratory.** (1) II. Two hours lab a week. Pr. or conc.: PHYS 102.

**PHYS 106. Concepts of Physics.** (4) I. An introductory course in physics which emphasizes the topics of physics normally presented to elementary school children. A qualitative approach with integrated laboratory, this course is recommended for students preparing for careers as elementary school teachers. Not available for credit to students who have completed PHYS 101.

**PHYS 107. Physical Science Colloquium.** (1-2) Offered by TELENET. Topics in physical science chosen to illustrate current research of scientists and methods used to study the physical universe. At each offering of this course a syllabus will be available giving the topics to be studied and the details of administration of the course. May be repeated once. Not open to physics majors.

**PHYS 113. General Physics I.** (4) I, II, S. A basic development of the principles of mechanics, heat, fluids, oscillations, waves, and sound. Emphasis is on conceptual development and numerical problem solving. Two hours lec., one hour rec., one hour quiz, and two hours lab a week. Pr.: MATH 150 or one and one-half units of high school algebra and one unit high school trigonometry.

**PHYS 114. General Physics II.** (4) I, II, S. The continued treatment of the fundamentals of electricity and magnetism,

light and optics, atomic and nuclear physics. These concepts are used to understand D.C. and A.C. circuits, motors, and generators. Emphasis is placed on conceptual development and problem solving. Two hours lec., one hour rec., one hour quiz, and two hours lab a week. Pr.: PHYS 113.

**PHYS 115. Descriptive Physics.** (4) I, II. A one-semester course in physics covering mechanics, electricity, heat, light, sound, and atomic theory. It presents a survey of the major fields of physics with a concentration on how physicists work to understand and describe physical phenomena. Three hours lec., one hour quiz, and two hours lab a week. Pr.: High school algebra.

**PHYS 122. Computation and Experimentation in Physics.** (4) I. An introduction to methods of data analysis and computation in physics. Examples emphasize topics of contemporary interests in physics. Pr.: MATH 220 or conc.

**PHYS 191. Descriptive Astronomy.** (3) I, II. A qualitative study of the sun and planets, stars and galaxies; a survey of what is known about the universe and how it is known.

**PHYS 213. Engineering Physics I.** (5) I, II. Mechanics and heat; for students of science and engineering. Two hours lec., two hours rec., one hour quiz, and two hours lab a week. Pr. or conc.: MATH 221.

**PHYS 214. Engineering Physics II.** (5) I, II. Sound, electricity, magnetism, light, and modern physics; for students of science and engineering. Two hours lec., two hours rec., one hour quiz, and two hours lab a week. Pr.: PHYS 213, MATH 221.

**PHYS 223. Physics I, Mechanics and Thermodynamics.** (5) II. For students of science and engineering. Lecture and quiz in common with PHYS 213. Special laboratory and recitation. Pr.: PHYS 122 or permission of lecturer, MATH 221 or conc.

**PHYS 224. Physics II, Electromagnetism and Sound.** (5) I. For students of science and engineering. Lecture and quiz in common with PHYS 214. Special laboratory and recitation. Pr.: PHYS 223 or permission of lecturer, MATH 221 or conc.

**PHYS 300. Physics in Relation to Other Disciplines.** (1-3) On sufficient demand. Variable content, offered only by prearrangement with the physics department and with the instructor. A brief syllabus will be available for each offering of PHYS 300 outlining the objectives and organization of the course for the semester in which offered. Pr.: Consent of instructor.

**PHYS 325. Physics III, Relativity and Quantum Physics.** (3) II. An introduction to modern physics as exemplified by atomic, nuclear, condensed matter, and particle phenomena. Pr.: PHYS 214 or 224, MATH 240 or conc.

**PHYS 399. Physics Honors Seminar.** (1-3) On sufficient demand. Discussions of topics of current interest in physics. Students must be enrolled in the arts and sciences honors program or have permission of the instructor.

**PHYS 400. Independent Study in Physics.** (1-3) I, II, S. Independent theoretical or experimental investigation of a topic for physics majors or for a senior honors thesis. May be repeated for credit up to a maximum of 6 hours. Pr.: Junior standing and consent of instructor.

**PHYS 451. Principles of Contemporary Physics.** (3) II. A nonmathematical introduction to twentieth century physics: relativity, quantum mechanics, the physics of solids, and fundamental particles. Not open to physics majors. Credit is not granted for both PHYS 451 and PHYS 452. Pr.: PHYS 101 or equiv.

**PHYS 452. Contemporary Physics: Problems and Principles.** (4) II. An introduction to twentieth century physics; relativity, quantum mechanics, the physics of solids, and fundamental particles. The lectures are in common with PHYS 451. Three hours lec. and one hour rec. each week. The recitation will consider the quantitative aspects of the subject matter. Not open to physics majors. Credit is not granted for both PHYS 451 and PHYS 452. Pr.: One year of college physics (PHYS 113 and 114 or equiv.), college algebra, and trigonometry.

**PHYS 460. Undergraduate Topics in Physics.** (1-6) Special topics in physics not completely treated in other courses. On sufficient demand. Pr.: PHYS 114 or equiv.

**PHYS 495. Astronomy.** (3) Topics in modern astronomy. Use of a telescope for observational astronomy will be emphasized. Two hours lec. and two hours independent observational astronomy a week. Pr.: PHYS 191.

**PHYS 497. Senior Research in Physics.** (1–3) I, II, S. Individually directed research in atomic physics, condensed matter, particle physics or physics education. Students in the Arts and Sciences honors program should enroll in PHYS 498 and PHYS 499 instead of PHYS 497. May be repeated once. Pr.: Senior in physics and permission of instructor.

**PHYS 498. Honors Tutorial in Physics.** (1–3) I, II, S. Individually directed research in physics, normally taken as a preparation for writing an honors thesis. Open only to students in the arts and sciences honors program. May be repeated once to a total of three credit.

**PHYS 499. Senior Honors Thesis.** (2) I, II, S. Open only to seniors in the Arts and Sciences honors program.

### Undergraduate and graduate credit in minor field

**PHYS 506. Physics Laboratory.** (3) I. This course gives the advanced undergraduate student an opportunity to perform experiments of historical and current significance and to develop knowledge of and skill in making measurements with precise mechanical, optical, electrical, and thermal instruments. Various data analysis techniques are considered. One hour rec. and six hours lab each week. Pr.: PHYS 551.

**PHYS 515. Physics for Science Teachers.** (1–4) Study of current topics in physics, with laboratory experience and demonstration of the processes or phenomena under consideration. Topics and activities will be directed toward providing teachers with material for demonstrations and student experiments or projects. Examples of topics are: solar power, laser applications, holography, and subnuclear particles, relativity, or the historical development of some physical concept. May be repeated for a maximum of 6 hours credit. Pr.: One year of college physics.

**PHYS 522. Mechanics I.** (3) I. Principles of statics and dynamics of particles and rigid bodies by the methods of the calculus. Pr.: PHYS 214; MATH 240 or conc. enrollment.

**PHYS 523. Mechanics I Recitation.** (2) I. Discussion section for problems presented in PHYS 522. Pr.: Students must be concurrently enrolled in PHYS 522.

**PHYS 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; MATH 240 or conc. enrollment.

**PHYS 553. Introduction to the Physics of Lasers.** (3) I. A study of the physics of lasers. Survey of current laser systems. Technological applications. Pr.: PHYS 214.

### Undergraduate and graduate credit

**PHYS 611. Introduction to Quantum Mechanics.** (3) I. An introduction to quantum mechanics: wave mechanics, one-dimensional solutions, perturbation theory, time-dependent perturbation theory, the one electron atom. Pr.: PHYS 522, 551; MATH 240.

**PHYS 616. Advanced Physics Laboratory.** (1–3) II. A laboratory course that gives the advanced physics student an opportunity to perform experiments using modern data acquisition equipment and tools such as are used in current physics research. Pr.: PHYS 506 or equiv.

**PHYS 621. Mechanics II.** (3) II. Continuation of PHYS 522. Pr.: PHYS 522.

**PHYS 631. Electricity and Magnetism II.** (3) I. Continuation of PHYS 532. Pr.: PHYS 532.

**PHYS 635. Plasma Physics.** (3) I, in alternate years. Fundamental properties of plasmas; motion of ions and electrons in electromagnetic fields; plasmas as magneto-hydrodynamic fluids; plasma waves; diffusion phenomena in plasmas; electric resistivity of plasmas; equilibrium and plasma stability; kinetic theory of plasmas. Three hours rec. a week. See NE 635. Pr.: PHYS 532; or EECE 557 and PHYS 621.

**PHYS 636. Physical Measurements and Instrumentation.** (4) II. A laboratory-oriented course to acquaint students with electronic circuits, their interfacing with measur-

ing instruments, and their use in making physical measurements. Two hours lec. and six hours lab a week. Pr.: PHYS 214.

**PHYS 651. Introduction to Optics.** (3) I, in alternate years. Introduction to modern concepts in optics: electromagnetic waves, propagation of light through media, geometric optics of lenses and mirrors, interference, coherence, Fraunhofer and Fresnel diffraction. Three hours lec. a week. Pr.: PHYS 532 or EECE 557.

**PHYS 671. Thermodynamics and Statistical Physics.** (3) II, in alternate years. Pr.: PHYS 522; MATH 240.

**PHYS 681. Semiconductor Physics.** (3) I. Introduction to the properties of semiconducting materials; electron and hole transport; models of semiconductor devices. Pr.: PHYS 532 or EECE 557.

**PHYS 691. Astrophysics.** (3) A quantitative study of the sun and stars; structure and evolution; intrinsic properties; solar activity; galaxies; chemical evolution. Pr.: PHYS 522, 532.

**PHYS 707. Topics in Physics.** (Var.) 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 senior standing and consent of instructor.

**PHYS 742. Nuclear Physics.** (3) II, in alternate years. Modern theories of nuclear physics. Pr.: PHYS 611.

## Political Science

Dale Herspring, \* Head

Professors Herspring,\* L. Richter,\* W. Richter,\* Suleiman,\* Tummala,\* and Williams;\* Associate Professors Ambrosius,\* Franke,\* Michie,\* and Unekis;\* Assistant Professors Bagby and Fliter. Emeritus: Professor Hajda;\* Associate Professor Gustafson.\*

The major in political science acquaints students with political aspects of society and encourages them to develop a critical and imaginative perspective on public issues. The program in political science also provides a foundation for a liberal education and continuing involvement in political activity and public affairs. At the same time, scientific training in analysis of political problems develops skills for a variety of careers in public service, business, teaching, research, and administration. Qualified students should consider training in political science at the graduate level.

A political science major should complete a broad liberal arts program that includes study in related social sciences and provides familiarity with computer applications, statistics, and mathematics as basic tools describing and explaining political phenomena.

### Advisory and special services

#### Departmental faculty

Several members of the department have backgrounds in nonacademic careers—including national and international government service, business, party politics, and journalism—besides professional training in political science. Students contemplating careers in these and other fields are encouraged to talk with departmental advisors.

### Pre-law program

A pre-law program may be pursued through a major in political science. A pre-law advisor helps the student select an appropriate course of study leading to a career in law, and offers individual assistance in selecting a law school. The pre-law advisor is John Fliter, 219C Kedzie Hall.

### Specialized curricula

The department takes part in several interdepartmental programs. More extensive information on several of these may be found elsewhere in this catalog.

### Latin American studies

Courses on Latin America are offered in several departments, including language studies in Spanish. A secondary major in Latin American studies is also available. For information, see Professor Marcial Antonio Riquelme, 304C Fairchild Hall.

### International studies

Students interested in the multidisciplinary study of the relations among nations, or in the study of world regions other than Latin America, may wish to pursue a secondary major in international studies. For information, see Professor William Richter, 204A Kedzie Hall.

### Armed forces and society

Political science and several other departments offer coordinated course work in military phenomena and security processes, ranging from the technology of war and military policy-making to the problems of civilian-military relations in peacetime and arms control. Some of the relevant courses are in history, geography, psychology, sociology, economics, and nuclear engineering. For information, see Professor Alden Williams, 217 Kedzie Hall.

### International trade studies

The department participates in the international trade studies program. Students interested in international trade may benefit from courses and programs on this subject in several arts and sciences and business departments.

### Gerontology

The Center on Aging coordinates programs and courses on social, cultural, economic, political, and other aspects of aging and the elderly. Interested students may pursue a secondary major in gerontology. For information see Professor James Franke, 219A Kedzie Hall.

### Requirements for the major

A major consists of a minimum of 33 credit hours in political science distributed as follows: POLSC 301 Introduction to Political Thought, POLSC 325 United States Politics, POLSC 333 World Politics, POLSC 344 Introduction to Comparative Politics, and at least one 500 level course or above in each of the following four areas of political science: American government and politics; compara-

tive government and politics; international relations; and political thought. Only 3 hours of the major are allowed to be readings, problems, internships, or similar courses that do not involve scheduled meetings of the class.

### Information for dual majors and nonmajors

The political science program is often advantageously combined with another major. Those seeking dual majors should coordinate their program in consultation with advisors in each area.

## Political science courses

### Undergraduate credit

**POLSC 107. Political Science Colloquium.** (2) I, II, S. Offered by TELENET. Topics in political science chosen to illustrate current research of political scientists and approaches to the study of politics. Each time the course is offered, a syllabus will outline the topics to be studied and the way the course will be administered. May be repeated once. Not open to political science majors.

**POLSC 110. Introduction to Political Science.** (3) I, II, S. Introduction to politics, public policy, and governmental processes. Distribution and use of political power, political thought, public opinion, groups, parties, institutions, public law, careers in politics, and related topics.

**POLSC 111. Introduction to Political Science, Honors.** (4) Introduction to politics, public policy, and governmental processes. Distribution and use of political power, political thought, public opinion, groups, parties, institutions, public law, careers in politics, and related topics. Pr.: Membership in arts and sciences honors program.

**POLSC 301. Introduction to Political Thought.** (3) I, II. A broad overview of political thought, including consideration of major themes and leading writers in Western political philosophy, some non-Western political thought, modern ideologies, and empirical theory. Pr.: Sophomore standing.

**POLSC 321. Kansas Politics and Government.** (3) An introduction to the political institutions of, the political behavior in and surrounding, and the public policies flowing from governmental units in the state of Kansas.

**POLSC 325. United States Politics.** (3) I, II, S. The national government with emphasis on constitutional principles, basic structure, functions, and the political process.

**POLSC 326. United States Politics, Honors.** (4) II. The national government with emphasis on constitutional principles, basic structure, functions, and the political process.

**POLSC 333. World Politics.** (3) I, II. 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.

**POLSC 344. Introduction to Comparative Politics.** (3) I. 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.

**POLSC 350. Current Political Issues.** (2) I, II. Each week a different political science faculty member explains and analyzes current developments in state, national, and international affairs, using the news media as text material. Not for major credit. May be repeated once.

**POLSC 355. Contemporary Issues.** (3) Study and analysis of selected political topics of immediate relevancy and concern. May be repeated once.

**POLSC 366. Practical Politics.** (3) II. Strategies and techniques of running for office, organizing a campaign, mobilizing community resources, direct action lobbying, and related practical aspects of local level citizen politics.

**POLSC 377. Introduction to Public Policy.** (3) I. The process of public policy formation and analysis with emphasis on theories of decision-making, the relationship between decisions taken, values maximized, and the social

impact of these decisions. Pr.: POLSC 110 or 325 or another social science course.

**POLSC 399. Honors Seminar in Political Science.** (1-3)

**POLSC 400. Political Inquiry and Analysis.** (3) Underlying principles and techniques used in the conduct of political science research. Pr.: Introductory social science course or consent of instructor.

**POLSC 401. Topics in Politics.** (1-3) Different subjects in politics are selected for intensive study. May be repeated for a total of 6 hours with advisor's approval.

**POLSC 499. Senior Honors Thesis.** (2) I, II, S. Open only to seniors in the arts and sciences honors program.

## American government and politics

### Undergraduate and graduate credit

**POLSC 502. Television and Public Policy.** (3) I. Television as a political institution, emphasizing TV structure, contents, and effects for political thought and public policy; comparative analysis of television with other mass media and nonmedia influences on political behavior. Pr.: POLSC 110 or 325, and sophomore standing, or appropriate vocational experience with consent of instructor.

**POLSC 507. Introduction to Public Administration.** (3) I. 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.: POLSC 110 or 325 or ECON 110.

**POLSC 508. The Mass Media and Political Campaigns.** (3) I. Examines the role of the mass media in the electoral process. Dynamics of voter decision making and the impact of the media on voter attitudes and choices. Pr.: POLSC 325.

**POLSC 519. National Security Policy and Process.** (3) I. 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. Pr.: POLSC 325.

**POLSC 520. State and Local Government.** (3) II. The American system of federalism with emphasis on the government and politics of the American states and their subdivisions. Pr.: POLSC 110 or 325 or sophomore standing.

**POLSC 603. Political Parties and Elections.** (3) I. Origins, structure, and function of political parties. Dynamics of the two-party system. Roles of third parties. Analysis of election results and voting behavior. Pr.: POLSC 110, 325, or junior standing.

**POLSC 604. Interest Groups and Public Opinion.** (3) II. Group theory and politics. Structure, internal politics, and techniques of interest groups and their impact on public policy. Formation and measurement of public opinion. Pr.: POLSC 110 or 325 or junior standing.

**POLSC 605. The American Presidency.** (3) The presidency as an institution, its evolution, congressional relationships, executive organization. Pr.: POLSC 110, 325, or junior standing.

**POLSC 606. Gender and Politics.** (3) II. 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. Pr.: SOCIO 545, XXX 105, POLSC 325.

**POLSC 607. Administrative Law.** (3) II. Legal analysis of the rule-making, adjudicatory, and enforcement functions of administrative agencies, with emphasis on constitutional framework, judicial review, requirements of procedural fairness, and rights of public employees. Pr.: One course in political science, U.S. history, or legal or political philosophy.

**POLSC 611. The Legislative Process.** (3) II. Legislative decision-making in modern democracy with emphasis on the United States, the concept of representation, and politi-

cal behavior of participants in the legislative process. Pr.: POLSC 110, 325, or junior standing.

**POLSC 613. Defendant's Rights.** (3) II. Constitutional provisions of due process in criminal cases; statutory protections and judicial rules; analysis of U.S. Supreme Court opinions concerning the rights of persons accused of crimes at all stages in the criminal process. Pr.: One course in political science, U.S. history, or legal or political philosophy.

**POLSC 614. Constitutional Law I.** (3) I. Principles of the American political system as prescribed by the Constitution and interpreted by Supreme Court decisions, with emphasis on the institutions and powers of the national government. Pr.: One course in political science, U.S. history, or legal or political philosophy.

**POLSC 615. Constitutional Law II.** (3) II. The Constitution as a limitation on governmental power, with emphasis on Supreme Court decisions defining fundamental liberties, property rights, and the requirement of substantive due process. Pr.: One course in political science, U.S. history, or legal or political philosophy.

**POLSC 616. Discrimination and the Law.** (3) II. Equal protection under the law, as provided by the Constitution, statutes, regulations, and judicial decisions, with special attention to discrimination on the basis of race and sex. Pr.: One course in political science, U.S. history, or legal or political philosophy.

**POLSC 618. Urban Politics.** (3) I. Fundamental problems of political power and decision making in urban-suburban governmental settings. Pr.: POLSC 110, 325, or junior standing.

**POLSC 708. Public Personnel Administration.** (3) I. Policy aspects of public personnel administrations at all levels of government with specific attention given to personnel issues unique to the public sector. Court decisions on the rights of public employees, public unionism, civil service systems, and public service ethics in a democracy. Pr.: POLSC 325 or 507, or ECON 110 and junior standing.

**POLSC 709. The Politics of Intergovernmental Relations.** (3) I. An analysis of the dynamics of the federal system. Interactions among local, state, and federal governments will be examined with emphasis upon governmental policy and program management. Pr.: POLSC 507 or 520 or SOCIO 531.

**POLSC 710. Policy Analysis and Evaluation.** (3) II. The relationship between public policy and the distribution of values, goods, and services in society, including a study of policy evaluation. Students analyze policies in an area of choice; e.g., agriculture, business, health, income, trade. Pr.: POLSC 325 or 507 or junior standing.

**POLSC 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.

**POLSC 735. Public Organizational Theory.** (3) I. Theories on the structure and mission of public organizations. A focus on the role of administrative leadership in applying theory to solve organization problems. Pr.: POLSC 325 or 507 or GENBA 420 or ECON 110 and junior standing.

**POLSC 737. Public Budgeting Techniques.** (3) I. Budgeting as part of our political system and as a fiscal process that assists in planning and program management. Overview of various budgetary approaches and their managerial benefits. Pr.: POLSC 507 or MANGT 420.

## Comparative government and politics courses

### Undergraduate and graduate credit

**POLSC 504. Political Sociology.** (3) II, in even years. An introduction to the principles of political sociology. 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.: SOCIO 211; POLSC 110. Same as SOCIO 504.

**POLSC 505. Introduction to the Civilization of South Asia I.** (3) I. An interdisciplinary survey of the development of civilization in India, Pakistan, Sri Lanka, Bangladesh, and Afghanistan, 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, ECON 505, SOCIO 505, ANTH 505.

**POLSC 506. Introduction to the Civilization of South Asia II.** (3) II. Interdisciplinary survey of recent and contemporary civilization in India, Pakistan, Sri Lanka, Bangladesh, and Afghanistan, including recent history, current economy, religion, culture, languages and literature, geography, social and political structures and ideas. Same as ECON 506, HIST 506, SOCIO 506, ANTH 506.

**POLSC 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.

**POLSC 545. The Politics of Developing Nations.** (3) II. Comparative analysis of politics in emergent states with emphasis on processes of modernization and nation building. Pr.: POLSC 110 or 344 or sophomore standing.

**POLSC 602. Class, Power, and Public Policy.** (3) I. Public policy and socioeconomic equality. Wealth and income distribution, social insurance programs, and ethnic relations. Conditions and institutions conducive to equality with emphasis on elites and power. Pr.: POLSC 377 or 507 or junior standing.

**POLSC 619. Comparative Agriculture Politics and Policy.** (3) I. Comparative examination of agricultural politics and policy with emphasis on decision making processes and the socio-political impacts of agricultural policy. Pr.: POLSC 110 or 344.

**POLSC 621. European Politics.** (3) I. Comparative analysis of British democracy, totalitarianism, and contemporary continental European political systems. Pr.: POLSC 110 or 344 or junior standing.

**POLSC 622. Latin American Politics.** (3) I. Comparative analysis of selected political systems of Latin America emphasizing political inputs, political organization, and political outputs. Special consideration is given to problems of political change. Pr.: POLSC 110 or 344 or junior standing.

**POLSC 623. South Asian Politics.** (3) Analysis of selected political systems of South Asia. Pr.: POLSC 344, 505, or junior standing.

**POLSC 624. Middle Eastern Politics.** (3) II. Comparative analysis of selected political systems in the Middle East including nationalism and the conflict of differing ideologies. Pr.: POLSC 110, 344, or junior standing.

**POLSC 625. Southeast Asian Politics.** (3) Comparative analysis of selected political systems in Southeast Asia including consideration of problems of nationalism and political development. Pr.: POLSC 110, 344, or junior standing.

**POLSC 626. African Politics.** (3) Comparative analysis of selected political systems of sub-Saharan Africa, including consideration of problems of nationalism and political development. Pr.: POLSC 110, 344, or junior standing.

**POLSC 627. Eastern and Central European Politics.** (3) II. Examination of contemporary politics and policy in the countries of Eastern and Central Europe. Pr.: POLSC 110, 344.

**POLSC 628. Comparative Security Establishments.** (3) I. Politics of conceiving, organizing, using, and reconciling military and related security forces as societal functions in the United States, selected other polities, and international organizations. Pr.: POLSC 333, 344, 541, or junior standing.

**POLSC 629. Development Policy and Administration.** (3) I. Comparative examination of development policy, politics, and administration. Pr.: POLSC 110, 344, 377, 507.

**POLSC 630. Politics of Russia and the Former Soviet Union.** (3) II. The primary conceptual framework utilized in this course will be political culture. Students will be presented with the major dilemma facing Russian leaders; how

to create a democratic political culture given the non-democratic nature of Russia's past. Pr.: POLSC 333.

**POLSC 707. Comparative Administrative Systems.** (3) I. This is a comparative analysis of public administration concepts and the morphology of administrative systems. Included are U.S., British, and French models and attempts by Third World countries to adapt these to their local cultures. Pr.: POLSC 344, or 507, or graduate standing, or consent of instructor.

## International relations courses

### Undergraduate and graduate credit

**POLSC 541. International Relations.** (3) II. Analysis of the nature of international relations with emphasis on contemporary theories explaining the international behavior of states. Pr.: POLSC 333.

**POLSC 543. American Foreign Policy.** (3) II. 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. Pr.: POLSC 325 or 333.

**POLSC 642. International Conflict.** (3) II. The nature of political conflicts in the world and the "types" of such conflicts. Emphasis is on determining the "causes" of the various conflict types as well as providing the student with a better understanding of the conflict process from political dispute through the escalation stages to war. Pr.: POLSC 333 and junior standing.

**POLSC 645. International Politics of Europe.** (3) II. 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. Pr.: POLSC 333, 344, or junior standing.

**POLSC 647. International Law.** (3) Theories of international law, and general problems, such as: recognition, responsibility, war crimes, sources, evidence, codification, and settlement of disputes. Pr.: POLSC 333, 541, or junior standing.

**POLSC 649. International Defense Strategies.** (3) I. 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. Pr.: POLSC 333, 541, or junior standing.

**POLSC 651. International Organization.** (3) Structure, functions, values, and effectiveness of international organizations with emphasis on the United Nations, Common Market, and other regional arrangements. Pr.: POLSC 333, 541, or junior standing.

**POLSC 652. International Politics of South Asia.** (3) Consideration of regional problems of South Asia and international roles and foreign policies of South Asian states. Pr.: POLSC 344 or junior standing.

**POLSC 653. International Politics of the Middle East.** (3) I. 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. Pr.: POLSC 333, 344, or junior standing.

**POLSC 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.

## Political thought courses

### Undergraduate and graduate credit

**POLSC 661. Political Thought: Classical to Sixteenth Century.** (3) I. Systematic study of ideas about law, politics, and government of great philosophers of Western civilization from Greek antiquity to the sixteenth century. Pr.: POLSC 110, 301, or junior standing.

**POLSC 663. Political Thought: Since the Sixteenth Century.** (3) I. Study of the development of Western political thought from the sixteenth century to the twentieth century. Pr.: POLSC 110, 301, or 325.

**POLSC 667. American Political Thought.** (3) I. Political ideas underlying the American union, including the doctrine of rights, the nature of union, liberty, property, and democracy. Pr.: POLSC 110, 301, or junior standing.

**POLSC 671. Modern Political Thought.** (3) Study of contemporary political ideas and social thought. Pr.: POLSC 110, 301, or junior standing.

**POLSC 672. Ideologies: Their Origins and Impact.** (3) II. Explores ideologies, including liberalism, conservatism, socialism, communism, and fascism. Their philosophical origins, transformation into systems of thought with mass appeal, and practical consequences are discussed. Their conflict between ideology and philosophy is examined. Pr.: POLSC 110, 301, or 3 hours of philosophy.

**POLSC 675. Religion and Politics.** (3) II. The relationship between religion and politics, as well as religion and science, through the eyes of a variety of political philosophers. Includes questions concerning the modern Western trend toward rationalism and secularism, and the religious nature of ideology and mass movements. Pr.: POLSC 110, 301, or 3 hours of philosophy.

**POLSC 676. 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.

**POLSC 711. Administrative Ethics.** (3) I. Ethical issues, approaches, and strategies in public service. Pr.: POLSC 325 or 507 or graduate standing, or consent of instructor.

## Methods, seminars, readings, and problems courses

### Undergraduate and graduate credit

**POLSC 555. Senior Honors Seminar.** (3) Open to senior majors who have attained a 3.0 grade point average in political science.

**POLSC 601. Computer and Quantitative Analysis in Political Science.** (3) Advanced data management, data analysis, and computing skills involved in conducting political science and public policy research. Pr.: STAT 330 or equiv.; CIS 110 or equiv.; and POLSC 301, or 325, or 333, or 344, or 400.

**POLSC 700. Research Methods in Political Science.** (3) I. Principles of research design, measurement of political phenomena, methods for collecting and analyzing political data. Pr.: POLSC 301, 325, 333, or 344.

**POLSC 784. Internship in Government, Public Administration, and Politics.** (1-3, Credit/No Credit only) I, II, S. Supervised field work at the international, national, state, and local levels of government or with political parties or other politically oriented voluntary organizations. May be repeated once. Pr.: Consent of instructor and a minimum of two courses in political science, at least one of which must be relevant to the internship area.

**POLSC 785. Readings in Political Science.** (1-3) I, II, S. Students will undertake directed reading and discussion of a selected topic in political science.

**POLSC 790. Problems in Political Science.** (1-3) I, II, S. Students will complete a research project and prepare an original paper under the supervision of a faculty member. Pr.: Consent of the instructor.

**POLSC 791. Topics in Political Science.** (3) I, II. Extensive exploration of a specific problem in political thought, American government, comparative politics, international relations, and public administration. May be repeated for a total of 6 hours in two subfields. Since topics will cover different areas in political science, prerequisites will be determined by the department as appropriate when the course is offered.

**POLSC 799. Pro-Seminar in Political Science.** (3) I, II. 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.

# Psychology

Frank E. Saal,\* Head

Professors Barnett,\* Cowan,\* Downey,\* Frieman,\* Griffitt,\* Harris,\* Kiefer,\* Mitchell,\* Rappoport,\* Saal,\* Shanteau,\* Thompson,\* and Uhlarik,\* Associate Professors Fullagar,\* and Knight,\* Assistant Professors Cozzarelli,\* and Wanberg,\* Emeriti: Professors Perkins,\* Phares,\* Rohles,\* and Samelson.\*

The psychology program is a versatile program composed of a core for all majors. Beyond this common core, majors may choose from several paths, depending upon their specific interests and goals.

## Qualified acceptance

In order to be accepted as a psychology major at Kansas State University, a student must:

A. Present evidence of having earned a cumulative GPA of at least 2.50 based on a minimum of 15 credit hours earned at K-State and a minimum of at least 30 total credit hours (including transfer hours);

or

B. Present evidence of 60 or more transfer hours from another accredited institution with a GPA of at least 2.50 (i.e., no credit hours need have been earned at K-State).

Students who are accepted as psychology majors at K-State will be: 1. Permitted to enroll in any and all undergraduate courses offered by the Department of Psychology for which they have the necessary prerequisites; and 2. Assigned an individual faculty advisor in the Department of Psychology.

In order to graduate from Kansas State University with a major in psychology, a student must have a cumulative GPA of at least 2.50 based on all course work undertaken at K-State.

Students wanting to declare psychology as a major who do not satisfy one of the two standards described above will be designated pre-psychology majors. As is the case for all students at K-State, pre-psychology majors may enroll in any course offered by the Department of Psychology *except those listed immediately below*:

PSYCH 350	Experimental Methods in Psychology ...	5
PSYCH 460	Cognitive Psychology .....	3
PSYCH 475	Principles of Learning .....	3
PSYCH 480	Fundamentals of Perception and Sensation .....	3
PSYCH 605	Foundations of Social Behavior .....	3
PSYCH 620	Psychology of Personality .....	3

Enrollment in these six courses will be restricted to declared psychology majors as well as students pursuing other majors that require one or more of these courses. Further, pre-psychology majors will be advised in groups during pre-enrollment periods, followed by

one-on-one sessions with a faculty advisor in the event that either the student or the advisor deems such a session necessary.

The psychology curriculum is arranged with several functions in mind: to give students, as a part of a liberal education, some familiarity with the principles, methods, and findings of psychology; to provide knowledge and skills requisite for advanced study at the graduate level; to offer valuable background for students preparing to work in professions such as medicine, law, theology, business, teaching, engineering, industry, and organizations; and to provide academic work that will prepare the students to pursue careers in psychology.

## Core courses

The undergraduate major requires STAT 330 and the following course work:

PSYCH 100*	Freshman Seminar .....	1
PSYCH 110	General Psychology .....	3
PSYCH 200	Junior Seminar in Psychology .....	1
PSYCH 350	Experimental Methods in Psychology ...	5

Select two courses from:

PSYCH 460	Cognitive Psychology .....	3
PSYCH 470	Psychobiology .....	3
PSYCH 475	Principles of Learning .....	3
PSYCH 480	Fundamentals of Perception and Sensation .....	3

Select one course from:

PSYCH 605	Foundations of Social Behavior .....	3
or		
PSYCH 620	Psychology of Personality .....	3
Psychology electives (chosen with advisor consultation) .....		12

\*Although not required, this course is strongly recommended for first-semester freshmen.

## General education option

For students interested mainly in a liberal education, the core program will be sufficient. In consultation with the advisor, students may wish to choose several other psychology courses beyond the 33-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 33 required hours, additional course work is entirely a discretionary matter.

Students interested in teaching or guidance counseling in schools should prepare for teacher certification with a major in psychology. Such students must consult with advisors in the College of Education.

## Graduate 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.

Undergraduates who anticipate pursuing a Ph.D. in psychology should take the following courses (the core of 33 hours is contained within the following recommendations):

STAT 330	Elementary Statistics for the Social Sciences .....	3
STAT 702	Statistical Methods for Social Sciences ..	3
CIS 200	Fundamentals of Computer Programming .....	2
CIS 201	FORTTRAN Language Laboratory .....	2
PSYCH 110	General Psychology .....	3
PSYCH 350	Experimental Methods in Psychology ...	5
PSYCH 460	Cognitive Psychology .....	3
PSYCH 470	Psychobiology .....	3
PSYCH 475	Principles of Learning .....	3
PSYCH 480	Fundamentals of Perception and Sensation .....	3
PSYCH 505	Abnormal Psychology .....	3
PSYCH 605	Foundations of Social Behavior .....	3
PSYCH 620	Psychology of Personality .....	3
PSYCH 775	History of Current Trends .....	3

Depending upon their more specialized goals, students may wish also to take PSYCH 560, 564, 580, 585, or others. Students oriented toward physiological psychology will want to ensure that they also have appropriate background in biology, chemistry, and other areas. These matters should be worked out in consultation with an advisor. It is also strongly recommended that students gain research experience by working on projects under faculty supervision.

## Psychological technician options

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.

Technicians are playing an increasing role in both clinical-institutional and industrial/organizational settings. The academic requirements and, in particular, the field experience requirements will provide a background in human relations that employers in business, industry, and government should find attractive.

Because the psychological technician options are geared toward specific employment, the recommended courses are larger in number and there is more structure.

The core of 33 hours is required for both the clinical and industrial emphases.

### Clinical emphasis

In addition, the following courses are required for the clinical emphasis:

PSYCH 559	Psychological Testing .....	3
PSYCH 505	Abnormal Psychology .....	3
PSYCH 585	Basic Concepts in Clinical Psychology ..	3
PSYCH 586	Laboratory in Clinical Concepts .....	2
PSYCH 587	Field Placement .....	1-6

Four courses relevant to the mental health field.

### Industrial emphasis

For the industrial emphasis the following additional courses are required:

PSYCH 559	Psychological Testing .....	3
PSYCH 560	Industrial Psychology .....	3
PSYCH 561	Laboratory in Industrial Psychology I ...	2
PSYCH 562	Laboratory in Industrial Psychology II ..	2
PSYCH 564	Psychology of Organizations .....	3

PSYCH 587 Field Placement ..... 1-6  
 MANGT 530 Industrial and Labor Relations ..... 3  
 One computer science course with laboratory.  
 One additional relevant course from business administration or elsewhere.

Other recommended courses for both the clinical and industrial emphases will depend on student interests and will be worked out in consultation with a psychological technician advisor. An integral part of both emphases is supervised field experience in an applied setting. Arrangements for such experience will be worked out individually with each student regarding the exact number of hours for PSYCH 587 Field Placement, and the location (hospital, business or industry, government agency, research laboratory, other).

## Psychology courses

### Undergraduate credit

**PSYCH 100. Freshman Seminar.** (1) I. An orientation and introduction to the field of psychology for freshman psychology majors only. Additional emphasis on the means by which psychological principles can be used to adapt to college life.

**PSYCH 110. General Psychology.** (3) I, II, S. An introductory survey of the general content areas of psychology, including methods, data, and principles.

**PSYCH 115. General Psychology (Honors).** (4) I, II. An introductory survey of the general content areas of psychology, including methods, data, and principles.

**PSYCH 200. Junior Seminar in Psychology.** (1) I. Discussion of professional, research, and educational methods and objectives in psychology. Acquaints psychology majors with psychology as a profession, and with the various options available to them at various levels of training. Should be taken during first semester of junior year. Pr.: Junior standing.

**PSYCH 202. Drugs and Behavior.** (2) I, S. 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.

**PSYCH 280. Psychology of Childhood and Adolescence.** (3) I, II. Survey of behavioral development from birth through adolescence. Pr.: PSYCH 110.

**PSYCH 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.

**PSYCH 350. Experimental Methods in Psychology.** (5) I, II. Laboratory investigation of learning, motivation, social-personality processes, and perception and sensation. Includes three hours rec. and four hours lab a week. Pr.: PSYCH 110. (Psychology majors only.)

**PSYCH 399. Honors Seminar in Psychology.** (3) II. Selected topics. Open to nonmajors in the honors program.

**PSYCH 400. Practicum in Teaching Psychology.** (1-4) I, II. Supervised experience in presentation of psychological concepts in various classes. May be taken only with approval of the instructor of a general psychology class under whose supervision the student will obtain this experience. Pr.: Nine hours of psychology including PSYCH 110; junior standing; consent of instructor.

**PSYCH 425. Problem Solving and Decision Making.** (3) II. Provides both the psychological background and practical aids to help solve problems in everyday decision making. Skills to be covered include creativity, methods of problem solving, memory aids, decision-making tools, avoiding biases of judgment, etc. Pr.: PSYCH 110.

**PSYCH 450. Applications of Memory.** (3) II. Examination of the applications of memory in such diverse areas as courtroom testimony, expert performance, mnemonic procedures, and advertising. Relevant theories and research in each area are examined. Pr.: PSYCH 110.

**PSYCH 460. Cognitive Psychology.** (3) I, II. A survey of the manner in which people extract and use 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 350. (Psychology majors only.)

**PSYCH 470. Psychobiology.** (3) I, II. Behavior from a biological point of view. Topics include: behavioral neuroscience techniques, sensory coding, food and water intake, sexual behavior, sleep and waking, memory, and learning. Pr.: BIOL 198, PSYCH 110.

**PSYCH 475. Principles of Learning.** (3) I, II. Introduction to the principles of learning and their relevance to the understanding of the behavior of animals and humans. Pr.: PSYCH 350. (Psychology majors only.)

**PSYCH 480. Fundamentals of Perception and Sensation.** (3) I, II. Empirical and theoretical approaches to phenomena of sensation and perception. Pr.: PSYCH 350. (Psychology majors only.)

**PSYCH 490. Honors Tutorial in Psychology.** (1-3) I, II. Individual directed research and study of a topic in psychology, normally as a preliminary to writing a senior honors thesis. May be repeated once to a total of 3 hours. Pr.: Sophomore standing, membership in the honors program of the College of Arts and Sciences, and permission of instructor.

**PSYCH 499. Senior Honors Thesis.** (2) I, II, S. Open only to seniors in the arts and sciences honors program.

### Undergraduate and graduate credit in minor field

**PSYCH 505. Abnormal Psychology.** (3) I, II, S. An introductory study of behavior pathologies, with emphasis on their etiology and treatment. Pr.: Junior standing; PSYCH 110.

**PSYCH 510. Introduction to Behavior Modification.** (3) II. Study of the principles of behavior modification and applications to human behavior. Emphasis on the learning principles and research in behavior modification. Pr.: PSYCH 505.

**PSYCH 518. Introduction to Health Psychology.** (3) II. Psychosocial factors relevant to general health maintenance, recovery from disease or injury, and the achievement of health. Topics include stress-management techniques, personality characteristics associated with disease, cognitive-emotional effects of diet and exercise, and theories of pain and pain management. Concepts of prevention and behavioral medicine are also included. Pr.: PSYCH 110.

**PSYCH 520. Life Span Personality Development.** (3) I, II, S. Theories and research in the development of personality from infancy through old age. Origins of personality in heredity and early experience, socialization practices, life crises and choices at various stages throughout life, and problems of aging. Pr.: PSYCH 110; sophomore standing.

**PSYCH 530. Psychology of Mass Communications.** (3) II. The psychological effects of mass communication on behavior and thought, including advertising, stereotyping of women and minorities, effects on children, violence and sex in the media, effects of news on behavior, and the promotion of prosocial behavior through the media. Pr.: PSYCH 110.

**PSYCH 535. Social Psychology.** (3) I, II. Psychology of the individual in society. Survey of empirical studies and theoretical models of social perception, attitudes, and social behavior (e.g., attribution, ethnic and gender prejudice, conformity). Relationship of these topics to personal and media influence, social mores, and social systems is also included. Pr.: PSYCH 110.

**PSYCH 540. Psychology of Women.** (3) II. Investigation of psychological processes of women. A developmental sequence with emphasis on major life events for women. Female physiology, early socialization into sex roles, friendship, achievement motivation, sexuality, marriage, childbearing, work, and mental health. Pr.: PSYCH 110.

**PSYCH 543. Women's Mental Health Issues.** (3) II. Investigates prevalent women's mental health issues such as incidence of depression/anxiety, eating disorders, sexuality,

relationship concerns. Also covers the efficacy of traditional treatment modalities and newer therapies that target women's unique mental health needs such as feminist or nonsexist therapies. Pr.: PSYCH 505.

**PSYCH 545. Consumer Psychology.** (3) I. 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.

**PSYCH 550. Group Dynamics.** (3) II. Interaction in small groups: interpersonal sensitivity, communication, decision making, development of group structure and norms. May be organized as laboratory "process" group and require some flexibility in scheduling. Pr.: Six hours in psychology.

**PSYCH 557. The Psychology of Ethnic Humor.** (3) S, and on sufficient demand. Reviews the structure, dynamics, and social functions of ethnic humor. Pr.: PSYCH 110 or SOCIO 211.

**PSYCH 558. Varieties of Consciousness.** (3) I, S. Traditional and contemporary approaches of both Western science and Eastern metaphysics to study of ordinary mind consciousness, unusual states of awareness, and efforts to expand the powers of mind. Topics include sleep, dreaming, biofeedback, meditation, psychoactive drugs, brain area dominance, and other factors influencing relationships. Pr.: PSYCH 110.

**PSYCH 559. Psychological Testing.** (3) II. Principles of psychological testing in industrial, clinical/counseling, and research environments. Topics include technical issues such as reliability, validity, norming, selection, placement, discrimination, etc. Also covers procedures for selecting, administering, and interpreting psychological tests. Pr.: PSYCH 110.

**PSYCH 560. Industrial Psychology.** (3) I, S. Survey of human behavior and psychological principles in an industrial/personnel context. Topics include: recruiting, selecting, and training personnel; evaluating their job performance; conducting job analyses; and implementing compensation strategies. Pr.: PSYCH 110.

**PSYCH 561. Laboratory in Industrial Psychology I.** (2) I. Supervised experience in personnel psychology including classifications, analysis, and evaluation of jobs. Pr.: PSYCH 560 or conc. enrollment.

**PSYCH 562. Laboratory in Industrial Psychology II.** (2) II. Additional supervised experience in personnel psychology including interviewing, EEOC regulations, training, and performance appraisal. Pr.: PSYCH 561.

**PSYCH 563. Gender Issues in the Workplace.** (3) I. Psychological experiences of women and men in the world of work, with emphasis on traditional and nontraditional sex-role behavior, sexual discrimination and harassment, and relevant socialization experiences. Pr.: PSYCH 110.

**PSYCH 564. Psychology of Organizations.** (3) II. Relationships between individuals, groups, and organizations. How organizational factors contribute to individual behavior, and how individuals affect groups and organizational functioning. Emphasis is on such traditional topics as work motivation, job satisfaction and other attitudes, leadership, communication, socialization, and organization and job design. Pr.: PSYCH 110.

**PSYCH 580. Psychology of Sexual Behavior.** (3) I, 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.

**PSYCH 585. Basic Concepts in Clinical Psychology.** (3) I. 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 110, 505, and 3 additional hours of psychology.

**PSYCH 586. Laboratory in Clinical Concepts.** (2) I. May be taken only in conjunction with PSYCH 585. Supervised practice in, demonstration of, and orientation to selected psychological techniques and practices. Pr.: Conc. enrollment in PSYCH 585.

**PSYCH 587. Field Placement.** (1-6) I, II, S. Supervised field experience in an agency or institutional setting in the application of psychological techniques to individuals,

groups, or organizations. Regular supervision emphasizes relationship between theory and application and the evaluation of outcomes. Pr.: PSYCH 585 and 586, or 560; 561 and 562 and consent of psychological technician training committee.

**PSYCH 599. Problems in Psychology.** (Var.) I, II, S. Investigation of selected problems. Pr.: PSYCH 110 and consent of instructor.

### Undergraduate and graduate credit

**PSYCH 605. Foundations of Social Behavior.** (3) II. Analysis of fundamental psychosocial processes underlying selected problems in contemporary society (e.g., effects on personality and interpersonal relations of changing sex roles, technological innovations, and historical events). Pr.: PSYCH 535 and either PSYCH 460, 475, or 480. (Psychology majors only.)

**PSYCH 620. Psychology of Personality.** (3) I. Discussion of different approaches to the study of personality. Pr.: PSYCH 350. (Psychology majors only.)

**PSYCH 625. Engineering Psychology.** (3) I. The role of behavioral factors in the design and operation of machines and equipment. Pr.: PSYCH 110, STAT 330, or 707.

**PSYCH 630. Human Neuropsychology.** (3) II. Study of brain-behavior relationships in humans. Brief review of human neuroanatomy followed by a major emphasis on brain function in learning, memory, language, and other cognitive behaviors. Also includes an examination of behavioral alterations following brain damage. Pr.: BIOL 198 and PSYCH 110, or consent of instructor.

**PSYCH 650. Psychology of Language.** (3) I. 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 junior standing.

**PSYCH 715. Psychology of Aging.** (3) II. The psychological aspects of human aging. An analysis of the contributions of experimental, developmental, and personality-social psychology to the study of aging. The psychopathology of aging and psychological intervention strategies are also covered. Pr.: PSYCH 110 or DAS 315 and junior standing.

**PSYCH 775. History of Current Trends.** (3) II. A review of the contributions of individuals and intellectual movements to the development of modern psychology. A survey of theoretical systems currently of influence. Pr.: PSYCH 110 and 9 additional hours of psychology; senior standing.

**PSYCH 790. Topics in Psychology.** (Var.) I, II, S. Pr.: PSYCH 110 and consent of instructor.

**PSYCH 799. Problems in Psychology.** (Var.) I, II, S. Pr.: PSYCH 110 and consent of instructor.

## Sociology, Anthropology, and Social Work

Michael Timberlake,\* Head

Professors Adamchak,\* Finnegan,\* O'Brien,\* H. Ottenheimer,\* and Timberlake;\* Associate Professors Benson,\* Denning, Dushkin,\* Frey,\* Huff-Corzine,\* Orbach,\* Prins,\* Riquelme,\* and Roncek;\* Assistant Professors Adams,\* Baird-Olson, Bloomquist,\* Brede,\* Cauble, Gibbons,\* Goe,\* Miley,\* Miller,\* and Verschelden; Emeritus Professors Friedmann and Taylor.

The Department of Sociology, Anthropology, and Social Work offers three separate undergraduate majors: sociology; anthropology; and social work. The sociology major has two op-

tions, sociology and criminology. The anthropology major has two options: anthropology and applied anthropology. The student may enroll in a B.S. or B.A. program in any of these major areas.

### 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.

Sociology is a desirable background, as either a sole or a combined major, for further professional training in law, city planning, public administration, hospital administration, and medicine, as well as for advanced graduate work in sociology or other social sciences.

Students who major in sociology should refer to the general requirements for the B.A. or B.S. degree earlier in the College of Arts and Sciences section. Sociology students who desire to teach in secondary schools should prepare for teacher certification with a major in sociology (see the College of Education section of this catalog).

Students enrolled in sociology will be required to complete 6 hours of tool and related courses, 16 hours of required core sociology requirements, and 15 hours of sociology electives at the 500 level or above.

#### Tool and related courses

CIS 110	Introduction to Personal Computing (or demonstration of equivalent competencies) .....	3
STAT 330	Elementary Statistics for the Social Sciences .....	3

#### Sociology core requirements

SOCIO 211	Introduction to Sociology .....	3
SOCIO 511	Comparative Social Theories .....	3
SOCIO 520	Methods of Social Research I .....	4
SOCIO 540	Social Organization .....	3
SOCIO 550	Introduction to Social Interaction .....	3

#### Sociology electives

Sociology electives at the 500 level or above .....	15
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### Criminology

The criminology option provides students with a broad knowledge of the workings of all agencies and organizations that make up the criminal justice system. The option is primarily for students who anticipate careers in the criminal justice system (including law enforcement, correctional institutions, court services) as well as advanced study in law or graduate work in sociology, criminology, or criminal justice.

Students will take core courses in sociology that acquaint them with the nature and extent of crime in society, police missions and crime control, the function of law, court organization and process, prison and its alternatives, and criminology and juvenile delinquency. Stu-

dents will also take relevant course work in other social and behavioral sciences.

A semester-length supervised internship is also required, providing students with direct personal experiences in working with offenders in various agencies within the criminal justice system.

Students who pursue the criminology option should refer to the general requirements for the B.A. or B.S. degree in the College of Arts and Sciences section. Students are required to complete 15 hours of tool and related courses, 34 hours of core sociology courses, and 13 hours of supervised internship and professional seminar courses.

#### Tool and related courses (15 hours)

STAT 330	Elementary Statistics for the Social Sciences .....	3
PSYCH 110	General Psychology .....	3
POLSC 325	U.S. Politics .....	3
Psychology elective .....		3
Political science elective .....		3

#### Major courses

SOCIO 211	Introduction to Sociology .....	3
SOCIO 361	Sociology of Criminal Justice .....	3
SOCIO 362	Police and Society .....	3
SOCIO 511	Comparative Social Theories .....	3
SOCIO 520	Methods of Social Research I .....	4
SOCIO 522	Sociological Field Methods .....	3
SOCIO 532	Community Organization and Leadership .....	3
SOCIO 550	Introduction to Social Interaction .....	3
SOCIO 560	Juvenile Delinquency .....	3
SOCIO 561	Criminology .....	3
SOCIO 661	Corrections .....	3

#### Professional field experience

SOCIO 567	Pre-Internship Orientation .....	1
SOCIO 568	Society and Criminal Justice Internship .....	9
SOCIO 569	Society and Criminal Justice Professional Seminar .....	3

### Anthropology

There are four major subfields of anthropology. Physical anthropology explores the origins of human life and the biological bases of culture. Archaeology examines the development of human cultures from prehistory and ancient civilizations to historic and modern times. Linguistic anthropology focuses on the languages and dialects of the world and the relationships of language to thought and culture. Cultural anthropology studies human behavior by surveying the range and variety of cultural traditions throughout the world. Some anthropology majors generalize, while others specialize in one or more of the subfields.

#### Requirements

In addition to the general B.A. or B.S. requirements, anthropology majors take a minimum of 27 hours in anthropology as follows:

#### Introductions to the four subfields:

ANTH 200	Introduction to Cultural Anthropology ..	3
ANTH 220	Introduction to Linguistic Anthropology .....	3
ANTH 260	Introduction to Archaeology .....	3
ANTH 280	Introduction to Physical Anthropology ..	3

#### Capstone course:

ANTH 602	Anthropological Theory .....	3
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Four advanced electives distributed among three or more subfields: 12 hours at or above the 500 level.

Many anthropology students prepare for the variety of occupations concerned with human relations by combining anthropological study with other training, frequently by majoring in two fields. Each program of study is worked out individually by a student and his or her advisor. Interested students may obtain additional information from the *Guide for Prospective Anthropology Majors*, which is available in the department office.

### Applied anthropology option

The applied anthropology option provides preparation and experience in the application of anthropology to professional settings outside the academic environment. The option is interdisciplinary, combining anthropology with other areas of training and expertise. While the option is flexible and accommodates a wide range of individual student interests, emphasis is on three major areas: developmental/action anthropology (domestic, international, community, and rural development); cultural resource management (historic preservation, parks and museums, and public archaeology); and complex organizations (agencies, foundations, business, administration, planning, and policy analysis).

The option builds on existing requirements for a bachelor's degree in anthropology. It adds 6 hours in anthropology and 18 hours in an area specialization outside the anthropology major. Double major, dual degree, pre-professional, and secondary major programs are particularly well suited for the option. Application to participate is normally made to the anthropology faculty during or before the junior year.

In addition to the existing 27 hours of major requirements for the bachelor's degree in anthropology, the following courses are required:

ANTH 640	Pro-Seminar in Applied Anthropology .	3
ANTH 641	Internship in Applied Anthropology .....	3
	or	
ANTH 626	Internship in Museology .....	3

An area specialization consisting of 18 hours of course work outside anthropology with the following distribution:  
Quantitative or technical skill development ..... 6  
Subject matter courses ..... 12

The area specialization is a set of related courses focused on a particular interest, problem domain, or area of expertise taken from any other discipline or combination of disciplines. The quantitative and technical skill courses must be consistent with and supportive of the subject matter work. Students must demonstrate the coherence of their chosen area specialization and its fit with anthropology. The area specialization must be approved by the anthropology faculty.

### Social work

Social work is concerned with the interaction between people and their social environments. Social workers help people deal with other people, cope with the many social and environmental forces that affect and control daily life, and help solve problems that inhibit growth and development.

The undergraduate social work program is accredited by the Commission on Accreditation of the Council on Social Work Education to educate entry-level, generalist social work practitioners. The social work major is of particular value to students who intend to pursue a career in social work upon graduation.

The bachelor's degree in social work is recognized as a beginning-level professional degree. Students graduating from the social work program are eligible for licensure as bachelor degree social workers in Kansas and numerous other states. No other bachelor's degree is recognized, or necessary, for such eligibility. Students who wish to pursue graduate studies in social work will be eligible for advanced standing in many master of social work programs throughout the United States.

The intervention tasks performed by social workers are derived from a common base of knowledge, values, and skills. Thus, social workers are uniquely qualified to provide resources, services, and opportunities to individuals, groups, families, organizations, and communities. Students are required to complete a field practice placement during their senior year to integrate classroom material with practice experience in a professional setting.

Students wishing to declare a major in social work may enroll directly in curriculum SOCWK. This is a provisional admission to the social work program. Students must complete SOCWK 010 and SOCWK 260 before formal evaluation and admission to the program can occur.

Formal evaluation occurs prior to admission to SOCWK 560 Social Work Practice I, taken during the junior year. At that time each student completes a personal statement and undergoes a formal review of academic and classroom performance by the program admissions committee. Students must have a 2.3 overall GPA and a 2.75 GPA in the core courses. Students successfully passing this review may enter the first course in the practice sequence, SOCWK 560.

Failure to meet the standards of the program will result in dismissal from the social work major. A student may be allowed to remain in the major on conditional or probationary status, but he or she must meet the standards of the program to complete the major.

For complete details on the admissions requirements and procedure, see the program admissions policy in the student handbook. Appeals of program faculty decisions may be made through established departmental procedures.

A student earning a B.A. or B.S. in social work must complete 120 hours including SOCWK 010 Orientation to the Social Work Major; SOCWK 260 Introduction to Social Work; 43 hours of major courses; and 22 hours of tool and related courses.

<b>Human behavior and the social environment content</b>	
SOCIO 211	Introduction to Sociology ..... 3
SOCIO 511	Comparative Social Theory ..... 3
SOCIO 532	Community Organization and Leadership ..... 3
ANTH 200	Introduction to Cultural Anthropology .. 3
PSYCH 110	General Psychology ..... 3
SOCWK 567	Human Behavior and the Social Environment ..... 3
POLSC 110	Introduction to Political Science ..... 3
	or
POLSC 301	Introduction to Political Thought ..... 3
ECON 110	Economics I ..... 3
BIOL 198	Principles of Biology ..... 4
<b>Social work practice content</b>	
SOCWK 560	Social Work Practice I ..... 3
SOCWK 561	Social Work Practice II ..... 3
SOCWK 568	Social Work Practice III ..... 2
<b>Research content</b>	
STAT 330	Elementary Statistics for the Social Sciences ..... 3
SOCWK 579	Methods of Social Work Research ..... 4
SOCWK 550	Field Practicum Research Preparation ... 1
<b>Social policy content</b>	
SOCWK 510	Social Welfare as a Social Institution .... 3
SOCWK 565	Program and Policy Formulation and Analysis ..... 3
<b>Field practicum</b>	
SOCWK 562	Field Experience ..... 12
<b>Professional social work seminar</b>	
SOCWK 564	Social Work Professional Seminar ..... 3

### Sociology courses

#### Undergraduate credit

**SOCIO 211. Introduction to Sociology.** (3) I, II, S. Development, structure, and functioning of human groups; social and cultural patterns; and the principal social processes.

**SOCIO 214. Introduction to Sociology, Honors.** (4) I, II. Development, structure, and functioning of human groups; societal and cultural patterns; the nature of sociological inquiry. Lecture, discussion, and independent study.

**SOCIO 301. Topics in Sociology.** (Var.) I, II, S. Supervised independent and/or interdisciplinary study projects. Pr.: SOCIO 211 and consent of instructor.

**SOCIO 360. Social Problems.** (3) I, II. Analysis of social problems such as drug use, crime, juvenile delinquency, mental illness, unemployment, and family instability. Pr.: SOCIO 211.

**SOCIO 361. Sociology of the Criminal Justice System.** (3) II. General introduction to the field, examining all agencies and organizations that collectively make up the criminal justice system. Pr.: SOCIO 211.

**SOCIO 362. Police and Society.** (3) I. Examines in detail the policing function in society and the role police play in the criminal justice process. Pr.: SOCIO 211.

**SOCIO 399. Honors Seminar in Sociology.** (1-3) I. On sufficient demand. Readings and discussion of selected topics. Open to nonmajors in the honors program.

**SOCIO 435. Sport and Contemporary Society.** (3) II. An analysis of sport and its role in contemporary society. Course creates a greater awareness of the social significance of sport in society and fosters the capacity to use critical thinking in the analysis of significant sport issues. Same as KIN 435. Pr.: SOCIO 211.

**SOCIO 499. Senior Honors Thesis.** (2) On sufficient demand. Open only to seniors in the arts and sciences honors program.

#### Undergraduate and graduate credit in minor field

**SOCIO 500. Sociological Perspectives on Contemporary Issues.** (Var.) I, II, S. Analysis of a selected topic of contemporary interest. Topics vary from semester to semester and might include: impact of public policy on rural life; white collar crime; student-athlete education; social change in the Third World. Pr.: SOCIO 211.

**SOCIO 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.

**SOCIO 504. Political Sociology.** (3) II, in even years. An introduction to the principles of political sociology. 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. Same as POLSC 504. Pr.: SOCIO 211, POLSC 110.

**SOCIO 505. Introduction to the Civilizations of South Asia I.** (3) I. Interdisciplinary survey of the development of civilizations in India, Pakistan, Sri Lanka, Bangladesh, and Afghanistan; geographical and demographic context; philosophical and social concepts; social and political institutions; literature; and historical movements. Same as HIST 505, ECON 505, POLSC 505, ANTH 505, GEOG 505. Pr.: SOCIO 211.

**SOCIO 506. Introduction to the Civilizations of South Asia II.** (3) II. Interdisciplinary survey of recent and contemporary civilizations in India, Pakistan, Sri Lanka, Bangladesh, and Afghanistan, including literature, geography, social and political structure, ideas. Same as HIST 506, ECON 506, POLSC 506, ANTH 506, GEOG 506. Pr.: SOCIO 211.

**SOCIO 507. Political Sociology of Latin America.** (3) I. A survey of the socioeconomic and political dimensions of Latin America's development in the twentieth century. Given the diversity that characterizes the region, the course adopts a comparative perspective, focusing on the experiences of particular countries in order to examine the most significant trends on the continent. Special attention is given to contemporary issues such as the process of transition to democracy; the impact of the foreign debt crisis, privatization, and free market policies. Pr.: SOCIO 211.

**SOCIO 510. Social Welfare as a Social Institution.** (3) I, II. The development and present status of social welfare in meeting changing human needs and the requirements in other parts of our social system; the analysis of present-day philosophy and functions of social welfare. Same as SOCWK 510. Pr.: SOCIO 211.

**SOCIO 511. Comparative Social Theories.** (3) I, II. Investigations of a range of current sociological theories concerning the socialization process, group behavior, and social organization. Pr.: SOCIO 211.

**SOCIO 520. Methods of Social Research I.** (4) I, II. 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.: SOCIO 211, STAT 330 or equiv. To include 1 credit hour of lab and field research experience.

**SOCIO 522. Sociological Field Methods.** (3) I, II. Introduction to field/qualitative methods. Includes collection and analysis of data using techniques such as interviewing, observation, and unobtrusive measures. Taking field notes, report writing, and ethical issues are also stressed. Pr.: SOCIO 520.

**SOCIO 531. Urban Sociology.** (3) II. 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.: SOCIO 211.

**SOCIO 532. Community Organization and Leadership.** (3) I, II. The analysis of community organization and change in American communities, with special emphasis on nonmetropolitan places. Issues include the analysis of internal community organizational ties, the interaction between the local community and its external environment, and the exploration of various methods affecting community development and social change within communities. Pr.: SOCIO 211 and 520, or equiv., or graduate standing.

**SOCIO 533. Rural Society.** (3) I. A survey of U.S. rural society, including change in agricultural structure, rural de-

mographic shifts, growth of the rural service sector, rural class structure, decline and transformation of rural communities, and linkages to urban society. Examination of selected rural institutions such as education and religion. Pr.: SOCIO 211 or consent of instructor.

**SOCIO 535. Population Dynamics.** (3) II, in odd years. World population trends and their implications for economic development, public policy, and social and cultural change. The interaction of fertility, mortality, and migration with the size, distribution, and structure of populations in nations and world regions. Pr.: SOCIO 211.

**SOCIO 536. Environmental Sociology.** (3) II, in even years. The interrelations among human societies, social institutions, and the biophysical environment. Emphasis on the reciprocal links among technological change, economic structure, and the ecological basis of human societies. Pr.: SOCIO 211.

**SOCIO 540. Social Organization.** (3) II. Principles and processes of the organization and structure of human societies. Analysis of social groups and institutions and theories of social structure. Pr.: SOCIO 211.

**SOCIO 541. Wealth, Power, and Privilege.** (3) II. Distribution of resources and rewards in American society. Various explanations of the causes, persistence, and effects of inequality in American life. Discussion of social mobility and current issues. Pr.: SOCIO 211.

**SOCIO 542. The Social Organization of the Future.** (3) On sufficient demand. 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.: SOCIO 211.

**SOCIO 545. The Sociology of Women.** (3) II. The positions of women in the United States and cross-culturally are studied in order to understand what women and girls do and how that is perceived and responded to by different groups. Pr.: SOCIO 211.

**SOCIO 546. Bureaucracy in Modern Societies.** (3) I. The nature and types of bureaucratic organizations in modern societies. Selected aspects of their internal structure, such as peer group and hierarchical relations in organizations, processes of communication, management, and interpersonal mechanisms of control. Pr.: SOCIO 211.

**SOCIO 550. Introduction to Social Interaction.** (3) I. A survey of theories of social interaction and social psychology with special attention to research on principles of interpersonal relations in social situations, group formation, maintenance, and change. Pr.: SOCIO 211.

**SOCIO 560. Juvenile Delinquency.** (3) I, II, S. Nature, extent, and causes of delinquency; characteristics of delinquents; means of prevention and treatment. Pr.: SOCIO 211.

**SOCIO 561. Criminology.** (3) I, II. Theoretical foundations of research on the nature, extent, and causes of crime; programs for prevention and treatment. Pr.: SOCIO 361 or 511.

**SOCIO 565. Program and Policy Formulation and Analysis.** (3) I, II. Examination of policies and programs developed to cope with various social problems. Emphasis will be 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 SOCWK 565. Pr.: SOCIO 510.

**SOCIO 567. Pre-Internship Orientation.** (1) I, II. Society and criminal justice option major's take this course in the semester prior to enrollment in SOCIO 568 Society and Criminal Justice Internship. Students, in consultation with faculty internship coordinator, select internship sites and undergo agency orientation. Pr.: SOCIO 522 and senior standing. Criminology option majors only.

**SOCIO 568. Society and Criminal Justice Internship.** (9) I, II, S. Supervised field experience in various agencies within the criminal justice system. To be taken concurrently with SOCIO 569. Pr.: SOCIO 567 and 522. Criminology option students only.

**SOCIO 569. Society and Criminal Justice Professional Seminar.** (3) I, II, S. Integrates field experience and everyday practices in working with offenders in the criminal jus-

tice system with sociological theory. To be taken concurrently with SOCIO 568. Pr.: SOCIO 567 and 522. Criminology option students only.

**SOCIO 570. Race and Ethnic Relations in the U.S.A.** (3) I, II. This survey of racial and ethnic relations focuses on discrimination and conflict now as well as on background factors of the past to enlarge understanding of dominant and minority groups. Pr.: SOCIO 211.

### Undergraduate and graduate credit

**SOCIO 618. Religion in Culture.** (3) II, in odd years. The nature of religion and its manifestations in different cultural systems. Same as ANTH 618. Pr.: ANTH 200 or SOCIO 211.

**SOCIO 633. Gender, Power, and Development.** (3) II, in even years. Examination of various models of development and their impact on roles of women and men in various cultures. Emphasis upon Africa, Asia, and Latin America. Comparisons of public, service, and economic sectors, including agriculture, marketing, and industry. Examination of policy issues. Pr.: SOCIO 211 or ANTH 200 and 3 additional hours in sociology or cultural anthropology. Same as ANTH 633.

**SOCIO 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.: SOCIO 211.

**SOCIO 643. Sociology of Religion.** (3) I. On sufficient demand. The role of religion as an institution in American society. An assessment of the functions of religion and an exploration of contemporary trends and movements, including information on traditional denominations and emerging sects and cults. Pr.: SOCIO 211.

**SOCIO 647. Sociology of Work.** (3) II. 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.: SOCIO 211.

**SOCIO 661. Corrections.** (3) I, II. The historical development and current status of the correctional system. Major institutional components: jails, prisons, probation, parole and other forms of community corrections. Modern issues such as offender and victim rights and electronic monitoring. Pr.: SOCIO 561.

**SOCIO 665. Women and Crime.** (3) I, in odd years. Nature, extent, and causes of crime among women; victimization of women including domestic assault, rape and incest; women who work in the criminal justice system. Pr.: SOCIO 361 or junior standing.

**SOCIO 701. Problems in Sociology.** (Var.) I, II, S. Pr.: SOCIO 211 and junior standing.

**SOCIO 709. Development of Social Thought.** (3) On sufficient demand. Development of social thought from ancient civilization to the middle of the nineteenth century; approaches to the study of society; ideas on human origins and human nature, character and results of associative life, social trends, and social betterment. Pr.: SOCIO 211.

**SOCIO 710. Systematic Analysis of Social Theory.** (3) I. Examination of sociological theory with reference to the nature of scientific explanation and the function of scientific theory. Critical study and analysis of selected social theory and major social theorists with the objective of clarifying the conceptual and logical structure of underlying theoretical models and their assumptions about man and society. Pr.: SOCIO 511 or equiv.

**SOCIO 724. Qualitative Methodology.** (3) On sufficient demand. Collection, analysis, and presentation of sociological data using such methods as participant observation, ethnomethodology, community analysis, documentary research and historiography, case study, and life history. Emphasis upon formulation of problems and the execution of research. Pr.: SOCIO 520 and STAT 330 or equiv.

**SOCIO 725. Intermediate Methods of Social Research.** (3) II. Current sociological research techniques, strategies of research design, construction of research instruments, logic of sociological inquiry, conceptualization, problem formation, and preparation of research proposals. Pr.: SOCIO 520 and STAT 330.

**SOCIO 730. Social Demography.** (3) I. The study of human population, including the social, economic, political,

ecological, and cultural determinants and consequences of changes in fertility, mortality, and migration. Pr.: Nine hours of sociology or equiv. Pr.: SOCIO 211.

**SOCIO 732. Sociology of Community.** (3) II, in odd years. A survey of theoretical perspectives and current research on the sociology of community in the U.S. and other countries. Examples of issues covered include community growth and decline, social inequality, community power and politics, social implications of community economic change, urbanization, and the global context of local change. Pr.: SOCIO 532 or permission of instructor.

**SOCIO 734. Sociology of Rural Development.** (3) I, in even years. A survey of theoretical perspectives and research on changes in the social organization of rural areas, both international and in the U.S. Examples of issues covered include relationship of agriculture to other social structures and the biosphere, implications of the limits to growth for the development of rural economies, peasants and other rural social groups, and the transnational organization of food production, distribution, and consumption. Pr.: SOCIO 533 or permission of instructor.

**SOCIO 735. Human Ecology.** (3) II, in even years. 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.: SOCIO 211 and consent of instructor.

**SOCIO 737. Methods in Human Ecology.** (3) Techniques for accessing, manipulating, and creating aggregate, ecological data from private and public sources including the U.S. Census through address matching or location identification, aggregation, and calculation of ecological potentials. Prepares students for doing basic and applied research in human ecology, sociology, and other related fields. Pr.: SOCIO 520 or equiv.

**SOCIO 740. Comparative Social Systems.** (3) I, in even years. Compares social systems in different regions of the world. Examines models of comparative and historical sociology. Provides students with a background for conducting and evaluating comparative research. Treats such issues as socioeconomic development, group relations, and age and sex roles from a cross-cultural perspective. Pr.: SOCIO 211 or ANTH 200 and a 500-level course in social or cultural change and development.

**SOCIO 741. Social Differentiation and Stratification.** (3) I, in odd years. Analysis of societal organization based on age, sex, residence, occupation, community, class, caste, and race. Pr.: SOCIO 211.

**SOCIO 742. Society and Change in South Asia.** (3) II, in even years. Examines recent studies of family and community, population, mobility, urbanization, and modernization in the India-Pakistan region, with focus on social change. Pr.: SOCIO 211 or ANTH 200 and either a 500-level course in South Asian studies or one in social change and development.

**SOCIO 744. Social Gerontology: An Introduction to the Sociology of Aging.** (3) II. 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.: SOCIO 211.

**SOCIO 750. Social Control.** (3) Analysis of social and institution processes and mechanisms of social control: socialization, role allocation, systems of social sanctioning, growth and dynamics of institutional systems of social control emphasizing its character at the institutional and societal level of analysis. Pr.: SOCIO 211.

**SOCIO 751. Social Change.** (3) II, in odd years. Examination of the processes and mechanisms of societal change. Attention centers on current theoretical, methodological, and research issues. Pr.: SOCIO 211.

**SOCIO 752. Social Roles and Social Relationships.** (3) II, in odd years. 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.: SOCIO 211 and 550.

**SOCIO 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.: SOCIO 561 or graduate student standing.

## Anthropology courses

### Undergraduate credit

**ANTH 200. Introduction to Cultural Anthropology.** (3) I, II. S. Introduction to ethnology and ethnography; analysis and comparison of technological, social, and religious characteristics of cultural systems.

**ANTH 201. Introduction to Cultural Anthropology, Honors.** (4) On sufficient demand. Introduction to basic ethnology and ethnography; technological, social, and religious characteristics of cultural systems; discussion and independent study.

**ANTH 202. Anthropology Seminar for Education Majors.** (1) I, II. To aid elementary and secondary education majors in relating anthropological perspectives and findings to their teaching areas. Pr.: ANTH 200 or conc. enrollment.

**ANTH 220. Introduction to Linguistic Anthropology.** (3) II. Language as a part of human behavior: its origins, uses and abuses, and ways of defining reality. Basic descriptive and ethnosemantic skills used by anthropologists to learn languages in the field.

**ANTH 260. Introduction to Archaeology.** (3) I, II. A brief survey of theories of culture change as they apply to the development of Stone Age cultures through the rise of worldwide agricultural societies, cities, and other complex societies; brief outlines of the major Old and New World cultural sequences.

**ANTH 280. Introduction to Physical Anthropology.** (3) I, II, S. History of research; principles of evolution and human genetics; primate relations of hominids; fossil evidence of the evolution of hominids; the study of modern race; culture and evolution.

**ANTH 281. Introduction to Physical Anthropology Laboratory.** (1) I, II, S. Laboratory investigation of human skeletal anatomy, human genetics, primate comparative anatomy, fossil hominid morphology, and comparative evolution of hominid types. Two hours lab a week. Pr.: ANTH 280 or conc. enrollment.

**ANTH 399. Honors Seminar in Anthropology.** (1-3) On sufficient demand. Readings and discussion of selected topics. Open to nonmajors in the honors program.

**ANTH 420. Ethnography of Language.** (3) I or II. Study of language and dialect as aspects of social and ethnic group identities. Participant observation is emphasized. Research project includes kinship terminology, life histories, folklore, and lexicography. Pr.: ANTH 200 or consent of instructor.

**ANTH 432. Indians of Mexico, Central America, and the Caribbean.** (3) I, in even years. Description and comparison of the cultural ecology of many of the indigenous peoples of the region including the Yaqui, Huichol, Tarahumara, and Zapotec of Mexico; the Maya of Guatemala; the Miskito of Nicaragua; the Cuna of Panama; and the Taino of Puerto Rico.

**ANTH 499. Senior Honors Thesis.** (2) On sufficient demand. Open only to seniors in the arts and sciences honors program.

### Undergraduate and graduate credit in minor field

**ANTH 501. Proficiency Development.** (1-3) I, II. 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.

**ANTH 505. Introduction to the Civilizations of South Asia I.** (3) I. Interdisciplinary survey of the development of civilizations in India, Pakistan, Sri Lanka, Bangladesh, and Afghanistan; geographical and demographic context; philosophical and social concepts; social and political institu-

tions; literature and historical movements. Pr.: ANTH 200. Same as HIST 505, ECON 505, POLSC 505, SOCIO 505.

**ANTH 506. Introduction to the Civilizations of South Asia II.** (3) II. Interdisciplinary survey of recent and contemporary civilizations in India, Pakistan, Sri Lanka, Bangladesh, and Afghanistan, including recent history, current economy, religion, culture, languages, literature, geography, social and political structure, ideas. Pr.: ANTH 200. Same as HIST 506, ECON 506, POLSC 506, SOCIO 506.

**ANTH 507. Folk Cultures.** (3) I or II. A comparative approach to agrarian societies; the investigation of economic, political, social, and ideological aspects of peasantry. Pr.: Sophomore standing.

**ANTH 508. Male and Female: Cross-Cultural Perspectives.** (3) I or II. Sex roles and male-female relationships in the world's cultures. Stresses sex-role complementarity within the anthropological framework of cultural relativism. Pr.: Sophomore standing.

**ANTH 510. Kinship and Marriage in Cross-Cultural Perspective.** (3) II, in even years. Systems of family, marriage, descent, and sex tabus in cross-cultural perspective. Pr.: ANTH 200 or SOCIO 211.

**ANTH 511. Cultural Ecology and Economy.** (3) I or II. Cultural ecology and organization in the world's cultures. Discussion of environment and culture, exchange and display, money, trade and markets, and economic development and social change in selected societies. Pr.: Sophomore standing.

**ANTH 512. Political Anthropology.** (3) I or II. Ethnological approaches to politics in societies around the world. Structural-functional, evolutionary, and conflict theories. A comparison of the political systems of small-scale and complex societies: political modernization. Pr.: Sophomore standing.

**ANTH 515. Creativity and Culture.** (3) I, in even years. How ethnologists view the expressive and creative aspects of culture. A cross-cultural survey of the verbal, visual, and performing arts. Pr.: Sophomore standing.

**ANTH 516. Ethnomusicology.** (3) I, in even years. Ethnic, popular, and traditional musics from around the world. The course samples a wide range of stylistic traditions from Africa, Asia, Oceania, Europe, and the Americas. Emphasis is on understanding musical style in cultural context.

**ANTH 517. African American Music and Culture.** (3) I, in odd years. Continuity and tradition in the musical styles and cultural patterns of African Americans in the United States, the Caribbean, and South America. Music, art, religion, social organization, from African roots to modern forms.

**ANTH 519. Practical Anthropology.** (3) I or II. Application of anthropological principles and insights to programs of planned change, cultural innovation, and contemporary problems. Pr.: Sophomore standing.

**ANTH 520. Research Seminar.** (Var.) On sufficient demand. Intensive exploration of anthropological problems for both majors and nonmajors of sufficient background. High levels of individual participation. Pr.: 9 hours of anthropology.

**ANTH 522. Special Topics in Anthropology.** (1-4) On sufficient demand. Variable topics within cultural anthropology, linguistic anthropology, archaeology, or physical anthropology. Pr.: Consent of instructor.

**ANTH 532. Central America: Its Peoples and Problems.** (3) I. An anthropological perspective of the interactions of indigenous and foreign populations with an examination of the geographic, social, economic, political, and ideological bases of the problems facing Central America today. A look at the seven countries composing Central America in terms of their particular problems and unique solutions. Pr.: ANTH 200.

**ANTH 533. Indians of Kansas.** (3) I, in even years. Description and comparison of native cultures of the prairies and plains of Kansas. Culture contact and change in surviving tribes. Pr.: Sophomore standing.

**ANTH 536. African American Cultures.** (3) I or II. Description and comparison of African-derived cultural patterns in the Americas, stressing culture contact and ac-

culturation, retention and syncretism, social and economic organization, religion, language, the arts. Pr.: Sophomore standing.

**ANTH 545. Cultures of India and Pakistan.** (3) I or II. 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. Pr.: Sophomore standing.

**ANTH 550. Cultures of Africa.** (3) I or II. Family life, subsistence patterns, exchange systems, languages, religions, and development of the peoples of Africa.

**ANTH 570. American Indian Archaeology.** (3) I or II. 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.: ANTH 200 or 260.

### Undergraduate and graduate credit

**ANTH 600. Cultural Dynamics.** (3) I or II. Cultural processes and their conditions and consequences; mechanisms by which customs originate and become culturally significant; development, modification, and decline of customs and cultures; processes and consequences of intercultural contact; applied anthropology. Pr.: ANTH 200 or consent of instructor.

**ANTH 602. Anthropological Theory.** (3) I or II. Review and integration of the major theoretical approaches in the principal branches of anthropology. Pr.: ANTH 200 or consent of instructor.

**ANTH 604. Culture and Personality.** (3) I or II. Anthropological contributions to personality study; cross-cultural comparisons of personality types, means of personality formation in different cultures; cultural change and personality. Pr.: Three hours of anthropology.

**ANTH 618. Religion in Culture.** (3) II, in odd years. The nature of religion in different cultural systems. Pr.: ANTH 200 or SOCIO 211 or consent of instructor. Same as SOCIO 618.

**ANTH 625. Independent Reading and Research in Anthropology.** (1-3) I, II. 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.

**ANTH 626. Internship in Museology.** (3) I, II, S. Practical professional museum experience of at least three weeks full time or 150 hours part time in the processing of collections, conservation, cataloging, archive and library maintenance, and/or the planning and preparation of exhibits. Only fulfills option requirements for anthropology majors. May be repeated once for credit if at a different type of museum. Pr.: ANTH 200 or 260.

**ANTH 630. Indians of North America.** (3) I, in odd years. Description and comparison of native cultures of Canada and the United States; culture contact and change among surviving groups. Pr.: ANTH 200 or 260.

**ANTH 633. Gender, Power, and International Development.** (3) II, in even years. Examination of various models of development and their impact on roles of women and men in various cultures. Emphasis upon Africa, Asia, and Latin America. Comparisons of public, service, and economic sectors, including agriculture, marketing, and industry. Examination of policy issues. Pr.: SOCIO 211 or ANTH 200 and 3 additional hours in sociology or cultural anthropology. Same as SOCIO 633.

**ANTH 634. Indian Cultures of South America.** (3) On sufficient demand. A survey of the nature and variability of the original cultures of South America. Analysis of sample cultures, stressing economic, social, political, and religious structures. Pr.: ANTH 200 or 260.

**ANTH 640. Pro-seminar in Applied Anthropology.** (3) I. Study and analysis in selected subfields of the discipline related to professional experience and problem solving outside the academic discipline. Critical emphasis is on analytical and evaluative skills in relation to the organization and objectives of groups, agencies, and institutions for which applied work is conducted. Only fulfills option requirements for anthropology majors. Pr.: Consent of instructor.

**ANTH 641. Internship in Applied Anthropology.** (3) I, II, S. Supervised field experience of at least three weeks full time or 150 hours part time with an organization or institution in the application of anthropological approaches to problem solving and working in a professional setting. Emphasis is on anthropological skills in relation to the objectives and operations of an institution. Only fulfills option requirements for anthropology majors. May be repeated once for credit. Pr.: Completion of all other option requirements and consent of the instructor.

**ANTH 673. Precolumbian Civilizations of Mexico and Guatemala.** (3) I or II. Early foraging societies, the beginnings of agriculture; the rise of civilization; the classic empires of the Maya, Aztec, Tarascans, and their neighbors; relationships with the United States. Pr.: ANTH 200 or 260.

**ANTH 676. Archaeology of the Old World.** (3) I or II. Origin and evolution of human culture and technology with a particular focus on the cultural developments in China, India, sub-Saharan Africa, and Polynesia as well as the Bronze and Iron Ages of Europe and the early Mediterranean civilizations. Pr.: ANTH 200, 260, or consent of instructor.

**ANTH 679. Archaeological Field Methods.** (3) I. Archaeological site survey, site excavation, and laboratory analysis of sites and artifacts from the Manhattan, Kansas region. Field work on Saturday, 8 a.m.–5 p.m., while weather permits, laboratory work thereafter. Pr.: Consent of instructor.

**ANTH 680. Survey of Forensic Sciences.** (3) Anthropological survey of the predominantly biological areas of forensic science, their methods and techniques, as they pertain to the application of that science to the purpose of the law. Particular emphasis will be given to perspectives about the science itself, its application to anthropology, and the unique ways in which that science may be used by the law. Pr.: A life science with laboratory requirement in the College of Arts and Sciences or consent of the instructor.

**ANTH 685. Race and Culture.** (3) on demand. 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.

**ANTH 688. Paleoanthropology.** (3) II, in odd years. 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.: ANTH 200 or 280 or consent of instructor.

**ANTH 691. Primatology.** (3) I, in even years. 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 hominids in the context of the primate order. Pr.: ANTH 280 or consent of instructor.

**ANTH 694. Osteology.** (3) II, in even years. 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.: ANTH 280 or consent of instructor.

**ANTH 695. Laboratory in Osteology.** II, in even years. Laboratory demonstration and exercise in working with skeletal material for analysis of sex, age, stature, and race. Complete metric and nonmetric analysis with consideration given to paleodemography, paleopathology, in situ analysis and excavation, and preservation. Written reports on bone material remains will be necessary. Pr.: ANTH 694 or conc. enrollment and consent of instructor.

**ANTH 697. Seminar in Osteology.** (2) II, in odd years and on demand. Analysis of human and nonhuman skeletal remains including age, sex, stature, race, anomalies, pathologies, trauma, metric and nonmetric traits, cause of death, and time since death. This course allows greater breadth and depth of osteological analysis than either ANTH 694 or 695, and allows for more concentration on individual methods and techniques and case studies. Pr.: ANTH 694 and 695.

**ANTH 730. Field and Laboratory Techniques in Archaeology.** (1-9) S. 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. May be repeated once if the areas or problems involved are different. Pr.: ANTH 200 or 260 or consent of instructor.

**ANTH 792. Field Methods in Linguistics.** (3) On sufficient demand. Techniques of collecting and analyzing linguistic data in the field. Work with language consultants in class, on languages such as Swahili. Pr.: ANTH 220 or LING 280 or 600. Same as LING 792 and LG 792.

### Social work courses

**SOCWK 010. Introduction to the Social Work Major.** (0) I, II. Information for new social work majors on the requirements, content, and objectives of the course sequences, and on the formal admissions process; and emphasizes the importance of the liberal arts foundation as the basis for the professional content; and reviews the CSWE Curriculum Policy Statement plus the NASW Code of Ethics.

### Undergraduate credit

**SOCWK 260. Introduction to Social Work.** (3) I, II. An introduction to the profession of social work and the various fields of social service by observing, experiencing, and analyzing social work and its place in society. An opportunity for the student to test social work as a possible career choice.

**SOCWK 310. Topics in Social Work.** (1-3) I, II. Supervised independent study projects. Pr.: Consent of the instructor.

**SOCWK 499. Senior Honors Thesis.** (2) On sufficient demand. Open only to seniors in the arts and sciences honors program.

### Undergraduate and graduate credit in minor field

**SOCWK 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. Pr.: Consent of instructor and superior performance in relevant course.

**SOCWK 510. Social Welfare as a Social Institution.** (3) I, II. The development and present status of social welfare in meeting changing human needs and the requirements in other parts of our social system; the analysis of present-day philosophy and the functions of social welfare. Same as SOCIO 510. Pr.: One course in each of the following areas: sociology, economics, and political science.

**SOCWK 519. Methods of Social Work Research.** (4) I, II. Focus is on research application in area of baccalaureate social work practice. Particular attention is given to research strategies for the evaluation of social work practice, for gathering information about communities and clientele, and for examining the impact of social policies at the local level. The content examines the ethics and processes of research, including the issues of research problem identification and selection, the use of the library to support the research effort, design considerations, problems of analysis with small samples, and presentation of research findings. Includes 1 credit hour of lab and field experience. Pr.: STAT 330 and SOCWK 260. Social work majors only.

**SOCWK 543. Women's Mental Health Issues.** (3) II. Investigates prevalent women's mental health issues such as the incidence of depression/anxiety, eating disorders, sexuality, relationship concerns. Also covers the efficacy of traditional treatment modalities and newer therapies that target women's unique mental health needs, such as feminist or nonsexist therapies. Pr.: One course in women's studies, social work, psychology, or family therapy.

**SOCWK 550. Field Practicum Research Preparation.** (1) I, II. Social work majors take this course in the semester before enrollment in SOCWK 562 Field Experience. The student is expected to prepare a research proposal which describes research that will be completed in the field practicum setting. In addition, the student is expected to complete 50 hours of volunteer time in the assigned field

practicum setting. Pr.: SOCWK 519 and senior standing. Social work majors only.

**SOCWK 560. Social Work Practice I.** (3) I, II. Introduction to the basic helping skills and techniques common to social work practice. The social systems perspective is used to guide the development of a problem-solving methodology with attention to information gathering, assessment, and problem identification. Values clarification and self-awareness are emphasized and the skills needed for intervention, termination, and evaluation are introduced. Pr.: SOCIO 211; PSYCH 110; ANTH 200; junior standing and permission of the instructor.

**SOCWK 561. Social Work Practice II.** (3) I, II. Continuation of SOCWK 560 with emphasis on skill development in intervention techniques, and practice evaluation from a social systems perspective. A variety of intervention strategies and techniques is presented with emphasis on the development of a social work frame of reference. Pr.: SOCWK 560, 567; senior standing and permission of the instructor.

**SOCWK 562. Field Experience.** (12) II, S. Supervised field experience in community agencies and programs as a practical application of social work knowledge and skills gained from major course work. Emphasis on direct work with clients, whether individuals, groups, or communities. Seminars make use of student's experiences to analyze social work theory and practice. Pr.: SOCWK 550, 561, 567; senior standing; social work majors only; permission of the instructor.

**SOCWK 563. The Practice of Social Work in Rural Areas.** (3) On sufficient demand. A review of characteristics and social problems of rural areas. The development of practice competency in social work roles and skills necessary for rural practice. Pr.: SOCWK 560.

**SOCWK 564. Social Work Professional Seminar.** (3) II, S. A review of various theories in the behavioral sciences which influence the practice of social work. Primary focus of the course is on the use of these theories in implementing change in various client systems. Pr.: To be taken conc. with SOCWK 562. Social work majors only.

**SOCWK 565. Program and Policy Formulation and Analysis.** (3) I, II. 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 organizational and legislative action. Same as SOCIO 565. Pr.: SOCWK 510; one course in each of the following areas: sociology, economics, and political science; and one course in social science research methods.

**SOCWK 566. Social Work in Aging Services.** (3) Social work practice course focusing attention on working with institutionalized and noninstitutionalized elderly. Role of the social worker is explored in the context of physical, psychological, social, and economic aspects of aging. Skills in working with elderly are emphasized through classroom and direct practice in social work or in gerontology. Pr.: Three course hours in social work or gerontology.

**SOCWK 567 Human Behavior in the Social Environment.** (3) I, II. An introduction to the relationship among biological, social, psychological, and cultural systems as they affect or are affected by human behavior as it relates to social world models of practice. Emphasis on social systems understanding of human development. Pr.: SOCWK 260, BIOL 198, PSYCH 110, SOCIO 211, and ANTH 200.

**SOCWK 568. Social Work Practice III.** (2) I, II. Continuation of social work practice sequence with focus on skills development for macro-level social work practice. Community and organization intervention strategies are presented with emphasis on the development of a social work frame of reference. Taken conc. with SOCWK 561. Pr.: SOCWK 560; senior standing; open to social work majors only.

**SOCWK 580. Women's Perspectives on Peace and War.** (2-3) Intercession only. This course will consider the issue of the participation of women in opposition to war and weapons of war and advocacy for peaceful resolution of conflict. Readings and discussions will focus on four areas: (1) historical and contemporary women's peace movements; (2) the influence of a male-dominated societal struc-

ture on the use of violence and militarism as a means of resolving conflict; (3) the question of whether or not women are naturally more inclined to be peaceful; and (4) the activities, thoughts, and works of individual women in their quest for peace, within themselves, and in the world.

### Undergraduate and graduate credit

**SOCWK 610. Topics in Social Work.** (1-3) Supervised independent study projects. Pr.: SOCWK 260 plus 6 hours of behavioral science foundation courses and consent of instructor.

## Speech

David Procter,\* Interim Head

Professors Fedder,\* Flanagan,\* Kahlich,\* and Zivanovic,\* Associate Professors Anderson,\* Armagost,\* Burtis,\* Griffin,\* Hinrichs,\* Hoag, Procter,\* Rainbolt,\* Schenck-Hamlin,\* Shelton,\* Smit,\* and Uthoff; Assistant Professors Centers, Goulden,\* McFarland, Maullar,\* Orlock, Ross, and Valk; Instructors P. Anderson, Bentz, Brown, Molineux, Salva, and Stanfield. -

The Department of Speech offers study in rhetoric/communication, linguistics, theatre, speech pathology-audiology, and dance.

The undergraduate major requires at least 21 hours in one of the four areas and 9 hours in other areas within the department. See speech secondary education requirements, College of Education, for teacher certification.

### Rhetoric and communication

Rhetoric, one of the original liberal arts, is concerned with the theory, criticism, and practice of communication. The rhetoric/communication program has two instructional goals. First, the program attempts to improve a student's communication skills in developing messages that are clear, coherent, reasoned, and fluent. Course work in public speaking, group and interpersonal communication, and co-curricular activities in debate and forensics provide opportunities to acquire practical communication skills. Second, the program attempts to develop a student's ability to analyze communication in different social, political, and organizational settings. Course work in theory, history, and criticism focuses on the study of speech and language used to achieve practical ends. A major in rhetoric/communication would be appropriate for anyone who plans to enter a career that is communication-intensive, such as law, education, public relations, or government.

An undergraduate major in rhetoric/communication is required to take 37 hours of course work in the Department of Speech: at least 28 credit hours of course work in rhetoric/communication and 9 credit hours in other divisions of the department (theatre, pathology, linguistics, or dance). The 28 credits in rhetoric/communication must be distributed as follows:

**Rhetorical and communication theory** ..... 7

SPCH 320 Theories of Human Communication ..... 3  
SPCH 330 Rhetoric of Western Thought ..... 3  
SPCH 550 Senior Colloquium ..... 1

**Guided electives** ..... 12

Choose two of the following courses in rhetoric:

SPCH 331 Criticism of Public Discourse ..... 3  
SPCH 432 Rhetoric of the American Presidency ..... 3  
SPCH 434 Rhetoric of Social Movements ..... 3  
SPCH 435 Political Communication ..... 3  
SPCH 460 Rhetoric of the 60's ..... 3

Choose two of the following courses in communication:

SPCH 322 Interpersonal Communication ..... 3  
SPCH 323 Nonverbal Communication ..... 3  
SPCH 326 Small Group Discussion Methods ..... 3  
SPCH 526 Persuasion ..... 3

**Rhetoric/communication electives** ..... 9

Must be 300-level or above with at least 6 credit hours numbered 426 or above.

### Rhetoric/communication minor

The Department of Speech offers a minor in rhetoric and communication.

SPCH 320 Theory of Human Communication ..... 3  
SPCH 330 Rhetoric of Western Thought ..... 3  
Three guided electives (SPCH 300 or above)  
chosen from: SPCH 311, 319, 321, 322, 323, 325, 326,  
328, 331, 426, 430, 432, 434, 435, 460) ..... 9  
One guided elective (SPCH 500 or above) chosen from:  
SPCH 520, 525, 526, 630, 720, 721, 725, 726,  
730, 732, 733, 799) ..... 3

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## Linguistics

There is general agreement that nothing is more characteristically human than the ability to use language. Linguists, however, usually do not study languages in order to become proficient in speaking, reading, or writing them. In linguistics we are interested in discovering all the principles that, in a sense, define each language, how it works, how it has changed through time and geographical distribution, as well as how children learn to speak, and how people use language.

There are relationships between linguistics and many other disciplines (see Linguistics, in the general information for the College of Arts and Sciences). Students are encouraged to explore as many of these relationships as they can as undergraduates, especially if they anticipate going on to graduate study.

### Speech pathology-audiology

The program in speech pathology-audiology is scheduled to be transferred from the College of Arts and Sciences to the College of Human Ecology in the Department of Human Development and Family Studies effective July 1, 1994. Changes in curricula and other program components are under discussion as this catalog goes to press. Please contact your advisor for current information.

The goal of the speech pathology-audiology program is to educate professional personnel who are competent to help children and adults with communicative problems of speech, hearing, and language. The undergraduate program provides the foundation for the M.A.

program in speech pathology, which is accredited by and meets the current requirements for the Certificate of Clinical Competence of the American Speech-Language and Hearing Association and the state of Kansas Department of Education requirements for school speech-language pathologists and school audiologists. Determination of the student's program of study and the completion of all requirements for certification are the responsibility of the student and the advisor.

Students have the opportunity to participate in supervised direct clinical experience with a variety of disorders and age groups in the Kansas State University Speech and Hearing Center, the public schools, and other off-campus clinical training sites.

## Theatre and dance

The major in theatre emphasizes the education of students for professional career goals or for cultural enrichment as an avocation. The goal is to develop an awareness of the many areas of theatre and dance and their disciplines. Training is available in all areas of theatre, including scenery, costuming, theatre history and literature, acting, directing, playwriting, and dance. The three purposes of the program are to provide: a liberal arts program in theatre; preparation for advanced training; and the basic theatre skills for the bachelor's candidate. K-State is an accredited institutional member of the National Association of Schools of Theater.

A major consists of 42 hours in theatre and 9 hours in tool courses in other areas of the department. (The course used to satisfy the College of Arts and Sciences requirement of one course in public speaking may not be counted as part of these 9 hours.) The 42 hours in theatre must be distributed as follows:

### A theatre core of 26 hours:

THTRE 162	Concepts of Theatre Production .....	1
THTRE 261	Fundamentals of Acting .....	3
THTRE 267	Fundamentals of Stage Costuming .....	3
THTRE 268	Fundamentals of Makeup .....	1
THTRE 368	Fundamentals of Technical Production ..	3
THTRE 369	Introduction to Theatrical Design.....	3
THTRE 370	Dramatic Structure .....	3
THTRE 565	Principles of Directing .....	3
THTRE 572	History of Theatre I .....	3
THTRE 573	History of Theatre II .....	3

Twelve additional hours in theatre courses numbered 500 or above (excluding THTRE 566 and 710).

**Four hours of production work distributed as follows:**  
Two hours in THTRE 211 Drama Participation: One hour in conjunction with THTRE 368 Fundamentals of Technical Production; one hour with THTRE 267 Fundamentals of Stage Costume Design.

Two hours in THTRE 710 Practicum in Theatre, or in THTRE 566 Rehearsal Techniques, for work in a production.

There will be an oral evaluation of all production work required for the major at the end of each semester.

### Theatre minor

The Department of Speech offers a minor in theatre.

THTRE 162	Concepts of Theatre Production .....	1
THTRE 261	Fundamentals of Acting .....	3
THTRE 369	Introduction to Theatrical Design .....	3
THTRE 370	Dramatic Structure .....	3
THTRE 572	Theatre History 1 .....	3
	or	
THTRE 573	Theatre History 2 .....	3
6 credit hours of electives: *(See note below) .....		6
		<b>19</b>

\*Excluded from counting toward electives are:  
THTRE 165, 211, 566, 710

### Concentration in dance

A concentration in dance requires the following:

<b>Core</b>		
DANCE 195	Improvisational Structures .....	2
DANCE 200	Anatomy for Dancers .....	1
DANCE 205	Dance as an Art Form .....	3
DANCE 225	Principles of Rhythmic Notation .....	2
DANCE 295	Dance Composition I .....	3
DANCE 321	Variations and Partnering .....	1
DANCE 380	Musical Stage Dance .....	2
DANCE 405	Applied Movement Fundamentals .....	3
DANCE 420	Dance/Theatre Lab (required each semester) .....	0
DANCE 495	Dance Composition II .....	3
DANCE 502	Performance Production (minimum of 3 semesters) .....	1-2
DANCE 504	Performance Aesthetics .....	3
DANCE 505	Methods and Materials of Teaching Dance .....	2
DANCE 506	Dance Education Fieldwork .....	1
DANCE 510	Senior Project .....	2
DANCE 520	Principles of Dance Technology .....	3
THTRE 261	Fundamentals of Acting .....	3
THTRE 211	Drama Participation (with THTRE 267 and 368) .....	2
THTRE 267	Fundamentals of Stage Costume Design .....	3
THTRE 368	Fundamentals of Technical Production .....	3
<b>Elective</b>		
Choose one		
ART 100	Design I .....	2
ART 190	Drawing I .....	2
HIST 459	History of Dance in Its Cultural Setting .....	3
KIN 455	Movement Exploration and Creative Dance for Children .....	3
		<b>43-45</b>

### Dance technique

Proficiency must be demonstrated by successful completion with a minimum grade of B of Level III in one technique and Level II in another. Enrollment in a minimum of one technique course and DANCE 420 is required each semester.

Dance courses are listed after theatre courses.

### Dance minor

The Department of Speech offers a minor in dance.

DANCE 205	Dance as an Art Form .....	3
DANCE 222	Improvisational Structures .....	1
DANCE 225	Principles of Rhythmic Notation .....	2
DANCE 295	Dance Composition I .....	3
DANCE 305	Anatomy for Dancers .....	1
DANCE 321	Variations and Partnering .....	1
DANCE 380	Musical Stage Dance .....	2
DANCE 420	Dance/Theatre Lab (4 semesters) .....	0
DANCE 502	Performance Production (minimum of three semesters) .....	1-2
Plus one of the following: .....		3
DANCE 405, 495, 504, (505 and 506) or 520 .....		<b>18</b>

### Dance technique

Proficiency must be demonstrated by successful completion with a minimum grade of B in Level III in one technique and Level II in another. Enrollment in a minimum of one

technique course and DANCE 420 is required for 4 semesters.

## Quiz-out

Students may earn 3 hours of credit for Public Speaking I by completing the quiz-out option with a grade of C or better. Students electing this option must (a) enroll in quiz-out as specified in the current schedule of classes; and (b) attend a mandatory informational meeting at the beginning of that semester.

## Rhetoric and communication courses

**SPCH 065. Spoken English for International Students.** (3) I, II. Intensive practice in spoken American English for increased fluency and overall comprehensibility.

**SPCH 080. Speech Seminar.** (0) Special topics and lectures for speech majors. Required of all majors each semester.

**SPCH 090. Teaching Public Speaking I and IA.** (0) Seminar for graduate teaching assistants in strategies, techniques, and materials for the introductory public speaking course; includes current practices and research in communication education. Enrollment limited to graduate teaching assistants in the Department of Speech.

### Undergraduate credit

**SPCH 105. Public Speaking 1A.** (2) I, II, S. Alternate to SPCH 106. Principles and practice of message preparation, audience analysis, presentational skills, and speech criticism. Primarily granted for students whose curricula require a 2-credit hour course. Credit not granted for both SPCH 105 and 106.

**SPCH 106. Public Speaking I.** (3) I, II, S. Principles and practice of message preparation, audience analysis, presentational skills, and speech criticism permitting greater practice in oral presentation. Credit not granted for both SPCH 105 and 106.

**SPCH 109. Public Speaking 1A, Honors.** (3) Honors speech preparation and delivery; a survey of topics basic to rhetoric, communication, and linguistics. For arts and sciences honors students.

**SPCH 210. Forensics Participation.** (1-2) I, II. Intercollegiate debate or individual events. Four hours maximum credit. Pr.: Consent of director of the activity.

**SPCH 319. Intercollegiate Forensics.** (3) I. Current practices and theories for competitive intercollegiate individual events forensics activities. Focus is on applying principles of prepared speech, limited preparation speech, and oral interpretation events in competition. Pr.: Consent of director of the activity. May not be taken concurrently with SPCH 210.

**SPCH 311. Business and Professional Speaking.** (3) I, II. Principles and practice of speaking in an organizational setting. Areas of emphasis will be oral reports, interviewing, interpersonal communication, and conducting meetings.

**SPCH 320. Theories of Human Communication.** (3) I. Survey of basic theories of human communication focusing on sending, receiving, and responding to messages face-to-face. Pr.: SPCH 105 or 106.

**SPCH 321. Public Speaking II.** (3) I, II. Advanced principles and practice of speech composition, audience adaptation, and delivery. Pr.: SPCH 105 or SPCH 106.

**SPCH 322. Interpersonal Communication.** (3) I, II, S. Examination of the dynamics of face-to-face interpersonal interaction. Focus is on applying principles of relational communication.

**SPCH 323. Nonverbal Communication.** (3) II. Analysis of nonverbal communication in human interaction; theory and research in kinesics, proxemics, and paralinguistics. Pr.: SPCH 105 or 106.

**SPCH 325. Argumentation and Debate.** (3) I, II. Basic theories of argumentation with emphasis on their application in academic debate. Pr.: SPCH 105 or 106.

**SPCH 326. Small Group Discussion Methods.** (3) I, II, S. Basic concepts of small-group decision making. Projects emphasize participation in and analysis of communication in the small group. Pr.: SPCH 105 or 106.

**SPCH 328. Professional Interviewing.** (3) Investigation of interviewing as it occurs in a variety of situations, including journalistic, diagnostic, persuasive, and managerial. Emphasis on developing practical skills in planning, managing interviews, and interpreting data in the professional context. Pr.: SPCH 105 or 106.

**SPCH 330. Rhetoric in Western Thought.** (3) I. An introduction to the figures, concepts, and trends in the development of rhetorical theory from classical to modern times. Pr.: SPCH 105 or 106.

**SPCH 331. Criticism of Public Discourse.** (3) I, II. An examination of public influence based on study of historical and contemporary models of rhetorical criticism. The students' critical experiences will focus on a broad array of public discourse including political, social, and cultural messages.

**SPCH 398. Sophomore Honors Seminar.** (3) II. Open only to qualified students in the arts and sciences honors program.

**SPCH 421. Technical Speaking.** (3) I, II. Intensive study of the principles and practice of communication for engineers. Emphasis is on presentational speaking and group decision making. Pr.: Enrollment in College of Engineering with junior or senior standing.

**SPCH 426. Coaching and Directing Speech Activities.** (3) I. Current practices in coaching curricular and extra-curricular speech activities with practical experience in the problems and procedures of directing a forensic program. Pr.: Six hours of general speech or theatre courses that are 200 level or above, SPCH 325, and THTRE 263.

**SPCH 430. Freedom of Speech.** (3) II. A study of communication and legal principles pertaining to freedom of expression, and an examination of their implications for competing interests such as public order, national security, morality, civil rights, and fairness.

**SPCH 432. The Rhetoric of the American Presidency.** (3) I, II. An examination of the American presidency from a rhetorical perspective, emphasizing the symbolic resources and duties of the office and those who hold it. Special attention paid to the public discourse of recent presidents during moments of national crisis. Pr.: SPCH 105 or 106.

**SPCH 434. Rhetoric and Social Movements.** (3) II. A study of the scope and functions of persuasive communication in contemporary social movements. Pr.: SPCH 105 or 106.

**SPCH 435. Political Communication.** (3) II. A study of political discourse. Attention is directed to theory that encompasses political discourse as it affects political behavior. Pr.: SPCH 105 or 106.

**SPCH 460. Rhetoric of the Sixties.** (3) I. Rhetorical interpretation of the social and political forces dominating the decade and an examination of the forms of persuasion which these forces brought to life. Emphasizes political leadership, pressures for social change, foreign policy, and transformation of the rhetorical environment. Pr.: SPCH 105 or 106.

**SPCH 498. Honors Tutorial in Speech.** (1–3) I, II. Individual directed research and study of a topic in speech, normally as a preliminary to writing a senior honors thesis. May be repeated once to a total of 3 hours. Pr.: Sophomore standing, membership in the honors program of the College of Arts and Sciences, and permission of the instructor.

### Undergraduate and graduate credit in minor field

**SPCH 525. Argumentation Theory.** (3) II. An advanced study of prominent argumentation theorists including Chaim Perelman and Stephen Toulmin, with an in-depth examination of special topics concerning the philosophy, theory, and practice of argumentation. Pr.: SPCH 125.

**SPCH 526. Persuasion.** (3) II. The study of communication as persuasion; examination of contemporary approaches to persuasion.

**SPCH 550. Senior Colloquium.** (1) I, II. A demonstration of the mastery of vocabulary, theory, and the ability to make practical applications of the study of rhetoric and communication will be required of all senior rhetoric communication majors. Mastery will be demonstrated by writing a senior thesis and presenting the results of that thesis to the assembled rhetoric communication faculty and majors in a required colloquium.

### Undergraduate and graduate credit

**SPCH 630. Special Topics in Rhetoric and Communication.** (3) II. Intensive study of selected topics in communication and rhetoric. Repeatable with change in topic. Pr.: Junior standing and consent of instructor.

**SPCH 710. Introduction to Communication Research Methods.** (3) I. Introduction to descriptive and experimental methodologies in communication, including conceptualization and operationalization of communication concepts, strategies of research design, and logic of inquiry. Pr.: SPCH 320.

**SPCH 720. Perspectives on Communication.** (3) Analysis of current perspectives on the communication process. Materials cover assumptions, principles, implications, and selected research within each perspective. Pr.: SPCH 320.

**SPCH 721. Language and Social Interaction.** (3) II. Study of the epistemological, social, and behavioral functions of language in communication. Examination of the processes by which language functions to construct one's worldview and guide individual action. Pr.: SPCH 320 or LING 280 or ANTH 220; junior standing.

**SPCH 722. Instructional Communication.** (3) II. Study of theory and practice of communication in the classroom including both teacher and student communication. Topics include integration of modes of communication, language choices, power, humor, communication strategies for instruction, and impact of communication on learning. Same as EDCIP 722.

**SPCH 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.

**SPCH 726. Seminar in Persuasion.** (3) II, in odd years. Survey and analysis of advanced theory and experimental studies in persuasion. Pr.: Junior standing.

**SPCH 730. Classical Rhetorical Theory.** (3) Study of rhetorical theory and criticism from early Greek to Roman times. Pr.: SPCH 330 or graduate standing.

**SPCH 732. Contemporary Rhetorical Theory.** (3) II. Study of major European and American contributors to rhetorical theory in the twentieth century. Pr.: SPCH 730.

**SPCH 733. Rhetorical Criticism.** (3) II. Study of traditional and contemporary approaches to the analysis of public discourse. Pr.: SPCH 330.

**SPCH 799. Problems in Speech.** (Var.) Open to students in any speech area. Pr.: Junior standing and consent of instructor.

## Linguistics courses

### Undergraduate credit

**LING 280. Introduction to the Study of Language.** (3) I, II. Survey of the scientific study of language. Contributions of linguistics to an understanding of the nature of language. Presupposes no previous knowledge of linguistics.

**LING 594. Comanche Texts.** (3) I or II, in alternate years. General introduction to Comanche grammatical and discourse systems and study of oral narratives: published and unpublished texts including coyote stories, adventure stories, personal recollections, etc. Some attention to pronunciation, but major emphasis on the development of a basic reading ability and understanding of the world portrayed in the narratives. Same as LG 594.

**LING 595. Archeological Decipherment.** (3) I or II, in alternate years. The art and science of four famous cases of decipherment: Mesopotamian cuneiform, Egyptian hieroglyphics, Cretan-Mycenaean Linear B, and on-going work on the Maya script. Characteristics of successful decipherments and resultant increases in knowledge about the his-

tory of writing and the richness of various cultures of the past. Same as LG 595.

### Undergraduate and graduate credit

**LING 600. Principles of Linguistics.** (3) The scientific study of language, with examples from English, Spanish, French, German, and others. Overview of language origins, phonetics, phonology, syntax, semantics, language acquisition, dialects, language change, and writing systems. Same as ENGL 600 and LG 600.

**LING 601. General Phonetics.** (3) I or II, in alternate years. Description and classification of speech sounds according to point and manner of articulation. Transcription in the International Phonetic Association Alphabet. Includes sounds of English, French, Spanish, German, and others. Same as ENGL 601 and LG 601.

**LING 602. Historical Linguistics.** (3) I or II, in alternate years. Internal and comparative reconstruction of earlier forms of languages. Genetic relationships in language families, and various typological considerations. Includes French, Spanish, and others. Same as ENGL 602 and LG 602.

**LING 603. Topics in Linguistics.** (1–3) I or II, in alternate years. Seminar on a special topic in linguistics: decipherment of ancient writing systems, linguistics applied to the teaching of English or other languages, discourse analysis (especially of spoken texts), etc. Topic to be announced for semester in which offered. Repeatable for credit on a different topic. Same as ENGL 603 and LG 603.

**LING 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 or ENGL 681 and SPCH, ENGL, or MLANG 780. Same as ENGL 783 and LG 783.

**LING 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 LG 780. Same as ENGL 785 and LG 785.

**LING 792. Field Methods in Linguistics.** (3) On sufficient demand. Techniques of collecting and analyzing linguistic data in the field. Work with language consultants in class, on languages such as Swahili. Pr.: Consent of the instructor. Same as LG 792 and ANTH 792.

**LING 796. Theories of Grammar.** (3) I, S. Comparative examination of the assumptions, aims, and procedures of four types of English grammar—the normative grammar of Robert Lowth, the historical grammar of Otto Jespersen, the structural grammar of Leonard Bloomfield, and the generative-transformational grammar of Noam Chomsky—and their application. Same as ENGL 796. Pr.: Junior standing, and ENGL 530 or LING 600.

## Speech pathology-audiology courses

### Undergraduate credit

**SPPAT 343. Communication Sciences and Disorders.** (3) I. A survey of normal communication processes and communication disorders and an introduction to the fields of speech pathology and audiology that are responsible for the clinical management of these disorders.

**SPPAT 349. Experimental Analysis of Vocal Behavior.** (3) II. Study of behavior analysis 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.

**SPPAT 350. Anatomy of the Speech Mechanism.** (3) II. Anatomy of the structures involved in speech production. The course includes histology of the larynx and an overview of speech physiology.

**SPPAT 351. Fundamentals of Hearing and Acoustic Phonetics.** (3) I. Study of the information needed for a basic understanding of acoustic phonetics and auditory perception, including vocal tract resonances.

**SPPAT 400. Manual Communication.** (3) I, II. Study of background information in current trends in the use of sign language. Restricted to sign language used in the United States. Includes instruction in the American Manual

Alphabet and Vocabulary for about 700 signs. Primary focus will be application of beginning skills for communication with those who depend on this form of communication.

**SPPAT 442. Developmental Psycholinguistics.** (3) I. Review of research and theory of early development of language comprehension and production, involving vocalization, phonology, morphology, syntax, semantics, and pragmatics. Includes discussion of the relationship between cognition and language as well as other variables influencing language acquisition.

**SPPAT 443. Language Assessment and Intervention.** (3) I, II. The nature of language disorders as well as general principles of language assessment and intervention are presented. Specific language assessment and intervention methodologies for individuals 0-5 years of age are reviewed. Communication profiles associated with specific language impairment, mental retardation, emotional disturbance, hearing impairment, and acquired aphasia are examined. Pr.: SPPAT 442.

**SPPAT 446. Disorders of Articulation and Phonology.** (3) II. Theory, research, and principles of (a) normal/abnormal phonetic and phonologic development, (b) assessment of speech sound disorders, and (c) intervention for speech sound disorders. Pr.: LING 601.

**SPPAT 449. Clinical Procedures in Communication Disorders.** (3) II. 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.: Concurrent enrollment in SPPAT 443 and 446.

**SPPAT 520. Augmentative and Alternative Communication.** (2) I. This course is concerned with an introduction to augmentative and alternative communication (AAC) to provide the student with an overview of characteristics, evaluation, and management information serving permanently or temporarily nonspeaking individuals. Course emphasis will be on experience with electronic communication devices.

**SPPAT 545. Clinical Research in Communication Sciences and Disorders.** (3) I. Logic and methods of clinical research with emphasis on those most frequently used in speech-language pathology and audiology. Experience formulating, doing and evaluating research. Pr.: STAT 330 or equiv.

**SPPAT 550. Speech Physiology.** (3) I. Physiology of the structures involved in speech production. This course includes methods of investigation and recent research in experimental phonetics as well as developmental anatomy of the head and neck. Pr.: SPPAT 350.

**SPPAT 589. Undergraduate Topics in Communication Sciences and Disorders.** (1-3) Review of current topics in speech-language pathology and/or audiology. May be repeated for a maximum of 6 hours with a change in topic. Pr.: Consent of instructor.

### Undergraduate and graduate credit in minor field

**SPPAT 555. Language Development.** (3) Survey of the development of speech and language skills in children. Pr.: HDFS 310 or EDEL 300.

### Undergraduate and graduate credit

**SPPAT 600. Manual Communication II.** (3) Instruction in an additional 400 to 500 signs in the SEE system. Introduction to elementary ASL techniques. Discussion of other augmentative communication systems. Research will be conducted in the use of various manual communication systems with special populations, including aphasic, language disabled, mentally handicapped, and others. Pr.: SPPAT 400 or basic sign language skills.

**SPPAT 605. Communication Disorders and Aging.** (3) An introduction to the most common communication disorders of older persons. Appropriate service delivery models and special needs of the elderly are discussed. Pr.: Consent of instructor.

**SPPAT 705. Practicum in Speech-Language Pathology.** (1-3) I, II, S. Supervised practice in the use of the methods and materials of speech-language pathology. Pr.: SPPAT 449 and consent of instructor.

**SPPAT 706. Practicum in Audiology.** (1-3) I, II, S. Supervised practice in the use of equipment, materials, and methods of audiology. Pr.: SPPAT 720 or conc. enrollment and consent of instructor.

**SPPAT 720. Audiology I.** (3) I, II. Fundamental topics in audiology. Included are monitoring of equipment calibration, pure tone measurements, masking, speech testing, and tympanometry. Laboratory practice is required. Pr.: SPPAT 351.

**SPPAT 721. Audiology I Laboratory.** (1) I, II, in alternative years. Effects of noise on hearing. Development, management, and control of community hearing conservation programs. Pr.: SPPAT 720.

**SPPAT 741. Fluency Disorders.** (3) I. Research and theory concerning etiology, characteristics, assessment, and treatment of individuals with disfluency problems. Pr.: SPPAT 545.

**SPPAT 742. Language Assessment and Intervention II.** (3) II. Theory and research concerning language disorders in school-aged children are presented. Specific language assessment and intervention methodologies for this population are reviewed. Dialectal and bilingual considerations for assessment and intervention are addressed. Pr.: SPPAT 443.

**SPPAT 744. Aural Rehabilitation.** (3) II. Study of and techniques for the habilitation or rehabilitation of speech and language problems of the hearing impaired. Pr.: SPPAT 720.

**SPPAT 750. Voice and Resonance Disorders.** (4) II. Research and theory concerning etiology, characteristics, assessment, and management of individuals with laryngeal disorders and orofacial anomalies. Pr.: SPPAT 550.

## Theatre courses

### Undergraduate credit

**THTRE 160. Introduction to Theatre.** (3) Consideration of the basic elements of theatre: aesthetics, dramatic literature, theatre technology, and producing organizations.

**THTRE 161. Fundamentals of Improvisation.** (3) Introduction to the techniques of improvisation with the emphasis upon practical participation.

**THTRE 162. Concepts of Theatre Production.** (1) I. An orientation to the various areas of theatrical production in the rehearsal and performance process. Required of all majors in their first spring semester.

**THTRE 165. Appreciation of Theatre.** (2) Direct experience with live theatre through an investigation of theatrical materials, forms, and styles, and through attendance at the University theatrical productions.

**THTRE 211. Drama Participation.** (1-2) I, II. Work in theatrical productions. Four hours maximum credit. Pr.: Consent of director of activity.

**THTRE 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.

**THTRE 260. Stage Movement.** (3) A study of the technique of stage movement and an investigation of the language of gesture.

**THTRE 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.

**THTRE 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.

**THTRE 267. Fundamentals of Stage Costuming.** (3) II. Basic techniques of stage costume construction and organization. Examination of the role of costuming in the theatre. Concurrent enrollment in at least one credit of THTRE 211 required.

**THTRE 268. Techniques of Makeup.** (1) Techniques of makeup for stage, movies, and television.

**THTRE 275. Summer Theatre Workshop.** (0-6) S. Supervised participation in a summer theatre repertory/stock program. Limited to freshmen and sophomores. May be repeated for a maximum of 6 hours credit. Pr.: Consent of instructor.

**THTRE 361. Intermediate Acting.** (3) Emphasis upon expanding the actor's capabilities through more advanced scene work and character study. May be repeated for a total of 6 hours credit with consent of instructor. Pr.: THTRE 261 and consent of instructor.

**THTRE 368. Fundamentals of Technical Production.** (3) I. Basic techniques, equipment and materials used in scenery construction and theatrical drafting. Conc. enrollment in at least 1 hour of THTRE 211 is required.

**THTRE 369. Introduction to Theatrical Design.** (3) An exploration of the four areas of stage design: sets, lights, costumes, and sound. Includes examination of relevant history and technology in these areas. Emphasis is on the design process and design development.

**THTRE 370. Dramatic Structure.** (3) 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.

**THTRE 475. Opera Workshop.** (1-6) Principles and techniques of operatic and musical theatre production, with emphasis on class rehearsal and performance of selected scenes from opera and musical drama; brief survey of the history of opera. Offered jointly by the Departments of Speech and Music. Same as MUSIC 475.

**THTRE 579. Fundamentals of Stage Lighting.** (3) Theory and practice of theatrical lighting design, control systems, projection equipment, and lighting consulting. Production work with KSU Theatre season required. Pr.: THTRE 369.

### Undergraduate and graduate credit in minor field

**THTRE 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.

**THTRE 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 instructor.

**THTRE 562. Playwriting.** (3) Theoretical study and practical application of techniques of playwriting with regard to plot, characters, and production; emphasis on the one-act form.

**THTRE 563. Storytelling.** (2) A consideration of literary materials appropriate for children in nursery schools, kindergarten, and elementary schools. Major emphasis is on training in the art of storytelling. Pr.: SPCH 105 or 106.

**THTRE 565. Principles of Directing.** (3) Principles and techniques of directing for the theatre; the historical emergence of the director; study of current theories. Pr.: THTRE 261.

**THTRE 566. Rehearsal Techniques.** (0-3) I, II. A laboratory course for students enrolled in performance and production classes. May be repeated for 6 hours. Pr.: Conc. enrollment in THTRE 765 or 783 or 779.

**THTRE 567. Advanced Costume Design.** (3) I. Studies in theory and practice of costume design for theatre, dance, and opera. Pr.: THTRE 267 and THTRE 369.

**THTRE 568. Fundamentals of Scene Design.** (3) Examination of the role of scene design in theatre, elements and objectives of design. Development, presentation, and synthesis of design images with the scripted play. Pr.: THTRE 368 and THTRE 369.

**THTRE 569. Advanced Technical Production.** (3) A lecture-lab course in advanced technical theatre problems of organization, planning, drafting and execution of scenery and lighting. Pr.: THTRE 368.

**THTRE 570. The Musical Comedy.** (3) On sufficient demand. The history of operetta and musical comedy from Offenbach to the present. Same as MUSIC 570. Pr.: MUSIC 150 or THTRE 165 or equiv.

**THTRE 572. History of Theatre I.** (3) II. A survey of the development of the theatre from ancient times to 1700. Pr.: Junior standing and consent of instructor.

**THTRE 573. History of Theatre II.** (3) I. A survey of the development of the theatre from 1700 to the present. Pr.: Junior standing or consent of instructor.

**THTRE 580. Music Theatre Workshop.** (2) II. Principles and techniques of musical theatre production with emphasis on rehearsal and performance of selected scenes from musical theatre. Dance, music, and theatre are studied as integrated elements within the musical theatre genre. Culminates in a public performance. Course may be repeated twice for credit. Pr.: MUSIC 202, two semesters of voice; THTRE 261; and DANCE 380; or consent of instructor.

### Undergraduate and graduate credit

**THTRE 660. Professional Theatre Tour.** (2–3) Inter-session. S. Supervised viewing and analysis of professional theatre productions. Travel to one or more theatre centers such as New York, London, or Los Angeles. Students are charged an additional fee to cover travel expenses. Written critical reviews of the productions are required. May be repeated once by undergraduates. Pr.: Six hours of credit in theatre.

**THTRE 661. Professional Development.** (1) I. Study of audition techniques including supervised preparation of appropriate material. Business aspects of professional theatre, including unions, contracts, and professional ethics. Pr.: 12 hours in theatre, music, and/or dance.

**THTRE 664. Creative Dramatics.** (3) The development of creative imagination and personal well-being through theatre games, improvisation, role playing, and simulation. The use of drama in recreational and educational settings. Improvisation in performing scripted drama. Pr.: Junior standing.

**THTRE 665. Drama Therapy with Special Populations.** (3) The therapeutic uses of drama in the development of creative imagination, self expression, and social relatedness with special populations such as the mentally disabled, the emotionally disturbed, and the senior adult. Pr.: Junior standing.

**THTRE 666. Stage Management.** (3) I, II. Theory and practice of stage management in the professional and non-professional theatre. Emphasis is on the organization of all areas of theatre knowledge needed for the running of theatrical productions. Pr.: THTRE 368.

**THTRE 667. Period Styles for the Theatre I.** (3) II. Survey of historical styles of architecture, furnishings, and clothing in relation to theatrical design and the history of the theatre from the Greeks to 1800. Pr.: THTRE 572 or conc. enrollment.

**THTRE 668. Period Styles for the Theatre 2.** (3) I. Survey of historical styles of architecture, furnishings, and clothing in relation to theatrical design and the history of the theatre from 1800 to present. Pr.: THTRE 573 or conc. enrollment.

**THTRE 671. History of Opera.** (3) A study of selected masterpieces of musical drama, with emphasis on the relationship of music and drama, and on the unique qualities of opera as a collective artwork. Pr.: MUSIC 201 or MUSIC 250 or THTRE 370. Same as MUSIC 650.

**THTRE 672. American Ethnic Theatre.** (3) Drama and stagecraft of ethnic groups in the United States, including the theatre of African, Asian, Hispanic, Jewish, and Native Americans. Pr.: Junior standing.

**THTRE 710. Practicum in Theatre.** (0–6) Supervised participation in a position of major responsibility. May be repeated for a maximum of 12 hours credit. Pr.: THTRE 160 or 261 or 368; junior standing; consent of supervising faculty member and approval of faculty members are required.

**THTRE 711. Topics in Technical Theatre.** (3) Selected topics in creative techniques and investigation for technical theatre. May be repeated for credit with change in topic. Pr.: THTRE 368 and consent of instructor.

**THTRE 712. Theatre Management.** (3) Theatre management, promotion, finance, organization; emphasis on contract negotiations and use of facilities.

**THTRE 760. Principles of Drama Therapy.** (3) Study of theory and practice in the use of drama as therapy, including assessment and treatment, individual and group practice, and psychodrama. Pr.: THTRE 664 or 665.

**THTRE 761. Advanced Acting.** (3) Studies in style, technique, and characterization. May be repeated once. Pr.: THTRE 361 and consent of instructor.

**THTRE 762. Advanced Playwriting.** (3) Further study in the writing of drama; emphasis on problems of writing full-length plays. May be repeated for a total of 9 hours credit by qualified students. Pr.: Consent of instructor. Same as ENGL 762.

**THTRE 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 instructor.

**THTRE 764. Early American Theatre.** (3) Studies in the drama and stagecraft of the colonies and the United States from the beginnings to 1900. Pr.: Junior standing.

**THTRE 765. Practice in Directing.** (3) A lecture-lab 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 instructor.

**THTRE 777. Aesthetics of the Theatre.** (3) Principal emphasis on theoretical problems of dramatic art.

**THTRE 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.: THTRE 368.

**THTRE 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 instructor.

**THTRE 780. Theatre Design Studio.** (0–3) I, II. Advanced problems in conceptualization and realization of design, including sets, costumes, lights, and technical production. Emphasis on advanced techniques in research, analysis, and production problems. May be repeated to a maximum of 6 credits. Pr.: THTRE 567, 568, 569, or 579.

**THTRE 782. Women in Theatre.** (3) A history of the contributions made by women in theatre as playwrights, managers, directors, and performers; contemporary women in theatre and their experiments in expressing women's consciousness.

**THTRE 783. Practice in Acting.** (3) Advanced studies in characterization with emphasis on communicating with the director. Taught in conjunction with the Practice in Directing workshop. May be repeated once. Pr.: THTRE 361 and consent of instructor.

## Dance courses

### Undergraduate credit

**DANCE 120. Modern Dance I.** (2) I, II. Introduction to principles of modern dance. Emphasis on correct body alignment, movement efficiency, and creative potential of the individual. Three hours lab a week.

**DANCE 165. Ballet I.** (2) I, II. Introduction to basics of classical ballet training. Includes terminology, body positions, movement vocabulary, and principles of body alignment.

**DANCE 171. Jazz Dance I.** (2) I, II. A basic course in jazz technique and style, focusing on isolations, rhythmic articulation, and the control and release of energy. Three hours lab a week.

**DANCE 195. Improvisational Structures.** (2) Exploration of personal creative sources for spontaneous movement through improvisational structures. Emphasis on solo and group problem-solving in creating a performance work.

**DANCE 200. Anatomy for Dancers.** (1) On sufficient demand. Analysis of human skeletal structure. Application and implication for performance, teaching, and injury prevention.

**DANCE 205. Dance as an Art Form.** (3) I. Dance in its religious, social, and artistic forms. Film, slides, demonstrations, and lectures will trace the function of dance in society, the influence of society on dance, how dance relates to other art forms, and current trends in the dance world.

**DANCE 225. Rhythmic Notation for Dance.** (1) On sufficient demand. Introduction to basic elements of meter, tempo, rhythm, and notation. Application and practice to dance pedagogy, performance, and choreography.

**DANCE 250. Performance Styles.** (1) Study and practice of technique and performance of specific period/historical, character, or ethnic/specialty dance styles. May be repeated three times.

**DANCE 295. Dance Composition I.** (3) On sufficient demand. Introduction to the principles of the choreographic craft. Practical experience in development of movement phrases. Culminating presentation and critique of work. Pr.: DANCE 195

**DANCE 321. Variations and Partnering.** (1) On sufficient demand. Directed study in the principles of partnering and repertoire performance in various styles and forms of choreography. Pr.: Consent of instructor.

**DANCE 323. Modern Dance II.** (2) I, II. May be repeated for a total of 8 hours. Only 2 of these hours may be applied toward humanities requirements. Pr.: DANCE 120 and consent of instructor.

**DANCE 324. Modern Dance III.** (2) I, II. May be repeated for a total of 8 hours. Only 2 of these hours may be applied toward humanities requirements. Pr.: DANCE 323 and consent of instructor.

**DANCE 325. Ballet II.** (2) I, II. May be repeated for a total of 8 hours. Only 2 of these hours may be applied toward humanities requirements. Pr.: DANCE 165 and consent of instructor.

**DANCE 326. Ballet III.** (2) I, II. May be repeated for a total of 8 hours. Only 2 of these hours may be applied toward humanities requirements. Pr.: DANCE 325 and consent of instructor.

**DANCE 371. Jazz Dance II.** (2) I, II. Intermediate course in jazz technique and style focusing on development of isolations, rhythmic articulation, and the control and release of energy. Performance of advanced movement sequences. May be repeated for a total of 8 hours. Only 2 of these hours may be applied toward humanities requirements. Pr.: DANCE 171.

**DANCE 372. Jazz Dance III.** (2) On sufficient demand. May be repeated for a total of 8 hours. Only 2 of the hours may be applied toward humanities requirements. Pr.: DANCE 371 or consent of instructor.

**DANCE 380. Musical Stage Dance.** (2) On sufficient demand. Technique and performance of musical stage dance. Rehearsal and performance of selected musical stage choreography. Pr.: DANCE 120, 165, or 171.

**DANCE 405. Applied Movement Fundamentals.** (3) Study, analysis, and application of movement theory to dance training, education, creation, and performance. Scientific and somatic principles are emphasized in the art form and body therapies. Pr.: DANCE 200.

**DANCE 420. Dance Theatre Lab.** (0) I, II. Practice in technique, improvisation, and choreographic process. Study of technical training to enhance cognitive, perceptual, and application skills in dance. Pr.: Consent of instructor.

**DANCE 459. 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. Same as HIST 459.

**DANCE 495. Dance Composition II.** (3) On sufficient demand. Advanced training and directed experiences in dance composition. Development of theme, phrasing, and style with particular emphasis on group forms. Pr.: DANCE 295.

**DANCE 498. Honors Tutorial in Dance.** (1–3) I, II. Individually directed research/creative endeavor in dance, normally as a preliminary to writing a senior honors thesis. May be repeated once to a total of 3 hours. Pr.: Sophomore standing, membership in the honors program of the College of Arts and Sciences, and permission of instructor.

**DANCE 499. Senior Honors Thesis.** Open only to seniors in the arts and sciences honors program.

### Undergraduate and graduate credit in minor field

**DANCE 502. Performance Production.** (1–2) I, II. Studies in the techniques of dance production and performance. Emphasis is on practical application. May be repeated four times. Pr.: Junior standing or consent of instructor.

**DANCE 504. Performance Aesthetics.** (3) On sufficient demand. Examination of performance as art. Analysis of general aesthetic theory to performance through such issues as style, content, form, gender, and role. Oral and written experience in planning, executing, and assessing performance events. Pr.: Junior standing or consent of instructor.

**DANCE 505. Methods and Materials of Teaching Dance.** (2) On sufficient demand. An in-depth survey of the development of dance education and a practical examination of dance for its educative, artistic, disciplinary, and therapeutic values. Emphasis on role of dance education, pedagogy, and advocacy. Pr.: DANCE 205, 405, and 504 or consent of instructor.

**DANCE 506. Dance Education Fieldwork.** (1) On sufficient demand. A semester of supervised fieldwork incorporating dance as an educative tool in the classroom, in a therapeutic setting, or in an advocacy position. Application of dance education theory under faculty supervision and conference. Pr.: DANCE 505.

**DANCE 510. Senior Project.** (1) Student creates and presents major performance, choreographic or written project demonstrating advanced level of achievement. Pr.: Senior standing and consent of instructor.

**DANCE 520. Principles of Dance Technology.** (3) On sufficient demand. Examination and application of video and computer technology to dance. Includes instruction and use in performance, choreography, education and research. Emphasis on conceptual framework. Pr.: Senior standing.

**DANCE 599. Independent Studies in Dance.** (1–3) Selected topics in dance. Maximum of 3 hours applicable toward degree. Pr.: Consent of department head.

**DANCE 690. Senior Honors Thesis.** Open only to seniors in the arts and sciences honors program.

## Statistics

James J. Higgins,\* Head

Professors Higgins,\* Johnson,\* Kemp,\* Milliken,\* Nelson,\* Perng,\* and Yang;\* Associate Professors Boyer,\* Keller–McNulty,\* Neill, and Schwenke. Assistant Professors Loughin, Noble and Rumsey; Emeritus: Professors Feyerherm\* and Fryer.

Statistics is a combination of classical mathematics, the theory of probability, and some new concepts related to inductive reasoning that have developed during the past 75 years.

Almost all activities of plants and animals (including people) depend to some degree on chance events, and most decisions made by people 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 modern-day computers relieves the statistician of tedious computations and elevates his professional activity to dealing with people and/or engaging in basic research.

Students who major in statistics may seek a bachelor of arts degree or a bachelor of science degree by satisfying the general requirements of that degree, and completing the following:

MATH 220	Analytic Geometry and Calculus I .....	4
MATH 221	Analytic Geometry and Calculus II .....	4
MATH 222	Analytic Geometry and Calculus III .....	4
MATH 551	Applied Matrix Theory .....	3
CIS 200	Fundamentals of Computer Programming .....	2
CIS 203	Fundamentals of Computer Programming Lab .....	1
STAT 410	Probabilistic Systems Modeling .....	3
STAT 510	Introductory Probability and Statistics I .....	3
STAT 511	Introductory Probability and Statistics II .....	3
STAT 704	Analysis of Variance and Covariance ....	2
STAT 705	Regression and Correlation Analyses ....	2
STAT 720	Design of Experiments .....	3
IE 541	Statistical Quality Control .....	3
Statistics elective (STAT 710, 716, 717, or 718) .....		2
ENGL 516	Written Communication for the Sciences .....	3
Upper division quantitative electives .....		9
(May include mathematics, computer science, or other approved courses)		

### Dual majors and dual degrees

Students may major in statistics and another discipline within the College of Arts and Sciences. The degree requirements of both departments must be met. For instance, it is possible to complete a dual statistics-mathematics degree in four years.

Students may obtain a dual degree in statistics and a field in another college such as business administration or engineering. The degree requirements of both colleges must be met and a minimum of 150 hours must be completed. Students who choose this option should complete the calculus sequence by the end of the sophomore year.

### Statistics courses

#### Undergraduate credit

**STAT 300. Sophomore Honors Seminar in Statistics.** (3) I. Selected topics. May be used to satisfy quantitative requirements for B.S. degree. Open only to students in the honors program.

**STAT 320. Elements of Statistics.** (3) I, II. 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.

**STAT 330. Elementary Statistics for the Social Sciences.** (3) I, II, S. 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.

**STAT 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.

**STAT 341. Biometrics II.** (3) II. Analysis and interpretation of biological data using analysis of variance, analysis of covariance, and multiple regression. Negative binomial distribution and its applications. Pr.: STAT 320, 330, 340, or 350.

**STAT 350. Business and Economic Statistics I.** (3) I, II, S. 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.

**STAT 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.

**STAT 410. Probabilistic Systems Modeling.** (3) I, II. Basic probability; discrete and continuous random variables; Markov chains; Poisson process; birth and death process; applications for queuing theory and reliability theory; computer simulation of random phenomena. Pr.: MATH 221, CIS 300, 570, or consent of instructor.

**STAT 490. Statistics for Geology.** (1) I, II. First course in statistics with examples and problems toward engineering. Distributions, means, measures of variation, confidence intervals, graphical display of data, simple regression and correlation, philosophy of experimentation. Must be taken conc. with a laboratory course in engineering which uses statistics.

### Undergraduate and graduate credit in minor field

**STAT 510. Introductory Probability and Statistics I.** (3) I, II. 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 CIs and  $X^2$ ; goodness of fit. Numerous applications. Pr.: MATH 222.

**STAT 511. Introductory Probability and Statistics II.** (3) I, 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.

**STAT 550. Basic Elements of Statistical Theory.** (3) I. The mathematical representation of frequency distributions, their properties, and the theory of estimation and hypothesis testing. Elementary mathematical functions illustrate theory. Pr.: MATH 220.

### Undergraduate and graduate credit

**STAT 702. Statistical Methods for Social Sciences.** (3) I, II. 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.: MATH 100.

**STAT 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 equiv. of college algebra.

**STAT 704. Analysis of Variance.** (2) I, II, S. Computation and interpretation for two- and three-way analyses of variance; multiple comparisons; applications including use of computers. Meets four times a week during first half of semester. Pr.: One previous statistics course.

**STAT 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 a week during second half of semester. Pr.: One previous statistics course.

**STAT 708. Use of Statistical Computer Packages.** (1) Intersession only. Processing data sets using SAS (Statistical Analysis System) for analysis of variance, regression and correlation analysis, chi-square, multivariate statistical analyses, and graphic displays using both the line printer and Calcomp plotter. Pr.: STAT 704, 705, or consent of instructor.

**STAT 710. Sample Survey Methods.** (2) II, in even years. Design, conduct, and interpretation of sample surveys. Pr.: STAT 702 or 703. Meets four times a week during first half of semester.

**STAT 716. Nonparametric Statistics.** (2) II, in even years. 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 a week during second half of semester. Pr.: One previous course in statistics.

**STAT 717. Categorical Data Analysis.** (2) II. Analysis of categorical data arranged in two- and higher-dimensional contingency tables using classical methods and log linear models. Various measures of association are discussed. Meets four times a week during first half of semester. Pr.: STAT 704, 705.

**STAT 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.

**STAT 722. Experimental Designs for Product Development and Quality Improvement.** (3) II. A study of statistically designed experiments which have proven to be useful in product development and quality improvement. Topics include randomization, blocking, factorial treatment structures, fractional factorial designs, screening designs, Gage methods response surface methods. Pr.: STAT 511 or STAT 704 and STAT 705.

**STAT 725. Digital Statistical Analysis.** (3) II. Techniques of programming in algorithmic languages for statistical applications. Topics include efficiency and numerical accuracy of algorithms, random number generation, Monte Carlo methods, techniques of simulation, and some basic principles of numerical analysis. Pr.: CIS 200 or equiv., STAT 704 and 705.

**STAT 730. Multivariate Statistical Methods.** (3) I. 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.

**STAT 735. Statistics in Health-Related Industries.** (2) I, in odd years. Case studies and selected literature of applications of statistics to problems in the pharmaceutical and health-related industries are discussed. Topics include pharmacokinetic analysis, covariance analysis, crossover studies, bioequivalence. Meets four times a week during first half of semester. Pr.: STAT 704, 705, 720.

**STAT 736. Bioassay.** (2) I, in odd years. Direct assays; quantitative dose-response models; parallel line assays; slope ratio assays; experimental designs for bioassay; covariance adjustment; weighted estimates; assays based on quantal responses. Meets four times a week during second half of semester. Pr.: STAT 704, 705.

**STAT 740. Nonlinear Models.** (3) S, in even years. Methods of estimating parameters of nonlinear models; procedures for testing hypotheses; construction of confidence intervals and regions; nonlinear analysis of covariance; quantal dose response and probabilistic choice models. Pr.: MATH 222, STAT 720.

**STAT 745. Advanced Regression Analysis.** (2) I, in even years. Tests of linear restrictions; residual diagnostics; tests and corrections for heteroscedasticity, autocorrelated errors, errors in variables; consequences of stochastic regressors and multicollinearity; alternatives to least squares; instrumental variable estimators and systems of equations; random coefficients. Meets four times a week during first half of semester. Pr.: STAT 705.

**STAT 746. Graphical Methods for Data Analysis.** (2) I, in even years. This is a study of visual portrayals of quantitative information. Topics include graphical display of raw data and quantities derived from the data, the use of statistical graphics to analyze data, exploratory methods, multidimensional methods, and methods for studying data in the context of statistical models. Meets four times a week during second half of semester. Pr.: STAT 704 and 705 or equiv.

**STAT 770. Theory of Statistics I.** (3) I. 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.

**STAT 771. Theory of Statistics II.** (3) II. Introduction to multivariate distributions; sampling distributions, derivation, and use; estimation of parameters, testing hypothesis; multiple regression and correlation; simple experimental designs; introduction to nonparametric statistics; discrimination. Pr.: STAT 770.

**STAT 799. Topics in Statistics.** (Var.) I, II, S. Pr.: STAT 703 or 770 and consent of instructor.

# Business Administration

Daniel G. Short,\* Dean  
Yar M. Ebadi,\* Associate Dean  
Kay C. Stewart, Assistant Dean

110 Calvin Hall  
532-7190

The main objective of the College of Business Administration is to provide a balanced program for general education and professional study in business administration and accounting.

The degree programs in business offered by the College of Business Administration are accredited by the American Assembly of Collegiate Schools of Business.

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 businessperson as the manager and decision maker of operations in a particular firm; two, the businessperson as one who must analyze and adapt to the larger economic, social, and political environment of which he or she and the firm are integral parts. Both subject and instructional techniques focus on decision making and implementation of decisions through critical and creative analysis.

The College of Business Administration also sponsors numerous short courses and conferences for business and management groups.

At the undergraduate level, the College of Business Administration seeks to produce graduates with a broad education in the arts, sciences, and humanities; a solid knowledge and understanding of the functioning of the business world; sufficient knowledge and skill in a field of specialization to obtain positions in business; and the proven ability to think creatively and analytically in order to progress into positions of greater responsibility in the future.

## General Requirements

### Bachelor of science in business administration

#### Business Administration Pre-Professions

Students entering college for the first time and eligible for admission to K-State must enroll in the Business Administration Pre-Professions Program (BAPP). Students with previous academic work (either at K-State or elsewhere) requesting transfer to the College

of Business Administration must have a 2.0 or higher grade point average and enroll in the BAPP curriculum. For purposes of admission, grade point averages will be based on all courses attempted at colleges or universities.

The BAPP program provides course work in communications, mathematics, social sciences, humanities, and natural sciences. The purpose of the BAPP curriculum is to help students develop the descriptive and analytical foundation of knowledge necessary for the study of business administration. Remaining "core courses" in business administration and courses in the five degree-track majors are taken after successful completion of the BAPP program.

The BAPP is expressly designed as a nondegree program; students with 90 or more credit hours will not be allowed to enroll in BAPP. Students with more than 90 hours who have consistently met the grade point requirements may be admitted into degree-track majors.

Admission to a degree-track major program in accounting, finance, management, or marketing is necessary for graduation. Applicants for admission to one of the degree-track majors will be accepted upon completion of a minimum of 60 credit hours with an overall grade point average of 2.50 or above. The 60 credit hours must include the following courses or their approved equivalents:

<b>BAPP requirements</b> .....	<b>44</b>
ACCTG 231    Accounting for Business Operations ...	3
ACCTG 241    Accounting for Investing and Financing .....	3
CIS 110        Introduction to Personal Computing ...	3
ECON 110     Principles of Macroeconomics .....	3
ECON 120     Principles of Microeconomics .....	3
ENGL 100      Expository Writing I .....	3
ENGL 120      Expository Writing II .....	3
KIN 101        Principles of Physical Fitness .....	1
MATH 100      College Algebra .....	3
MATH 205      General Calculus and Linear Algebra .	3
	<b>or</b>
MATH 220      Analytical Geometry and Calculus I ...	4
POLSC 325     U.S. Politics .....	3
PSYCH 110     General Psychology .....	3
SOCIO 211     Introduction to Sociology .....	3
SPCH 106      Public Speaking I .....	3
STAT 350      Business and Economic Statistics I ....	3
<b>Communications electives</b> .....	<b>3</b>
Three hours selected from:	
ENGL 300      Expository Writing III .....	3
ENGL 301      Writing and the Law: Legislative Analysis .....	3
GENBA 391    Administrative Communications .....	3
MKTG 422      Sales Communication .....	3
MLANG        All modern language courses .....	3
SPCH 311      Business and Professional Speaking ...	3
SPCH 321      Public Speaking II .....	3
SPCH 335      Criticism of Public Argument .....	3
SPCH 526      Persuasion .....	3
<b>Humanities electives</b> .....	<b>6</b>
Six hours selected from:	
All courses in art,* dance,* history, modern languages, music,* philosophy, theatre;* ARCH 301; English: all liter- ature plus four (230, 231, 233, 234) humanities courses; ANTH 515 and 517; DAS 160.	

\*All courses from these areas are acceptable; however, students may take a maximum of 3 credit hours total from these four areas in participation or artistic skill development courses.

**Natural science electives** ..... 7  
Seven hours selected from:  
All courses in biochemistry, biology, chemistry, geology, and physics; ANTH 280, 281; DEN 420, 425; GEOG 220, 221. One laboratory course is required.

**Unrestricted elective** ..... 1  
60

The exact sequence of the courses to be taken is worked out between student and advisor. There is some flexibility in scheduling; to enroll in any course, students must have prerequisites as stated in the catalog.

Applications for a degree-track major must be made by November 15, April 1, or July 1 of the respective semester during which the student will have completed the 60-credit-hour pre-professional requirements. Decisions for admission will be made as soon as possible after the end of the semester.

#### Degree requirements

Candidates for the bachelor of science in business administration must complete at least 27 credit hours of resident instruction in upper-division courses after acceptance and enrollment in a degree-granting program in the college. Exceptions may be considered for those who have consistently exceeded a 2.50 grade point average on upper-division courses applied toward the degree. See additional residency requirements earlier in this catalog.

## Program Options

### Dual degree in business administration

The dual degree programs allow students to earn the bachelor of science in business administration degree in addition to a nonbusiness degree. Because of course sequence requirements, students should begin the dual degree program in their sophomore year. Students must be enrolled in both the college offering the nonbusiness degree and the College of Business Administration.

Any student who wishes to complete a dual degree must satisfy the requirements for both degrees. The business administration requirements include course work in the following areas: communications, quantitative, social sciences, economics, and business. For further information about the exact academic requirements, contact Student Services, College of Business Administration, 107 Calvin Hall.

## Associate of arts degree at Fort Riley (A.A.)

In cooperation with the Division of Continuing Education, the College of Business Administration offers an A.A. degree at Fort Riley, Kansas. This program is designed primarily for military personnel. Sixty semester hours of academic work are required to earn the degree. The requirements include work in communications; mathematics; computer science; social, behavioral, and natural sciences; humanities; economics; and business. For information about the exact academic requirements, write to Fort Riley Degree Program, Division of Continuing Education, College Court Building.

## Honors program

The College of Business Administration honors program enables students to further develop broad intellectual interests and investigate the latest issues and research related to business and industry.

Freshmen and sophomores eligible to participate in the honors program enroll in GENBA 299 Honors Colloquium; juniors and seniors enroll in GENBA 499 Honors Seminar.

One hour of unrestricted elective credit will be given upon completion of a semester program. A total of 8 credit hours may be earned.

## Cooperative education

The College of Business Administration, through the co-op program, offers opportunities for students to obtain experience in business and industry as part of their college education. Students enroll through Career and Employment Services and are selected through formal interviews with participating companies. Once selected, students will be paid to work two to five periods (semesters or summers) in positions related their academic major or career objectives.

## Pre-business education

Pre-business education majors are enrolled in and advised by the College of Education. Students interested in the field are instructed to refer to the 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: the acquisition of skills in comprehension and expression; understanding human institutions; and the ability to think clearly, carefully, and independently. 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.

## Business minor

Upon graduation, most students will be involved in organizations, profit or nonprofit, that will use business concepts and principles to improve their services or products. To complete the business minor students must graduate from another Kansas State University college and complete the business courses listed below:

ACCTG 231	Accounting for Business Operations .....	3
ACCTG 241	Accounting for Investing and Financing .....	3
MANGT 420	Management Concepts .....	3
MKTG 400	Marketing .....	3
FINAN 450	Essentials of Finance .....	3
		<b>15</b>

Students will be responsible for meeting the prerequisites for the business courses in the minor program.

## International Trade Institute

Dr. Wayne Norvell, Director  
2323 Anderson Avenue, Suite 110  
Manhattan, Kansas 66502-2912  
532-6799

The International Trade Institute provides special resources to help meet the growing challenges of world trade. The ITI's program of research, service, and education provides an integrated and systematic approach to supporting the concern of both the academic community and area businesses on projects relevant to current international problems and opportunities.

The International Trade Institute publishes *Export Mid-America*, a full-color advertising brochure translated into six languages and distributed to more than 170 countries. *Export Mid-America* helps Mid-American firms explore new markets, identify prospective distributors and agents, and increase international recognition. The brochure not only provides leads for the advertisers, but also generates hundreds of inquiries for the ITI on other U.S. products.

The ITI offers non-degree educational programs for international students and businesspeople. Special emphasis is placed on business administration, marketing, management, and international trade. They can be tailored to focus on specific management or technical skills and to incorporate internships or other special course arrangements. Most are short courses, but the time frame can be adjusted according to the needs of the sponsoring agency.

Additional resources provided by the ITI, including a comprehensive international library that contains materials not found elsewhere in the region, are available to students, faculty, and businesses. Reference topics include trade

policy, marketing, trade financing, technology licensing, trading practices, country-specific information, political and monetary risk, international economics, and import/export procedures. Along with a number of text and periodical references, the ITI research assistants will provide personalized assistance with export inquiries. The ITI staff members also work with students and counsel those interested in international careers.

## Small Business Development Center

Frederick H. Rice, Director  
2323 Anderson Avenue, Suite 100  
Manhattan, Kansas 66502-2912  
532-5529

The Small Business Development Center is part of a nationwide program that shares the knowledge base of universities with the needs of small business owners.

The center serves a 7-county area in north central Kansas and provides free individual, confidential counseling on a range of business topics; workshops and evening classes on business start-up, marketing, recordkeeping, and computers; and information services through a library of books, magazines, audio and video tapes, and computer data search services.

Specialized services available include the Robert G. Chapman Small Business Computing Center, which utilizes state-of-the-art computer systems to teach business owners how to use computers in their businesses and supports a wide range of research projects; the Small Business Institute, which utilizes teams of seniors and graduate students to evaluate small businesses and recommend corrective strategies; and the Kansas Rural Enterprise Institute, which focuses research on the economic problems of businesses in rural areas and conducts specialized programs to foster start-up and growth of businesses throughout Kansas.

Summer internships are offered to qualifying juniors or seniors in the College of Business Administration. Students may earn 3 credit hours through a qualifying summer work program with a cooperating business.

## Accounting

Maurice E. Stark,\* Head

Professors Donnelly\* and Stark;\* Associate Professors Ainsworth,\* Deines,\* Ott,\* Thomas,\* and Vruwink;\* Assistant Professors D. Fisher, and Robson; Instructors S. Fisher and Lyle; Emeriti: Professors Fox and Laughlin; Associate Professor Gugler.

Accounting is often called the “language of business” because its terms and concepts are used to describe the daily events of business. The accountant measures and reports to various users the relevant financial information necessary for decision making.

The objective of the undergraduate accounting program is to provide basic conceptual accounting and business knowledge as a foundation for accounting career development in all areas. The program requirements that accomplish these objectives are specified below.

## Requirements for major in accounting

**BAPP Program** ..... 60  
(See general section of the College of Business Administration.)

<b>Business core courses</b> .....	<b>24</b>
FINAN 450 Essentials of Finance .....	3
MANGT 420 Management Concepts .....	3
MANGT 421 Introduction to Operations Management .....	3
MANGT 466 Management Information Systems .....	3
MANGT 595 Business Strategy .....	3
MANGT 596 Business, Government, and Society ....	3
MKTG 400 Marketing .....	3
STAT 351 Business and Economic Statistics II ....	3

<b>Major field</b> .....	<b>24</b>
ACCTG 331 Accounting Processes and Controls ....	4
ACCTG 342 Taxation I .....	3
ACCTG 432 Controllorship .....	3
ACCTG 433 Financial Reporting .....	3
ACCTG 434 Accounting for Not-For-Profit Entities .....	2
ACCTG 442 Auditing .....	3
ACCTG 641 Accounting Theory and History .....	3
ACCTG 642 Accounting Research .....	3

**Economics electives (All courses numbered above 120 except 505 and 506)** ..... 6

**Restricted electives** ..... 9  
Humanities, natural sciences, quantitative, or social science courses below qualify for restricted electives.

**Humanities**—See BAPP requirements in this college section.

**Natural science**—See BAPP requirements in this college section.

**Quantitative**—All courses in the computing and information sciences department numbered 300 or above; MATH 221 or 222; all statistics courses numbered 500 and above.

**Social science**—All courses in anthropology, history, political science, psychology, sociology, and economics, except those used as BAPP requirements or economics electives; all courses in geography, except those listed as natural sciences.

**Unrestricted electives** ..... 3  
126

## Accounting courses

### Undergraduate credit

**ACCTG 231. Accounting for Business Operations.** (3) I, II. An introduction to the operating activities of businesses and the roles that accounting information plays in planning, evaluating, and recording those activities. An introduction to financial statements is included. Pr.: Sophomore standing and MATH 100.

**ACCTG 241. Accounting for Investing and Financing.** (3) I, II. Extends the concepts of planning and evaluation to the business activities of acquiring, disposing, and financing productive assets. Financial statement analysis will be covered. Pr.: ACCTG 231.

**ACCTG 331. Accounting Processes and Controls.** (4) I, II. The accounting information system will be shown as a means of insuring the accuracy of information and safeguarding assets. Students will interpret documents and record many transactions that typically occur in business, governmental units, and not-for-profit entities. Pr.: ACCTG 241.

**ACCTG 342. Taxation I.** (3) I, II, S. Fundamental concepts of income determination in federal and state income tax regulations; examination of the impact of tax regulation on business and personal financial planning and decision making. Pr.: ACCTG 241.

**ACCTG 431. Problems in Accounting.** (Var.) I, II, S. Pr.: Background of courses needed for the problems undertaken and consent of instructor.

**ACCTG 432. Controllorship.** (3) I, II. Identifying relevant accounting data and organizing, summarizing, and analyzing that data into information useful for planning and budgeting, decision making, controlling, and evaluating functions of management. Pr.: ACCTG 641 and MANGT 421.

**ACCTG 433. Financial Reporting.** (3) I, II. An introduction to the U.S. and international rules and regulations that govern current reporting to external entities by profit entities. Pr.: ACCTG 641.

**ACCTG 434. Accounting for Not-For-Profit Entities.** (2) I, II. An introduction to the source of authoritative guidance, rules and regulations that govern current reporting to external entities by not-for-profit entities. Pr.: ACCTG 641.

**ACCTG 442. Auditing I.** (3) I, II. An introduction to the environment of auditing and the objectives and techniques of both financial and operational auditing. Pr.: ACCTG 433 and 422 or conc. enrollment.

**ACCTG 494. Accountants' Professional and Legal Responsibilities.** (3) II. An intensive study of an accountants' professional responsibilities to the public and the profession and the knowledge of the legal implications of business transactions, particularly as they relate to accounting and auditing. Pr.: ACCTG 433 and ACCTG 442 or conc. enrollment.

**ACCTG 641. Accounting Theory and History.** (3) I, II. The theories which underlie the practice of accounting and financial reporting including a historical perspective on the evolution of the theories. Pr.: ACCTG 241.

**ACCTG 642. Accounting Research.** (3) I, II. Use of the sources of authoritative guidance in resolving complex, professionally oriented problems in financial, governmental, and tax reporting. Analysis and presentation of case-material is covered. Pr.: ACCTG 433 and 442 or conc. enrollment.

### Undergraduate and graduate credit

**ACCTG 631. Accounting Internship.** (3) I, II. Provides a full semester of practical accounting experience prior to entering graduate accounting program. Pr.: Twenty-four hours of accounting and admission to M.Acc. program.

**ACCTG 710. Accounting Concepts and Analysis.** (3) II. The accumulation, presentation, interpretation, and quantitative applications of accounting data for business use. Pr.: MATH 100 and ECON 120 may be taken concurrently.

**ACCTG 711. Taxation II.** (3) I. A study of the federal and state taxation of partnership and corporate income, estates and trusts, gift taxes, and inheritance taxes. Introduction to tax and estate planning. Pr.: ACCTG 422.

**ACCTG 722. Advanced Auditing.** (3) I. An in-depth exposure to authoritative auditing pronouncements and specialized topics, e.g., statistical methods, EDP auditing, internal auditing, operational auditing, and audit management. Pr.: ACCTG 421 and 18 hours of accounting.

## Finance

Ali M. Fatemi,\* Head

Professors Fatemi\* and Graham,\* Assistant Professors Davis, Desai, Dukas,\* Park,\* and

Tavakkol; Instructors Kruse and Rumsey. Emeriti Professors Hollinger and Richards.

The finance curriculum emphasizes corporate financial management and allows students to specialize in commercial banking, investments, and investment banking. Supplemental areas include financial planning, real estate, and insurance. Finance majors should expect to develop a broad understanding of business management, effective communications skills, and a sound background in accounting, economic theory, management information systems, and quantitative techniques. These skills are necessary to work effectively with other internal and external participants in the management, financing, and regulation of business enterprises.

Financial managers specialize in controlling the resource investments required to support an enterprise's operating activities, planning and negotiating appropriate financing arrangements to support these investment requirements, and managing the risks inherent in an enterprise's investment and financing activities.

## Requirements for major in finance

**BAPP program** ..... 60  
(See the general section of the College of Business Administration.)

<b>Business core</b> .....	<b>31</b>
ACCTG 331 Accounting Processes and Controls ....	4
FINAN 450 Essentials of Finance .....	3
MANGT 420 Management Concepts .....	3
MANGT 421 Introduction to Operations Management .....	3
MANGT 466 Management Information Systems .....	3
MANGT 595 Business Strategy .....	3
MANGT 596 Business, Government, and Society ....	3
MKTG 400 Marketing .....	3
STAT 351 Business and Economics Statistics II .....	3
ACCTG 432 Controllorship .....	3
or	
ACCTG 433 Financial Reporting .....	3

<b>Major field</b> .....	<b>20</b>
FINAN 550 Financial Institutions and Markets .....	3
FINAN 551 Introduction to Investments .....	3
FINAN 660 Intermediate Finance .....	4
FINAN 670 Financial Management .....	4

Six credit hours selected from the following. At least 3 credits must be selected from courses numbered 553 or above:

FINAN 455 Professional Financial Planning .....	3
FINAN 460 Insurance .....	3
FINAN 552 Real Estate .....	3
FINAN 554 International Financial Management .....	3
FINAN 652 Working Capital Management .....	3
FINAN 653 Securities and Portfolio Analysis .....	3
FINAN 654 Futures and Options .....	3
FINAN 655 Commercial Bank Management .....	3
ACCTG 442 Taxation I .....	3

**Economics electives** ..... 6  
All courses numbered 510 or above in consultation with the student's academic advisor. One course must be selected from either ECON 510 Intermediate Macroeconomics or ECON 520 Intermediate Microeconomics.

**Unrestricted electives** ..... 13  
130

9 of 13 hours of unrestricted electives must be nonbusiness courses.

## Finance courses

### Undergraduate credit

**FINAN 450. Essentials of Finance.** (3) I, II, S. Study of the financial performance characteristics for a business firm accompanied by analysis of the timing, risk, and return attributes of the firm's underlying investment and financing policies. Pr.: ECON 120, STAT 350, CIS 110 or 200 and lab, and ACCTG 221.

**FINAN 455. Professional Financial Planning.** (3) I, II. A study of the principles and practices of professional financial planning in the financial services industry. Topics include programs relating to savings, insurance, investment, real estate, employee benefits, and retirement and income tax management and estate planning. Pr.: ECON 110, 120, and junior standing.

**FINAN 460. Insurance.** (3) I, II. A study of life, property, casualty, and health insurance from the purchaser's point of view with additional emphasis on the operation and contribution of the insurance industry. Pr.: ECON 110.

**FINAN 498. Problems in Finance.** (Var.) I, II, S. Internship program and selected projects appropriate to the student's program of study. Pr.: Consent of department head based on background courses appropriate to the project selected.

### Undergraduate and graduate credit in minor field

**FINAN 550. Financial Institutions and Markets.** (3) I, II. The role of financial intermediaries and markets in facilitating the efficient financing of economic activity. Primary emphasis is on financial management concepts that underlie the operation of commercial banks and nonbank institutions in the financial system. Pr.: FINAN 450.

**FINAN 551. Introduction to Investments.** (3) II, S. 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.: FINAN 450.

**FINAN 552. Real Estate.** (3) I, II. Principles and practices including legal, economic, and social implications from the viewpoint of the real estate practitioner, investor, and society. Pr.: Junior standing.

**FINAN 554. International Financial Management.** (3) I. An application of financial management concepts to investment, financing, and managerial control decisions undertaken by the multinational firm within its institutional environment of monetary arrangements, financial intermediary organizations, and balance of payments considerations that affect the international flow of capital. Pr.: FINAN 450.

### Undergraduate and graduate credit

**FINAN 652. Working Capital Management.** (3) I. Application of the concepts of managerial finance to evaluate a firm's short-term investment and financing decisions. Pr.: FINAN 450.

**FINAN 653. Securities and Portfolio Analysis.** (3) I. A theoretical and empirical study of financial management techniques employed by the professional investor to evaluate the underlying risk-return tradeoff on a particular financial asset investment opportunity and the implications of efficient portfolio management techniques for modifying this risk-return tradeoff experience. Pr.: MATH 220 or 205, STAT 351, and FINAN 450.

**FINAN 654. Futures and Options.** (3) II. An application of the option pricing theory to the valuation of speculative securities such as financial futures, stock options, index options, and futures option contracts. Pr.: FINAN 653.

**FINAN 655. Commercial Bank Management.** (3) II. An application of financial management concepts to the liquidity management, investment portfolio analysis, capital budgeting, and capital structure decision-making process required by a commercial bank to perform effectively its financial intermediation role within the financial system's institutional, regulatory, and competitive environment. Pr.: FINAN 450.

**FINAN 660. Intermediate Finance.** (4) I, II. In-depth study of a firm's long-term financing, capital investment, and working capital decisions. Topics include cash-flow analysis, capital asset valuation, business financial, and market risk, dividend policy, capital structure theory, and

short-term financial management. Pr.: MATH 205 and FINAN 450.

**FINAN 670. Financial Management.** (4) I, II. A case-oriented analysis of current topics in financial management, designed as a capstone course in corporate finance. Pr.: FINAN 551 and 660.

**FINAN 710. Managerial Finance.** (3) I. An intensive coverage of the fundamentals of financial management applicable to the management of nonfinancial institutions. Pr.: MATH 100 and ECON 120.

## General Business

### General business courses

#### Undergraduate credit

**GENBA 101. General Topics in Business.** (2) I. An introduction to the academic and professional challenges in business and industry. Topics such as environment, ethics, cultural diversity, and gender will be examined.

**GENBA 299. Honors Colloquium in Business.** (1) I, II. Open to freshmen and sophomores in the honors program for the College of Business Administration. Discussions and lectures on topics of interest to business students.

**GENBA 391. Administrative Communications.** (3) On sufficient demand. Preparation of business communications, reports, and correspondence, and analysis of communication systems within an enterprise structure. Pr.: ENGL 120 and SPCH 106.

**GENBA 498. Problems in Business Administration.** (Var.) I, II, S. In-depth analysis of special problems in general business including study of current literature. Pr.: Senior standing and consent of instructor and the department head.

**GENBA 499. Honors Seminar.** (1) I, II. Open to juniors and seniors in the honors program for the College of Business Administration. Selected seminars, lectures, and convocations on topics of interest to business students. Discussion sessions will follow.

**GENBA 506. Theories of Gender.** (3) I. Surveys major contemporary U.S. theories of gender and their development, including impact of feminist movement on the development of theory, interactions of race and gender, women's culture and men's roles. Compares approaches of social sciences and humanities. Pr.: Six hours of women's studies.

## Management

James B. Townsend,\* Head

Professors Ebadi,\* Paul,\* and Townsend;\* Associate Professors Elsea\* McCahon,\* and Niehoff;\* Assistant Professors Babbar, Bunch, Hagmann,\* Henricks, Hightower, Pearson, and Sheu; Instructors Krumwiede and Rice; Emeriti: Professors Barton-Dobenin, Deihl, and Jones; Associate Professor Thiessen; Assistant Professors Buzenberg and Riley.

The curriculum in management allows for areas of emphasis in human resource management, management information systems, operations management, and general management. In addition, the Department of Management offers courses to improve potential managers' integrative skills as well as top management skills in corporate strategy and institutional leadership. This background provides individuals with excellent opportunities for rapid advancement in professional management careers in larger organizations.

The KSU Center for Leadership is housed in the Department of Management. The center sponsors on-campus speakers, facilitates management development workshops, and provides funds for research on leadership and related topics.

## Secondary major in industrial and labor relations

See the Secondary Majors section of this catalog.

## Requirements for major in management

<b>BAPP program</b>	60	
<b>Business core</b>	36	
ECON 520	Intermediate Microeconomics	3
	<b>or</b>	
ECON 540	Managerial Economics	3
FINAN 450	Essentials of Finance	3
MANGT 420	Management Concepts	3
MANGT 421	Introduction to Operations Management	3
MANGT 466	Management Information Systems	3
MANGT 520	Organizational Behavior	3
MANGT 521	Quantitative Management	3
MANGT 531	Personnel and Human Resources Management	3
MANGT 595	Business Strategy	3
MANGT 596	Business, Government, and Society	3
MKTG 400	Marketing	3
STAT 351	Business and Economics Statistics II	3

### Major field

One of the following fields of emphasis:

#### Human resources management emphasis

Required:

MANGT 635	Personnel Law	3
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Select 9 credit hours from:

MANGT 530	Industrial and Labor Relations	3
MANGT 610	Organizational Training and Development	3
MANGT 623	Compensation Management	3
MANGT 630	Labor Relations Law	3
MANGT 631	Collective Bargaining	3
MANGT 633	Advanced Personnel Management	3
MANGT 637	Industrial Conflict Resolution	3
MANGT 690	International Management	3
	<b>or</b>	
MANGT 390	Business Law	3

#### Management information systems emphasis

Required:

MANGT 696	Computer Applications in Business	3
MANGT 656	Systems Analysis and Design	3
MANGT 666	Application of Data Models in Business	3
	Select 3 credit hours from:	
MANGT 670	Advanced Systems Analysis and Design	3
MANGT 676	Management of Local Area Networks	3
MANGT 686	Data Quality Administration	3

#### Operations management emphasis

Required:

MANGT 522	Operations Planning and Control	3
	Select 9 hours from:	
MANGT 622	Decision Analysis	3
MANGT 641	Management of Quality	3
MANGT 651	Operations Strategy	3
MANGT 661	Management of Services	3

#### General management

Select 3 credit hours from each major field emphasis above and 3 additional credit hours from any of the three fields of emphasis or from the following list:

ACCTG 331	Accounting Processing and Control	4
ACCTG 342	Taxation I	3

FINAN 550	Financial Institutions and Markets .....	3
FINAN 551	Introduction to Investments .....	3
FINAN 660	Intermediate Finance .....	4
FINAN 670	Financial Management .....	4
MANGT 440	Entrepreneurship .....	3
MKTG 450	Consumer Behavior .....	3
MKTG 640	Marketing Research .....	3
MKTG 690	Marketing Management .....	3

#### Economics electives .....

3  
All courses numbered above 120 except 505 and 506.  
We recommend that human resource management and operations majors take ECON 620 labor economics as their elective.

#### Restricted electives .....

6  
Humanities, natural science, quantitative, or social sciences below qualify for restricted electives above.

**Humanities electives**—See BAPP requirements in this college section.

**Natural science electives**—See BAPP requirements in this college section.

**Quantitative electives**—All courses in the computing and information sciences department numbered 300 and above; MATH 221 or 222; all statistics courses numbered 500 and above.

**Social science electives**—All courses in anthropology, history, political science, psychology, sociology, and economics, except those used as BAPP requirements or economics electives; all courses in geography, except those listed as natural sciences; DEN 450 Impact of Engineering Technology on Society; ENVD 510 Places and People.

#### Unrestricted electives .....

9

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## Management courses

### Undergraduate credit

**MANGT 300. Introduction to Total Quality Management.** (1) I, II. Overview of major topics related to Total Quality Management (TQM), including managerial and engineering aspects. One hour lec. a week. Pr.: MATH 100, 205, or 220, sophomore standing. Crosslisted with DEN 300.

**MANGT 330. Introductory Seminar.** (1) I. A multidisciplinary introduction to the field of industrial and labor relations. Examines the economic, legal, psychological, and sociological aspects of the field.

**MANGT 390. Business Law I.** (3) I, II. A study of law as it relates to business, including court procedures and systems, contracts, torts, agency and employment law, and business crimes. Pr.: Junior standing.

**MANGT 392. Business Law II.** (3) On sufficient demand. A study of civil law as it affects commercial transactions, including corporations, partnerships, property, commercial paper, and secured transactions. Pr.: MANGT 390.

**MANGT 420. Management Concepts.** (3) I, II, S. Managing organizations through fundamental processes of developing plans, structuring work relationships, coordinating effort and activities, directing and motivating subordinates, and controlling. Also includes managerial roles and responsibilities, effective decision making, productivity improvement, and models and theories of human behavior. Pr.: ECON 120, PSYCH 110, SOCIO 211, and junior standing.

**MANGT 421. Introduction to Operations Management.** (3) I, II, S. Description and analysis of problems related to the output of goods and services, operations planning and control, and systems management. Pr.: MATH 205 and STAT 350.

**MANGT 440. Entrepreneurship.** (3) On sufficient demand. The role of the entrepreneur is examined in the conception, start-up, organization, and development of new independent businesses. New venture problems to be studied include identification of possible new products and services, evaluation of practical commercial potential, and development of a business plan, with attention to financing, operating, and marketing. Pr.: FINAN 450, MANGT 420, MKTG 400. Instructor may waive prerequisites based on appropriate business experience.

**MANGT 466. Management Information Systems.** (3) I, II, S. A comprehensive view of the role of information technology in satisfying organizations' information requirements. Problems and technique concerning the management of responsive information systems with special attention to managers' use of systems outputs. Cases and hands-on exercises emphasizing the use of information systems in decision making, information gathering and organizing, use of modeling techniques, and presentation of information. Pr.: CIS 110.

**MANGT 495. Business Internship.** (3) S. Eight weeks of business experience between junior and senior years designed to coordinate the interests of students and firms. Pr.: FINAN 450, MANGT 420, MKTG 400, completion of junior year, and consent of instructor.

**MANGT 498. Independent Studies in Management.** (Var.) I, II, S. In-depth analysis of special problems in management including study of current literature. Pr.: Senior stand, consent of instructor, and 12 hours of management.

### Undergraduate and graduate credit in minor field

**MANGT 520. Organizational Behavior.** (3) I, II. Examination of psychological and sociological variables important in understanding individual motivation, group functioning, change, creativity, and leadership in organizations. Pr.: MANGT 420.

**MANGT 521. Quantitative Management.** (3) I, II. Quantitative techniques, models, and the integrative nature of management systems. Includes PERT, CPM, linear programming, and inventory models. Pr.: CIS 110 or 200 and lab, MANGT 420, MATH 205, and STAT 350.

**MANGT 522. Operations Planning and Control.** (3) II. Development of concepts and understanding of planning and control systems for allocating resources and scheduling activities in business firms. To guide and coordinate the flow of materials, labor inputs, and goods and services through physical productive systems. Topics include aggregate planning, master production scheduling, production activity planning and control, operations information systems, inventory control, material requirements planning, and total quality control. Pr.: MANGT 421.

**MANGT 530. Industrial and Labor Relations.** (3) I. Basic course in industrial and labor relations. Broad coverage of the institution of collective bargaining and its environment, the goals and operation of labor unions, the impact of unions on management, and labor relations law. Pr.: Junior standing.

**MANGT 531. Personnel and Human Resources Management.** (3) I, II. The personnel program and its operational processes of manpower planning, recruiting, testing, developing, and evaluating. Analysis of the personnel department's role in the organization with emphasis on problem solving. Pr.: MANGT 420.

**MANGT 595. Business Strategy.** (3) I, II, S. An integration of previous courses through the study of problems in policy formulation and implementation. Cases and current topics with emphasis on strategic planning. Open only to seniors or nonbusiness graduate students. Pr.: FINAN 450, MANGT 420, and MKTG 400.

**MANGT 596. Business, Government, and Society.** (3) I, II, S. The interrelationships and interactions of business with the social, political, and economic institutions. The impact of changes in the external environment on business and the managerial task. Pr.: FINAN 450, MANGT 420, and MKTG 400.

**MANGT 610. Organizational Training and Development.** (3) II, on demand. The process of training and developing the human resources in organizations, which includes organizational diagnosis, needs assessment, program design, appropriate methodologies, program implementation, transfer of training, and the evaluation of program effectiveness. Current trends in the content and process of training and development activities are also examined. Pr.: MANGT 520 and MANGT 531.

**MANGT 622. Decision Analysis.** (3) I, II. Application of decision-making models and quantitative techniques to business problems and policy. Pr.: MANGT 421.

**MANGT 623. Compensation Management.** (3) II. An in-depth analysis of theories, research, and practices of

performance appraisal and compensation systems. Includes study of the impact of economic, behavioral, legal, and political forces on compensation management. Pr.: MANGT 531.

**MANGT 630. Labor Relations Law.** (3) II. Detailed examination of the development and current status of labor relations law governing the private sector in interstate commerce. Topics to be discussed include antitrust prosecution of unions, injunctions, unfair labor practices, NCRP policies, employee rights, union rights, employer rights, and contract enforcement. Pr.: Junior standing.

**MANGT 631. Collective Bargaining.** (3) On sufficient demand. Study of the unionized labor market. The goals, strategies, and tactics of unions and management will be examined in detail. Other topics include the environment of collective bargaining, contract negotiations, administration, and enforcement. Pr.: MANGT 530; or ECON 120 and MANGT 630.

**MANGT 633. Advanced Personnel Management.** (3) I. On sufficient demand. An in-depth analysis of selected topics in personnel management and employment legislation including study of current research and literature. Pr.: MANGT 531.

**MANGT 635. Personnel Law.** (3) I, on demand. A survey course designed to acquaint students with the broad and controlling aspects of prominent public laws which affect human resource management. Includes readings, cases, and dicta pertaining to ADA, ADEA, OSHA, Title VII, etc. Pr.: MANGT 531.

**MANGT 637. Industrial Conflict Resolution.** (3) I. Examination of causes and nature of conflict in business and between organizations. The resolution of dysfunctional conflict and management of functional conflict. Special emphasis on resolution techniques, including mediation, arbitration, negotiation, and litigation avoidance. Pr.: MANGT 530 and 630.

**MANGT 639. Advanced Labor Relations.** (3) On sufficient demand. Research methods, model building, economics of unionized labor markets, and the behavioral theory of negotiations are examined in detail. Pr.: MANGT 631 or ECON 620.

**MANGT 641. Management of Quality.** (3) I, in alternate years. Development of quality as a management philosophy through the study of ideas from contemporary quality philosophies of Deming, Juran, and Taguchi. Statistical process control charting as a process and quality improvement tool and product and process design as important components of quality. Pr.: MANGT 421.

**MANGT 651. Operations Strategy.** (3) I, in alternate years. Emphasis on the elements of operations strategy as a subcomponent of general business strategy. Product/process design, operations scheduling, inventory control, and quality control alternatives are investigated and analyzed in different combinations to understand their effect on productivity and competitiveness of organizations. Pr.: MANGT 522.

**MANGT 656. Systems Analysis and Design.** (3) I. Development of a basic understanding of the systems approach and an examination of the systems impact on managerial decision making. Evaluation of systems analysis alternatives from a manager's point of view to formalize complex managerial situations effectively. Management issues associated with each stage of the systems development life cycle—especially identification of management information requirements and implementation and maintenance strategies. Relationship of systems design and organization structure. Pr.: MANGT 466 and 520.

**MANGT 661. Management of Services.** (3) II, in alternate years. Identifying and comprehending the subtle differences between manufacturing and services. Management in accordance with a coherent theory for services and greater productivity. Service characteristics of design, planning, location, layout, human resource management, technology and information, scheduling, quality and process control. Pr.: MANGT 421.

**MANGT 666. Application of Data Models in Business.** (3) I. Examination of interrelationship between managers and database designers from the user's perspective. Database design strategies for the functional areas of business such as accounting, marketing, and manufacturing management with a focus on making data responsive to

changing information needs and supportive of organizational plans and goals. Pr.: MANGT 466.

**MANGT 670. Advanced Systems Analysis and Design.** (3) II. The application of systems analysis and design theory to business applications. Students are required to use various CASE tools and design techniques learned in MANGT 656 to solve system development problems commonly found in business organizations. Pr.: MANGT 656.

**MANGT 676. Management of Local Area Networks (LANs).** (3) I. The study of Local Area Networks (LANs) and their impact on the business organization. Coverage includes an introduction to the basic components of LANs, network management, network security, administrative issues, LAN management tools, and LAN software. Course includes a hand-on project that focuses on the development and management of Local Area Networks. Pr.: MANGT 466 and MANGT 656.

**MANGT 686. Data Quality Administration.** (3) II. An in-depth study of the data quality dimension in organizations. Emphasis on data quality requirements determination, statistical measurement, use of simulation to improve data-intensive processes, management of multiple processes and databases, and promotion of data quality in the design of new organizational processes. Pr.: STAT 350, MANGT 656, and MANGT 666.

**MANGT 690. International Management.** (3) On sufficient demand. Examination of business decision parameters and strategy in a multinational context. The influence of cultural, economic, political, and social differences on decision making and the operation of American enterprises in the international environment. Pr.: FINAN 450, MANGT 420, MKTG 400, or FINAN 710.

**MANGT 696. Computer Applications in Business.** (3) I, II. A capstone course in Management Information Systems (MIS). Emphasis on systems planning and integration (including networks, databases, systems analysis, and end-user computing). Cases and current topics addressing the role of information technology in the firm. Pr.: MANGT 656 and MANGT 666.

## Marketing

Wayne Norvell,\* Head

Professors Coleman,\* Fraser-Hite, Andrus,\* Hite,\* and Norvell,\* Assistant Professor Laughlin; Instructors Ahern and Thierer.

Study in marketing covers such areas as the consumer, the seller, marketing strategy, marketing research, and marketing decisions. Dual degree and dual major programs, combining marketing with other fields, may be arranged by consulting the marketing department office.

### Requirements for major in marketing

<b>BAPP program</b> .....	<b>60</b>
<b>Business core courses</b> .....	<b>24</b>
FINAN 450 Essentials of Finance .....	3
MANGT 420 Management Concepts .....	3
MANGT 421 Introduction to Management .....	3
MANGT 466 Management Information Systems .....	3
MANGT 595 Business Strategy .....	3
MANGT 596 Business, Government, and Society ....	3
MKTG 400 Marketing .....	3
STAT 351 Business and Economic Statistics II ....	3
<b>Major field</b> .....	<b>18</b>
MKTG 450 Consumer Behavior .....	3
MKTG 640 Marketing Research .....	3
MKTG 690 Marketing Management .....	3

Plus 9 hours from:

MKTG 541	Retailing .....	3
MKTG 542	Sales Management .....	3
MKTG 543	Promotional Strategy .....	3
MKTG 544	International Marketing .....	3
MKTG 545	Marketing Channels .....	3
MKTG 550	Industrial Marketing .....	3

**Economics electives** ..... 6

One must be selected from the following five courses:

ECON 510	Intermediate Macroeconomics
ECON 520	Intermediate Microeconomics
ECON 530	Money and Banking
ECON 540	Managerial Economics
ECON 681	International Trade

The second elective may be selected from the first five or from the following:

ECON 555	Urban and Regional Economics
ECON 631	Principles of Transportation
ECON 633	Public Finance
ECON 682	Economics of Underdeveloped Countries

**Restricted electives** ..... 9

Humanities, natural, quantitative, or social sciences below qualify for restricted electives.

**Humanities**—See BAPP requirements in this college section.

**Natural science**—See BAPP requirements in this college section.

**Quantitative**—All courses in the computing and information sciences department numbered 300 and above; MATH 221 or 222; all statistics courses numbered 500 and above.

**Social science**—All courses in anthropology, political science, psychology, sociology, and economics, except those used as BAPP requirements or economics electives; all courses in geography, except those listed as natural sciences; DEN 450 Impact of Engineering Technology on Society; ENVD 510 Places and People; HDFS 110 Introduction to Human Development; HDFS 350 Family Relationships and Sex Roles.

**Unrestricted electives** ..... 9  
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### Agribusiness option in marketing

Marketing majors interested in agriculture may take an option in agribusiness. Students choosing the agribusiness option complete all requirements for the marketing major plus hours in agribusiness.

#### Requirements for agribusiness option in marketing

**BAPP program** ..... 62  
Complete the BAPP program with one exception: natural science electives—9 credit hours; BIOL 198 Principles of Biology (4 hours) and CHM 110 General Chemistry (5 hours)

<b>Business core courses</b> .....	<b>43</b>
FINAN 450 Essentials of Finance .....	3
MANGT 420 Management Concepts .....	3
MANGT 421 Introduction to Management .....	3
MANGT 466 Management Information Systems .....	3
MANGT 595 Business Strategy .....	3
MANGT 596 Business, Government, and Society ....	3
MKTG 400 Marketing .....	3
MKTG 450 Consumer Behavior .....	3
MKTG 640 Marketing Research .....	3
MKTG 690 Marketing Management .....	3
STAT 351 Business and Economic Statistics II ..	3
AGEC 318 Economic Principles of Agricultural Business Firms .....	3
AGEC 500 Production Economics .....	3
AGEC 505 Agricultural Market Structure .....	3

<b>Economics electives</b> .....	<b>3</b>
Select one course from the following:	
ECON 510 Intermediate Macroeconomics .....	3
ECON 530 Money and Banking .....	3
ECON 555 Urban and Regional Economics .....	3
ECON 631 Principles of Transportation .....	3
ECON 633 Public Finance .....	3
ECON 681 International Trade .....	3

**Nineteen hours must be taken from the following three groups of electives:**

**Agribusiness electives** ..... 9

Select nine credit hours from the following:

AGEC 410	Agricultural Policy .....	3
AGEC 416	Agricultural Law and Economics .....	3
AGEC 417	Rural Banking .....	3
AGEC 420	Commodity Futures Marketing .....	3
AGEC 421	Livestock-Meat Marketing .....	3
or		
AGEC 422	Grain Marketing .....	3
AGEC 513	Agricultural Finance .....	3
AGEC 515	Agribusiness Marketing .....	3
AGEC 598	Farm Management Strategy .....	3
AGEC 525	Natural Resource Economics .....	3
AGEC 605	Price Analysis and Forecasting .....	3
AGEC 610	Agricultural and Natural Resources Policy .....	3
AGEC 615	International Agricultural Development .....	3
AGEC 623	International Agricultural Trade .....	3

**Agricultural sciences and/or product technology electives** ..... 6-8

Select six to eight credit hours from the following:

AGRON 220	Crop Science .....	4
or		
HORT 200	Plant Science .....	4
AGRON 305	Soils .....	4
AGRON 340	Grain Grading .....	2
AGRON 501	Range Management .....	3
ASI 102	Principles of Animal Science .....	3
and		
ASI 103	Dairy Science Lab .....	1
or		
ASI 104	Poultry Science Lab .....	1
or		
ASI 105	Animal Science and Industry Lab .....	1
ASI 300	Principles of Livestock Feeding .....	3
ASI 302	Introduction to Food Science .....	3
ASI 305	Fundamentals of Food Processing .....	3
ASI 350	Principles of Meat Science .....	3
ASI 361	Meat Processing .....	2
ASI 405	Fundamentals of Milk Processing .....	3
ASI 430	Food Products Evaluation .....	3
ASI 694	Food Plant Management .....	3
ENTOM 300	Economic Entomology .....	3
ENTOM 305	Livestock Entomology .....	3
FN 132	Basic Nutrition .....	3
FN 301	Trends in Food Products .....	3
FOR 285	Introduction to Forestry .....	3
GENAG 500	Food Science Seminar .....	3
GRSC 100	Principles of Milling .....	3
GRSC 305	Fundamentals of Food Processing .....	3
GRSC 120	Introductory Bakery Technology .....	2
and		
GRSC 121	Introductory Bakery Technology Lab ..	1
PLPTH 500	Principles of Plant Pathology .....	3

**Additional agribusiness option electives** ..... 2-4

Select additional courses from agribusiness electives and agricultural sciences and/or product technology electives to total 19 credit hours.

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### Marketing courses

#### Undergraduate credit

**MKTG 400. Marketing.** (3) I, II, S. A general study of marketing principles which lead to the development of marketing strategy. A review of environmental influences and key analytical tools used in formulating marketing plans. Product or service design, distribution, pricing, and promotional programs. Pr.: ECON 110 and 120.

**MKTG 442. Sales Communication.** (3) I, S. Focuses on the nature of interpersonal communications, both oral and written, between buyers and sellers. The mechanics and intricacies of personal sales presentations. Concepts of buyer behavior and communication theory. Students develop selling communications skills through practice.

**MKTG 450. Consumer Behavior.** (3) I, II, S. An examination of consumer motives, attitudes, and decision processes as these relate to product imagery and purchase symbolism. The sociological and psychological foundations of marketplace choice are analyzed, including life-style, social status, age, income, taste, habit, custom, fashion, self-concept, and opinion influences. Pr.: MKTG 400 and junior standing.

**MKTG 498. Independent Study in Marketing.** (Var.) I, II, S. Selected topics in marketing. Pr.: Consent of department head.

### **Undergraduate and graduate credit in minor field**

**MKTG 541. Retailing.** (3) I. 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.: MKTG 400.

**MKTG 542. Sales Management.** (3) II, S. Management of the sales force in other than retail settings. Involves hiring, screening, recruiting, training, organizing, motivating, supervising, controlling, and evaluating members of the sales force. Also focuses on the development and execution of sales strategies as well as on the mechanics and need for sales forecasting. Pr.: MKTG 400.

**MKTG 543. Promotional Strategy.** (3) I. Focuses on the management of promotional programs which include elements of advertising, personal selling, sales promotion, and public relations. Includes a review of concepts from economics, behavioral sciences, and mathematics which play a role in creating, executing, and evaluating promotional programs. Pr.: MKTG 400 and 450.

**MKTG 544. International Marketing.** (3) II. This course deals with the management of marketing problems arising from various degrees of foreign involvement (exports, licensing, foreign subsidiaries). Emphasis is on the management of marketing functions in a multinational context where the parameters differ from those in domestic marketing. Topics include international economic factors, foreign cultures, nationalism and government influences, and economic development. Pr.: MKTG 400.

**MKTG 545. Marketing Channels.** (3) II, S. Study of the quantitative and qualitative factors involved in selecting, developing, managing, and controlling marketing channels of distribution. Includes decision models from industrial marketers through purchasing units. Pr.: MKTG 400.

**MKTG 550. Industrial Marketing.** (3) I. A study of the nature of the industrial marketplace, concentrating on those aspects that differentiate it from the consumer markets. The major topics are analysis of market needs, market segments, organizational buying behavior, purchasing agent functions and activities, marketing strategy and mix for institutional customers, not-for-profit and services marketing, and buyer/seller relations. Pr.: MKTG 400.

### **Undergraduate and graduate credit**

**MKTG 640. Marketing Research.** (3) I, II, S. 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.: STAT 351, CMPSC 200 and lab, and MKTG 400.

**MKTG 690. Marketing Management.** (3) I, II, S. Analysis of marketing situations which lead to appropriate management of the marketing program's objectives. Capstone course integrates knowledge of marketing and other business management principles into marketing strategy, development, implementation, and control. Pr.: MKTG 640 and 450.

**MKTG 700. Marketing Theory and Practice.** (3) I. A comprehensive study of marketing concepts and analytical tools used in developing marketing strategy. Pr.: ECON 110 and 120. ECON 120 may be taken conc.

# Education

Michael C. Holen, Dean

Janice R. Wissman, Associate Dean

Paul R. Burden, Assistant Dean

Robert C. Newhouse, Assistant Dean

Michael F. Perl, Director, Center for Student and Professional Services and Coordinator of Laboratory Experiences

Willard J. Nelson, Associate Director, Center for Student and Professional Services

Candace Bond, Certification Officer and Associate Director, Center for Student and Professional Services

Floyd H. Price, Director, Community College Relations

Emmett L. Wright, Director, NSF Preservice Elementary Education Project

Charles I. Rankin, Director, Midwest Desegregation Center

6 Bluemont Hall  
532-5525

College of Education programs prepare individuals for the broad spectrum of educational positions.

Primary consideration is given to preparing education students for the various positions in elementary, secondary, occupational, and vocational programs, and the personnel who support these programs. In addition, the college provides consultative services and in-service training for the improvement of various aspects of education programs at all levels.

The College of Education cooperates with all other colleges and departments in its interdisciplinary approach to the preparation of teachers and other educational personnel. This includes participation in cooperative education programs through Career and Employment Services.

The undergraduate teacher education programs are accredited by the Kansas Board of Education, North Central Association of Colleges and Secondary Schools, and the National Council for Accreditation of Teacher Education.

The College of Education participates in the intercollegiate programs in women's studies and gerontology, described earlier in the Secondary Majors section of this catalog.

## Support Facilities and Programs

In addition to major instructional and research programs, the College of Education provides service to K-State faculty and students, local schools, and a variety of other entities in the state and region.

Specific services of the College of Education are provided or coordinated through the following centers.

### Center for Extended Services and Studies

The center initiates and responds to requests for staff development programs, administrative searches, curriculum studies, staff development needs assessments, program evaluations, and other studies designed to enhance education at all levels and environments. Formalized partnerships have been established through the center to provide technical assistance and leadership to selected education foundations in Kansas.

The center is staffed and maintained through the assignment of faculty and staff in the College of Education and through contracts with faculty from K-State and other professionals as determined by the nature of the project. Coordination of K-State's educational development resources is a major responsibility of this service unit.

### Center for Rural Education and Small Schools

Activities designed to address the unique educational needs of small schools and rural communities in Kansas and the plains states are the major focus of this center. Its basic services as ongoing endeavors are in research—to identify unique needs, effective techniques, and decision-making processes—and assistance programs centered on the development, coordination, and delivery of information and services. Development and maintenance of linkages with local schools and state and federal agencies are important functions of the center. A highly successful annual conference on rural education and small schools has attracted national attention and was initiated by the center and the College of Education.

### Center for Economic Education

With joint support from K-State and many Kansas businesses, the Center for Economic Education has developed and conducted pre- and in-service programs on economic education, including consumer economic awareness. Center staff provide consultation seminars, non-credit workshops, and graduate credit course work for schools and educators interested in improving the competence of their students in economic education. A mini-grant program for teachers, the nationally acclaimed Stock Market Game, and an extensive materials library (free loan basis) are important functions of the center.

### Midwest Regional Processing Center for the Stock Market Game

The College of Education and Computing and Network Services work with the Securities Industry Foundation for Economic Education in processing portfolios for states participating in the Stock Market Game. In addition, curriculum materials and a consultation service are provided to state coordinators to enhance the teaching of economic concepts and to assist in interpreting weekly stock portfolios.

### Instructional Media Center

The Instructional Media Center provides a range of services, instructional materials, and audiovisual equipment for faculty and students. Professional-quality 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 many types is maintained and provided by the center. The instructional materials collection includes films, filmstrips, slides, and tapes used in teacher education.

The Instructional Media Center includes a full range of computers and computer services for use in instructional media classes and for independent use. The facilities include computers with a variety of word processing, database, and spreadsheet programs. Programs and equipment are also available for multimedia presentations with the use of hypermedia and other representation capabilities and also for desktop publishing. Portable workstations with most computer functions are available for use in other classrooms.

A video recording studio is used 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 variety of recorded teaching and individual study materials.

Facilities are available for group and individual uses of instructional media, including rooms for group viewing of films and video tapes, and an independent development laboratory for the individual use of instructional materials. The laboratory includes learning spaces with all materials and equipment needed for totally individualized instruction.

### Center for Science Education

Administratively housed in the College of Education, the Center for Science Education is a university-wide vehicle for marshalling and coordinating K-State's historically inde-

pendent and compartmentalized endeavors in science, mathematics, technology, and environmental education. Groups of faculty affiliates specializing in science, mathematics, computer science, educational technology, and environmental education from across the K-State campus are brought together to address teaching and learning issues.

The center’s mission is to improve the quality of science, mathematics, and technology teaching and learning throughout Kansas and the prairie states from kindergarten through the Ph.D. level. The center facilitates collaboration among individuals and units on and off campus for the purpose of conducting research; developing curriculum materials, pedagogical strategies, and organizational mechanisms; demonstrating their effectiveness in model school sites; and disseminating the latest knowledge to an audience of school administrators, teachers, researchers, and other professionals in related organizations and non-formal educational settings.

## Honors Program

The honors program in the College of Education has been established for undergraduate students who have demonstrated high academic achievement. The major purpose of the honors program is to give selected students an opportunity to expand their knowledge of the teaching profession and to acquire a desire to be leaders in the profession. The program is designed for students in the College of Education and other students who are completing a teacher certification program through another college at K-State.

Participants may expect to receive recognition of academic ability and achievements; learn and interact with other honor students in small groups; establish close association with faculty members in seminars and research projects; exercise creativity and explore leadership responsibilities; and have alternatives to selected required courses in the professional education component.

### Admission requirements

1. Present a written statement of interest in the program.
2. Submit an ACT Composite score of 28 or higher or evidence of a cumulative grade point average of 3.5 in a minimum of 9 semester hours of college work.
3. Enroll in the non-credit course DED 010 Introduction to the Honors Program.
4. Have a satisfactory interview with a faculty member of the Honors Program Coordinating Committee.

### Student progression after admission

1. Formal admission to the honors program by the Coordinating Committee.
2. Enrollment each semester in DED 020 Honors Program (0).
3. Enrollment in an honors section of EDCEP 315 Educational Psychology (3), and/or other courses designated for honors students.
4. Enrollment in a minimum of two Honors Seminars (DED 320) prior to graduating.
5. Maintenance of a grade point average of 3.5 or better in all college work.
6. Completion of DED 420 Honors Research (1–3), for at least 2 credit hours under the supervision of a professor in the College of Education.

### Features of the honors program

Honors seminars are offered each semester. Students will be encouraged to enroll in one seminar each semester although the minimum requirement for the program is two honors seminars. One of the required seminars may be taken in another college at K-State. The seminars will focus on topics that will broaden the knowledge of future teachers and give them insights into leadership responsibilities in their professions.

Honors Research gives students an opportunity to work with professors having similar research interests. Research topics may be selected from a range of areas and they may reflect the student’s particular interests.

## Coaching and Athletic Training

### Coaching endorsement

This coaching endorsement is open to students who plan to coach at the high school level after graduation. The Kansas State High School Activities Association accepts the K-State College of Education coaching endorsement as a substitute for the American Coaching Effectiveness Program, which is currently offered through the KSHSAA educational program.

Any student interested in the College of Education endorsement program should take the following hours of course work:

EDSEC 250	Scientific Principles of Coaching .....	3
EDSEC 320	Treatment of Athletic Injuries .....	3
EDSEC 587	Supervised Practicum for Athletic Coaches .....	2
One class selected from the following:		
EDSEC 302	Coaching and Officiating Basketball .....	2
EDSEC 305	Coaching and Officiating Football .....	2
EDSEC 306	Coaching and Officiating Volleyball .....	2

### Athletic training

The athletic training department is jointly supported by the College of Education and the Department of Intercollegiate Athletics. Course work includes prevention and treatment of athletic injuries, evaluation and emergency management of athletic injuries, therapeutic modalities in athletic injuries, rehabilitation and conditioning for athletic training, administration of athletic training programs, and supervised internship.

The following courses comprise the core courses in athletic training:

EDSEC 320	Treatment of Athletic Injuries .....	3
EDSEC 551	Evaluation and Emergency Management of Athletic Injuries .....	3
EDSEC 555	Therapeutic Modalities in Athletic Training .....	3
EDSEC 556	Rehabilitation and Conditioning for Athletic Training .....	3
EDSEC 557	Seminar in Issues in Administration of Athletic Training Programs .....	3
EDSEC 585	Internship in Athletic Training .....	1
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## Teacher Education

The College of Education is the designated authority for all K-State teacher certification recommendations to the Kansas Board of Education. All certification programs offered by K-State have been approved by the Kansas Board of Education.

The programs are designed to develop competencies essential for teaching. Some programs are parts of degree requirements in colleges other than the College of Education. All College of Education program requirements are subject to revision as necessary to meet Kansas certification standards. Students should contact their advisors or the certification officer if they have questions about certification program changes.

Certification through the teacher education program is available for three teaching levels: early childhood education prepares for preschool teaching, birth to K; elementary education prepares for grades K–9; and secondary programs satisfy state certification requirements for grades 7–12.

### Admission requirements

The application for admission to a teacher education program must be filed when the applicant has satisfied all of the admission requirements. Transfer students who have satisfied all the admission requirements should apply at the time of initial enrollment.

Students making changes in degree programs must reapply for teacher education.

### Hours

Fifty total hours must be completed, including all transfer and K-State credits. Thirty-five of

the fifty hours constitute a designated core of general education requirements.

### English composition

Both Expository Writing I and II must be completed satisfactorily with a grade no lower than C (2.0).

### Public speaking

A grade of C or better is required in SPCH 105, 106, or 109. Students may complete the requirement with the quiz-out conducted by the speech department. Courses in interpersonal communication may not apply.

### Mathematics

A grade of C or better is required in six credit hours of mathematics including college algebra, or a higher level of mathematics and at least one other course that requires algebra as a prerequisite.

### Overall GPA

*Full admission:* 2.5 is required in all college work attempted, including transfer and K-State credits.

A 2.75 grade point average is required on a 35 hour general education core which is specified by each department. Students should consult with their advisors or inquire in 13 Bluemont Hall for specific requirements.

*Probationary admission:* An applicant with a cumulative grade point average of 2.4 or above may apply for admission on a probationary status, provided all other requirements have been met. Students admitted on a probationary basis must achieve a cumulative grade point average of 2.5 by the time they have completed the first 30 hours after admission to teacher education, or they will be dropped from the teacher education program.

### Secondary education and early childhood teaching specialty

A 2.5 GPA is required in all college work attempted in the teaching specialty at other institutions and at K-State. There is no probationary admission for students with a teaching field GPA of less than 2.5.

### Pre-professional skills tests

A transfer student may be admitted *provisionally* before the test is taken, but the student must take the test the next time it is given on campus or he or she will be dropped from teacher education. Tests will be given throughout the year on dates specified by the testing service and will include sections on reading, writing, and mathematics. A score of 172 in writing, 173 in reading, and 174 in mathematics are required for admission to teacher education.

### Early field experience

These requirements are currently under review. Students should consult their advisors or inquire in 13 Bluemont Hall for further information.

### Application deadlines

To pre-enroll for summer or fall professional classes ..... February 15

To pre-enroll for spring professional classes ..... October 1

When the applications are approved, students are notified of their acceptance into the respective teacher education professional program and are reassigned from a pre-professional advisor to a professional-level advisor. Students who do not meet the requirements will be notified of the options available to them.

### Professional semester

The professional semester comprises a series of prescribed courses that allocate one-half or more of the semester to teaching participation (student teaching). This semester usually occurs in the fall or spring of the senior year. There is no teaching participation experience offered during summer sessions.

Students desiring to be recommended for certification by K-State must earn credit for teaching participation in residence. Students who have had any secondary methods course at another college or university will be required to audit the equivalent course at K-State.

Students may only take the courses prescribed for the professional semester unless permission is obtained through the Office of the Coordinator of Laboratory Experiences. Teaching participation is graded Credit/No Credit.

### Application for student teaching

The application for student teaching must be submitted to the College of Education coordinator of laboratory experiences not later than December 20 of the year preceding the professional semester.

Students must submit the application by this deadline even though all admission requirements to the professional semester are not fully satisfied.

The application will be obtained from and returned to the coordinator of laboratory experiences. Junior and senior transfer students from other educational institutions should file the application immediately upon enrollment.

### Admission to the professional semester

Students will be approved for the professional semester when the requirements listed below have been met. If notified that all requirements for the professional semester have not been satisfied, students may request through the College of Education advisor that the application be postponed.

### Requirements for all applicants to the professional semester

Full admittance to a teacher education program.

Completion of 90 semester hours.

An overall grade point average of 2.5 in all college or university course work attempted.

Physical examination by the student health center or by a licensed physician. The student verifies to the coordinator of laboratory experiences that the physical examination has been completed.

### Additional requirements for elementary majors

Completion of EDCEP 315, EDSP 324, EDCIP 455, and Blocks A and B.

Students must have a B average (3.0 GPA) in all Block A and B courses with no grade lower than a C in any blocked course. Students may retake blocked methods courses one time only.

### Additional requirements for secondary majors

A grade point average of 2.5 in all teaching fields based on all teaching field courses attempted at K-State and at all colleges or universities attended. Completion of Blocks I and II, and EDCIP 410 and EDETC 318.

### Student teaching assignment request

All student teaching options require a special application called the Student Teaching Assignment Request. This form may be obtained from the office of the coordinator of laboratory experiences and returned to that office by:

*September 25* for students participating in the spring professional semester.

*February 25* for students participating in the fall professional semester.

Should either of these dates fall on a Saturday, Sunday, or holiday, the next working day will be considered as the due date.

### Professional semester options

In addition to the conventional professional semester, the following options are available:

#### MITEC option

There are Multi-Institutional Teacher Education Centers in Topeka, Kansas City, and Emporia. The Kansas City center includes Kansas City, Kansas, and the suburban area. The MITEC option is a voluntary, full-semester, off-campus program. This professional semester option requires advanced planning with the education advisor and the coordinator of laboratory experiences. Students must make special requests for this program.

#### CUTE option

The Cooperative Urban Teacher Education option is in an urban educational setting in Kansas City in which students spend a full semester off campus. A limited number of students is selected by application for this option.

### Interruption of degree

The following College of Education policy regarding interruption of academic programs

applies to all people seeking teacher certification as well as those enrolled in degree programs in the College of Education.

Students who graduate within six years from the time they enter K-State without having previously earned credit from another institution shall have the opportunity to graduate under the academic program (course and total credit requirements) in existence at the time of entrance, unless the student cannot be certified by the state of Kansas under the original entry requirements.

If more than six years have elapsed since original entry, the student will need to complete the degree or teacher education program requirements in existence at the time he or she re-enters the university for the final and uninterrupted phase of the program.

This policy applies to students who are admitted to the university with previously attained credit as follows:

#### Allowed for completion

Less than 30 credits .....	6 years
30 to 59 credit .....	5 years
60 to 89 credits .....	4 years
90 or more credits .....	3 years

Due to the number of credit hours required in their program, music education students will have an additional semester, for a total of 6½ years, to complete their teacher education program.

Most students who interrupt their educations for military service during peacetime do so by voluntary enlistment. In such a case, the above policy would hold. In wartime or national emergency, students with good grade records might be drafted. In these cases, it would be expected that students could graduate under the requirements that existed at the time they originally entered unless certification requirements have changed, whereupon the student must modify the entry program to include the current certification requirements.

## Professional certification

### Initial certification

The College of Education has the responsibility to serve as the recommending agent for all K-State 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 program requirements in the state of Kansas. Early childhood, elementary, and secondary teaching certification may be accomplished through the completion of the approved program and the appropriate degree.

Students who do not apply for the initial certification when they are eligible will be expected to meet the requirements in effect at the time they do apply for initial certification. Students enrolled in and earning degrees in colleges other than the College of Education

must complete all requirements of an approved teacher education program.

The state of Kansas will issue initial teaching certificates only to individuals who have completed an approved teacher education program, received the recommendation of their college or university, and successfully passed the precertification examination. This examination consists of the three sections of the Pre-Professional Skills test and the Professional Knowledge section of the National Teachers Examination. These tests will be administered at K-State several times each academic year.

The state of Kansas may not issue a teaching certificate to any applicant who has been convicted of a felony or who has had a teaching certificate revoked in another state.

People seeking initial certification who present degrees from other accredited institutions must meet all requirements of the teacher education program. For additional information, these individuals should contact the Office of Certification, 13 Bluemont Hall.

### Additional certification endorsements

K-State will recommend for certification those individuals who are already certified, but who are adding an endorsement to the certificate (e.g., reading specialist, administrator, counselor, an additional teaching area).

K-State may become the recommending agent for individuals presenting degrees from other accredited institutions. These persons must complete 8 hours in residence.

### Recertification

Renewal applications not requesting an additional certification endorsement are sent directly to the Kansas Board of Education.

For additional information on precertification testing, applications, or procedures, contact the Office of Certification in 13 Bluemont Hall.

## Approved Programs

All students preparing to be certified to teach in preschool, elementary, or secondary schools must fully complete the approved teacher education program regardless of which college awards the degree. The approved program consists of: general education studies, a major or specialization, and professional education studies.

The curricula in elementary education and in secondary education fulfill program requirements for teacher certification in the state of Kansas. Both degrees offered through the College of Education are four-year programs.

### Elementary education

Bachelor of science in elementary education  
Minimum of 126 hours required  
Certification K-9

### General education requirements

(51 hrs. minimum)

#### Communications (8-9 hrs.)

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 105	Public Speaking IA .....	2
	or	
SPCH 106	Public Speaking I .....	3

#### Humanities (12 hrs.)

(Recommended courses are available from 13 Bluemont Hall.)

Literature .....	3
ENGL 355 Literature for Children .....	3
Humanities .....	3
Fine arts .....	3

#### Social science (12 hrs.)

PSYCH 110	General Psychology .....	3
HIST 100	Introduction to History .....	3
GEOG 100	World Regional Geography .....	3
ANTH 200	Introduction to Cultural Anthropology ..	3
	or	
AMETH 160	American Ethnic Studies .....	3

#### Natural science (12 hrs.)

(Recommended courses are available from 13 Bluemont Hall.)

Biological	
Physical	
Earth science	

#### Mathematics (6 hrs.)

These requirements are currently under review. Students should consult their advisor or inquire in 13 Bluemont Hall for further information.

#### Physical education (1 hr.)

KIN 101	Principles of Physical Fitness .....	1
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### Pre-professional entry level

For the freshman and sophomore years, or until requirements for admission to teacher education have been satisfied, students in the College of Education will enroll in the appropriate pre-professional curriculum: elementary (EDPPE) or secondary (EDPPS). These students are advised by a College of Education pre-professional advisor in 13 Bluemont Hall concerning the courses essential for entry into the teacher education program.

Students transferring to K-State after earning credit at another institution will be enrolled in a pre-professional program until it has been determined that requirements for admission to teacher education have been satisfied. Students attending community colleges are encouraged to plan their degree programs in a four-year sequence. The College of Education invites students to seek advice from the Center for Student and Professional Services in 13 Bluemont Hall concerning course selections.

#### Professional-level courses (44 hrs.)

All students must file an application for admission to the teacher education program. When a student's application has been approved, he or she is admitted to the professional level and assigned to a professional-level advisor.

Admission to teacher education is not required for enrollment in the following.

EDEL 220	Orientation to Elementary/ Middle School .....	1
HDFS 110	Introduction to Human Development ....	3
HDFS 200	Sexuality and Health .....	2
EDEL 300	Principles of Elementary Education .....	3
ART 425	Art for Elementary Schools .....	3
MUSIC 405	Music for Elementary Teachers .....	3
EDEL 379	Elementary/Middle-Level Physical Education Methods .....	2

Admission to teacher education is required for enrollment in the following courses, which are prerequisite to Blocks A and B:

EDCEP 315	Educational Psychology .....	3
EDSP 324	Exceptional Child in the Regular Classroom. ....	3
EDCIP 455	Teaching in a Multicultural Society .....	2

#### Block A

EDEL 470	Elementary/Middle-Level Science Methods .....	3
EDEL 473	Elementary/Middle-Level Mathematics Methods .....	3
EDETC 318	Instructional Media and Technology .....	2
EDEL 420	Block A Clinical Experience .....	1

#### Block B

EDEL 474	Elementary/Middle-Level Reading Methods .....	3
EDEL 471	Elementary/Middle-Level Language Arts Methods .....	3
EDEL 472	Elementary/Middle-Level Social Studies Methods .....	3
EDEL 430	Block B Practicum .....	1

#### Professional semester (16 hrs.)

Requirements for admittance to student teaching: Minimum 3.0 GPA in all Block A and Block B courses, with no grade lower than a C in any blocked course. Students may re-take blocked methods courses one time only.

EDEL 585	Teaching Participation in the Elementary School (with seminar) .....	16
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#### Area of concentration (15 hrs.)

The 15 hours selected in the area of concentration are in addition to those taken to meet general education requirements. A 2.5 grade point average is required in all areas for which certification is requested. Guidelines for applicable courses are available in the Center for Student and Professional Services. Concentrations are offered in the following fields: art, biological science, communication arts, English, human development and family studies, general science, health education, mathematics, modern foreign languages, music, physical science, social science, and special education.

Minimum hours required in the area of concentration .....	15
<b>Total credit hours required for graduation .....</b>	<b>126</b>

## Secondary education

Bachelor of science

Minimum of 126 hours required

Certification grades 7–12

All students wishing to teach in secondary schools must fully complete the approved teacher education program regardless of which college awards the degree. The approved program consists of: general education studies, professional education studies, and teaching field studies as specifically outlined in the following sections.

### General education requirements

#### Communications (8–9 hours)

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 105	Public Speaking 1A .....	2
	or	
SPCH 106	Public Speaking I .....	3
	or	
SPCH 109	Oral Communication Honors .....	3

#### Humanities (12 hours)

Any two of the following four: ENGL 230, 231, 233, 234 .....	6
Literature: ENGL 261, 262, 271, 272, 361, 362, 381, or 382 .....	3
Restricted elective .....	3

#### Social science (9 hours)

History: HIST 101, 102, 251, or 252 .....	3
ANTH 200      Introduction to Cultural Anthropology .....	3
Restricted elective .....	3

#### Quantitative sciences (6–7 hours)

(College Algebra is a prerequisite for statistics and computer science.)

MATH 100	College Algebra (or higher level math course) .....	3
Any math course over 100	or	
STAT 320	Elements of Statistics (or higher level statistics course) .....	3
	or	
CIS 200	Fundamentals of Computer Programming and Lab .....	4

#### Natural science (7 hours)

Biological (BIOL 198 Principles of Biology, 4 hours, is recommended.)

Physical (PHYS 101 The Physical World, 3 hours, is recommended.)

#### General education electives (5–7 hours)

#### Physical education

KIN 101	Principles of Physical Fitness .....	1
		<b>50</b>

### Professional education requirements

#### Pre-professional education

Required for admission to teacher education and prerequisite for Block I.

DED 102	Teaching as a Career .....	1
HDFS 110	Introduction to Human Development ..	3

#### Block I—Admission to teacher education required.

Courses must be taken concurrently and are a prerequisite for Block II.

EDCEP 315	Educational Psychology .....	3
EDSP 323	Exceptional Students/Secondary School .....	2
EDSEC 376	Core Teaching Skills and Lab .....	3

#### Block II—Courses must be taken concurrently and are a prerequisite for Block III.

EDSEC 476	Content Area Methods/Secondary School .....	2
EDSEC 477	Middle Level/Secondary Reading .....	2
EDSEC 420	Content and Reading Methods Lab .....	1

#### Block III—Courses must be taken concurrently.

EDCIP 455	Teaching in a Multicultural Society ....	1
EDCEP 525	Interpersonal Relations in the School ..	1
EDSEC 586	Teaching Participation/Secondary School .....	12

**Non-blocked courses**—These courses must be taken after admission to teacher education and prior to student teaching.

EDCIP 410	Foundations of Education .....	3
EDETC 318	Instructional Media and Technology ...	2
		<b>36</b>

#### Electives

Hours will vary with majors; they will bring the total hours to 126.

## Teaching Fields

### Agriculture education

For agriculture education requirements, see the section on secondary education programs outside the College of Education.

### Art education (EDART)

Students preparing for K–12 certification must complete ART 425 Art for Elementary Schools and student teaching on both the elementary and secondary levels.

ART 100	Design I .....	2
ART 190	Drawing I .....	2
ART 195	Survey of Art History I .....	3
ART 196	Survey of Art History II .....	3
ART 200	Design II .....	2
ART 210	Drawing II .....	2
ART 220	Water Color I .....	2
ART 225	Figure Drawing I .....	2
ART 230	Sculpture I .....	2
ART 235	Printmaking I .....	2
ART 245	Painting I .....	2
ART 265	Ceramics I .....	2
ART 270	Metalsmithing and Jewelry .....	2
ART 295	Photography in Art .....	2
ART 545	Twentieth Century Art History I .....	3
ART 690	Techniques in Teaching Art .....	2
Art electives .....		4

Additional hours in an area of concentration in one of the following: painting, printmaking, sculpture, metals, drawing, graphic design, or ceramics ..... **6**  
**45**

### Business education (EDBUS)

ACCTG 231	Accounting for Business Operations .....	3
ACCTG 241	Accounting for Investments and Finances .....	3
MANGT 390	Business Law I .....	3
MANGT 420	Management Concepts .....	3
MKTG 400	Marketing .....	3
GENBA 391	Administrative Communications .....	3
EDSEC 215	Information Processing .....	3
EDSEC 315	Administrative Data Applications .....	3
EDSEC 415	Administrative Support Services and Technology .....	1
EDSEC 416	Office Management .....	3
ECON 530	Money and Banking .....	3
	or	
FINAN 450	Business Finance .....	3

Select one of the following:

FINAN 460	Insurance .....	3
MANGT 440	Entrepreneurship .....	3
MANGT 466	Management Information Systems .....	4

<b>Option A: Computer literacy .....</b>	<b>8</b>
CIS 300      Algorithms and Data Structures .....	3
EDETC 718      Microcomputers in Instruction .....	2
EDETC 719      Microcomputers in Instruction Lab .....	1
EDETC 476 .....	Content Area Methods in the Secondary
School: Computers .....	2

<b>Option B: Vocational office education .....</b>	<b>7</b>
EDSEC 611    Coordination Techniques .....	1
EDSEC 612    Job Analysis .....	1
EDSEC 620    Principles and Philosophy of Vocation Education .....	3
EDSEC 701    Administration and Supervision of Vocational Education .....	2

<b>Option C: Accounting .....</b>	<b>6</b>
ACCTG .....	3
ACCTG .....	3

#### Supporting courses required

ECON 110	Principles of Macroeconomics .....	3
ECON 120	Principles of Microeconomics .....	3
CIS 110	Introduction to Personal Computing .....	3
CIS 200	Fundamentals of Computer Programming .....	3
CIS 203	Fundamentals of Computer Programming Laboratory .....	1

Select one of the following:

HDFS 105	Introduction to Personal and Family Finance .....	3
HDFS 400	Family Economics .....	3
HDFS 405	Advanced Personal and Family Finance .....	3
		<b>9</b>

**56–59**

### English (EDENG)

Two of the following four survey courses:

ENGL 361	British Survey I .....	3
ENGL 362	British Survey II .....	3

ENGL 381	American Survey I .....	3
ENGL 382	American Survey II .....	3
Required:		
ENGL 252	Introduction to Literary Studies .....	3
ENGL 350	Introduction to Shakespeare .....	3
ENGL 400	Advanced Expository Writing for Prospective Teachers .....	3
ENGL 430	The Structure of English .....	3
ENGL 490	Development of the English Language ..	3
ENGL 545	Literature for Adolescents .....	3
ENGL	World literature .....	3
ENGL	Literature electives at 600 level and above .....	6
ENGL	Composition elective (may include ENGL 500, 761, or 763) .....	3
PSYCH 650	Psychology of Language .....	3
		<b>45</b>

## English/journalism (EDENJ)

Two of the following:

ENGL 361	British Survey I .....	3
ENGL 362	British Survey II .....	3
ENGL 381	American Survey I .....	3
ENGL 382	American Survey II .....	3

Required:		
ENGL 252	Introduction to Literary Studies .....	3
ENGL 350	Introduction to Shakespeare .....	3
ENGL 430	The Structure of English .....	3
ENGL 490	Development of the English Language ..	3
ENGL 545	Literature for Adolescents .....	3
ENGL 750	Theory and Practice of Cultural Studies .....	3
Literature elective above 600 level .....		3
MC 235	Mass Communication in Society .....	3
MC 400	News and Feature Writing .....	3
MC 430	Photography I .....	3
MC 440	Editing and Design .....	3
MC 565	Law of Mass Communications .....	3
MC 605	Supervision of School Publications .....	3
PSYCH 650	Psychology of Language .....	3
		<b>48</b>

## Home economics education

For home economics requirements, see the section on secondary education programs outside the College of Education.

## Journalism (EDJOR)

MC 235	Mass Communication in Society .....	3
MC 400	News and Feature Writing .....	3
MC 430	Photography I .....	3
MC 440	Editing and Design .....	3
MC 565	Law of Mass Communications .....	3
MC 605	Supervision of School Publications .....	3

Electives (12 hours):

MC 320	Principles of Advertising .....	3
MC 360	Publications Practice .....	1-4
MC 410	Writing for the Electronic Media .....	3
MC 470	Audio I .....	3
or		
MC 480	Video I .....	3
MC 500	Advanced News and Feature Writing ....	3
MC 510	Yearbook Editing and Management .....	2
MC 540	Advanced Editing and Design .....	3
MC 555	Advertising Techniques .....	3
MC 710	History of Journalism .....	3
MC 720	Ethics in Mass Communications .....	3
		<b>30</b>

## Mathematics (EDMTH)

MATH 220	Analytic Geometry and Calculus I .....	4
MATH 221	Analytic Geometry and Calculus II .....	4
MATH 222	Analytic Geometry and Calculus III .....	4
MATH 240	Elementary Differential Equations .....	4

Approved mathematics courses numbered 300-799 (18 hours):		
MATH 312	Finite Application of Mathematics .....	3
MATH 511	Introduction to Algebraic Systems .....	3
or		
MATH 512	Introduction to Modern Algebra I .....	3
MATH 520	Foundations of Analysis .....	3
MATH 521	The Real Number System .....	3
MATH 570	History of Mathematics .....	3
MATH 572	Foundations of Geometry .....	3
MATH 791	Topics in Mathematics for Secondary School Teachers .....	3
Supporting courses required:		
STAT 320	Elements of Statistics .....	3
or		
STAT 510	Introductory Probability and Statistics I .....	3
CIS	Computer science with language course .....	3-4
		<b>40-41</b>

It is recommended that a course in physics be included as part of general education.

## Modern languages (EDMLA)

Modern language majors must demonstrate proficiency in speaking and understanding the foreign language during the semester preceding student teaching by making a satisfactory score on the Modern Language Department Oral Proficiency Interview. The interview is conducted by members of the modern language department faculty by arrangement with each individual. Students should contact the modern language education advisor for additional information.

### French

30 hours at 200 level or above to include the following:		
FREN 211	French III .....	4
FREN 213	French IV .....	3
FREN 214	French Conversation IVA .....	2
FREN 511	Masterpieces of French Literature I .....	3
FREN 512	Masterpieces of French Literature II .....	3
FREN 513	French Composition and Grammar .....	3
FREN 514	French Civilization .....	3
FREN 719	Advanced Spoken and Written French ..	3
FREN	French electives at 500 and above .....	6
		<b>30</b>

### German

30 hours at 200 level or above to include the following:		
GRMN 221	German III .....	4
GRMN 223	German IV .....	3
GRMN 224	German Conversation IVA .....	2
GRMN 521	Introduction to German Literature I .....	3
GRMN 522	Introduction to German Literature II .....	3
GRMN 523	German Composition .....	3
GRMN 530	German Civilization .....	3
GRMN 731	Advanced Spoken and Written German ..	3
GRMN	German electives at 500 and above .....	6
		<b>30</b>

### Spanish

30 hours at 200 level or above to include the following:		
SPAN 261	Spanish III .....	4
SPAN 263	Spanish IV .....	3
SPAN 264	Elementary Spanish Conversation IVA ..	2
SPAN 563	Introduction to the Literature of Spanish America .....	3
SPAN 564	Spanish Composition and Grammar .....	3
SPAN 565	Spanish Civilization .....	3
or		
SPAN 566	Hispanic-American Civilization .....	3
SPAN 567	Introduction to the Literature of Spain ..	3
SPAN 571	Advanced Spanish Conversation .....	3
SPAN	Spanish electives at 500 and above .....	6
		<b>30</b>

Certification to teach elementary school foreign language is an optional extension of secondary school certification. The following must be added to the requirements for secondary modern foreign language certification if elementary foreign language certification is desired:

EDEL 585	Teaching Participation in the Elementary School .....	Var.
EDEL 720	Foreign Language Methods for Elementary Schools (offered spring of even years) .....	3

## Natural sciences

### Biological science (EDBSC)

BIOL 198	Principles of Biology .....	4
BIOL 201	Organismic Biology .....	5
BIOL 410	Biology of the Cancer Cell .....	2
BIOL 455	General Microbiology .....	4
BIOL 303	Ecology of Environmental Problems .....	3
or		
BIOL 529	Fundamentals of Ecology .....	3
ASI 500	Genetics .....	3
or		
BIOL 400	Human Genetics .....	3
BIOL 430	Population Biology .....	4

Eight hours of biology electives. Many different biology courses may be used but it is suggested that the following courses be considered:

ENTOM 312	General Entomology .....	2
ENTOM 313	General Entomology Laboratory .....	1
BIOL 310	Bioethics .....	3
BIOL 510	Embryology .....	3
BIOL 540	Molecular Biology .....	3
BIOL 620	Evolution .....	3

Chemistry courses required:

CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
CHM 350	General Organic Chemistry .....	3
CHM 351	General Organic Chemistry Lab .....	2

Other required courses:

GEOL 130	Elementary Geology Laboratory .....	1
GEOL 512	Earth Science .....	3
PHYS 115	Descriptive Physics .....	4
MATH 100	College Algebra .....	3
MATH 150	Plane Trigonometry .....	3
MATH 312	Finite Applications of Math .....	3
STAT 320	Elements of Statistics .....	3
EDSEC 614	Lab Techniques in Teaching Science .....	3
		<b>65-66</b>

### Chemistry (EDCHM)

CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
CHM 271	Chemical Analysis .....	4
CHM 350	General Organic Chemistry .....	3
CHM 351	General Organic Chemistry Laboratory ..	2
CHM 500	General Physical Chemistry .....	3
CHM	Chemistry electives .....	5

Supporting courses required:

BIOL 198	Principles of Biology .....	4
BIOL 201	Organismic Biology .....	5
MATH 220	Analytic Geometry and Calculus I .....	4
MATH 221	Analytic Geometry and Calculus II .....	4
MATH 222	Analytic Geometry and Calculus III .....	4
or		
MATH 312	Finite Applications of Math .....	3
PHYS 113	General Physics I .....	4
PHYS 114	General Physics II .....	4
STAT 320	Elementary Statistics .....	3
EDSEC 614	Laboratory Techniques in Teaching Science .....	3
		<b>59-60</b>

Additional course recommended:

CHM 799	Problems in Chemistry .....	Var.
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It is highly recommended that additional courses be selected to fulfill requirements for an additional teaching area in biology or physics. The course selection should be made in consultation with the science education advisor.

### Earth science (EDESC)

GEOL 100	Introductory Geology .....	3
GEOL 130	Elementary Geology Laboratory .....	1
GEOL 300	Historical Geology .....	4
GEOL 502	Mineralogy .....	3
or		
GEOL 503	Petrology .....	3

GEOL 520	Geomorphology .....	2
GEOL 220	Environmental Geography I .....	4
GEOL 221	Environmental Geography II .....	4

## Supporting courses required:

BIOL 198	Principles of Biology .....	4
BIOL 201	Organismic Biology .....	5
CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
MATH 100	College Algebra .....	3
MATH 150	Plane Trigonometry .....	3
MATH 312	Finite Applications .....	3
PHYS 113	General Physics I .....	4
PHYS 114	General Physics II .....	4
PHYS 191	Descriptive Astronomy .....	3
STAT 320	Elementary Statistics .....	3
EDSEC 614	Laboratory Techniques in Teaching Science .....	3
		<b>64</b>

It is highly recommended that additional courses be selected to fulfill requirements for an additional teaching area in biology, physics, or chemistry. The course selection should be made in consultation with the science education advisor.

**Physical science (EDPSC)**

PHYS 113	General Physics I .....	4
PHYS 114	General Physics II .....	4

## Six hours physics electives selected from the following:

PHYS 191	Descriptive Astronomy .....	3
PHYS 506	Physics Laboratory I .....	3
PHYS 551	Introduction to Modern Physics .....	3
<b>or</b>		
PHYS 452	Contemporary Physics .....	4
PHYS 636	Physical Measurements Instrumentation .....	4

## Supporting courses required:

CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
CHM 350	General Organic Chemistry .....	3
CHM 351	General Organic Chemistry Laboratory .....	2
GEOL 100	Introductory Geology .....	3
GEOL 130	Elementary Geology Laboratory .....	1
GEOL 220	Environmental Geography I .....	4
GEOL 300	Historical Geology .....	4
BIOL 198	Principles of Biology .....	4
BIOL 201	Organismic Biology .....	5
MATH 220	Analytic Geometry and Calculus I .....	4
MATH 221	Analytic Geometry and Calculus II .....	4
MATH 222	Analytic Geometry and Calculus III .....	4
<b>or</b>		
MATH 312	Finite Applications of Math .....	3
STAT 320	Elementary Statistics .....	3
EDSEC 614	Laboratory Techniques in Teaching Science .....	3

**65-66****Physics (EDPHY)**

PHYS 122	Computation and Experimentation in Physics .....	3
PHYS 223	Physics I: Mechanics and Thermodynamics .....	5
PHYS 224	Relativity and Quantum Physics .....	5
PHYS 506	Physics Laboratory I .....	3
PHYS 522	Mechanics I .....	3
PHYS 532	Electricity and Magnetism I .....	3
PHYS 636	Physical Measurements Instrumentation .....	4

## Supporting courses required:

BIOL 303	Ecology of Environmental Problems .....	3
CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
MATH 220	Analytic Geometry and Calculus I .....	4
MATH 221	Analytic Geometry and Calculus II .....	4
MATH 222	Analytic Geometry and Calculus III .....	4
MATH 240	Series and Differential Equations .....	4
EDSEC 614	Laboratory Techniques in Teaching Science .....	3

**56**

## Additional courses recommended:

GEOL 100	Introduction to Geology .....	3
<b>and</b>		
GEOL 130	Elementary Geology Laboratory .....	1
<b>or</b>		
GEOL 512	Earth Science .....	3

It is highly recommended that additional courses be selected to fulfill requirements for an additional teaching area in chemistry or mathematics. The course selection should be made in consultation with the science education advisor.

**Social sciences****Economics (EDEC)**

## Required:

ECON 110	Principles of Macroeconomics .....	3
ECON 120	Principles of Microeconomics .....	3
ECON 510	Intermediate Macroeconomics .....	3
ECON 520	Intermediate Microeconomics .....	3
Fifteen hours of economics (500 level and up) .....		15

## Supporting courses required:

GEOL 100	World Regional Geography .....	3
<b>or</b>		
GEOL 440	Geography of Natural Resources .....	3
<b>or</b>		
GEOL 450	Geography of Economic Behavior .....	3
HIST 251	U.S. History to 1877 .....	3
HIST 252	U.S. History Since 1877 .....	3
MATH 100	College Algebra .....	3
POLSC 110	Introduction to Political Science .....	3
SOCIO 211	Introduction to Sociology .....	3
STAT 350	Business and Economic Statistics I .....	3
<b>or</b>		
STAT 330	Elementary Statistics for the Social Sciences .....	3

## One of the following:

ACCTG 211	Financial Accounting .....	4
MATH 205	General Calculus and Linear Algebra .....	3
MATH 220	Analytic Geometry and Calculus I .....	4
STAT 351	Business and Economics Statistics II .....	3

## Social science electives:

Additional U.S. history courses .....		6
<b>or</b>		
Additional political science courses .....		9

**57-61****Geography (EDGEO)\***

## Required:

GEOL 100	World Regional Geography .....	3
<b>or</b>		
GEOL 200	Man Space Environment .....	
GEOL 220	Environmental Geography I .....	4
GEOL 221	Environmental Geography II .....	4
GEOL 440	Geography of Natural Resources .....	3
GEOL 450	Geography of Economic Behavior .....	3
GEOL 470	Cartography .....	3

## Nine hours at specified levels:

GEOL 300	.....	3
GEOL 500	.....	3
GEOL 700	.....	3

## Supporting courses required:

HIST 101	Western Civilization: The Rise of Europe .....	3
HIST 102	Western Civilization: The Modern Era .....	3
HIST 251	History of the United States to 1877 .....	3
HIST 252	History of the United States Since 1877 .....	3
POLSC 110	Introduction to Political Science .....	3
SOCIO 211	Introduction to Sociology .....	3
STAT 330	Elementary Statistics for the Social Science .....	3

## Social science electives:

Six additional hours of U.S. history .....		6
<b>or</b>		
Nine hours of political science .....		9

**56-59**

\*A minimum of 12 hours of U.S. history, political science, or world history is required prior to student teaching.

**History (EDHST)\***

## Required:

HIST 101	Western Civilization: The Rise of Europe .....	3
HIST 102	Western Civilization: The Modern Era .....	3
HIST 251	United States History to 1877 .....	3
HIST 252	United States History Since 1888 .....	3
HIST 397	Junior Seminar .....	3
HIST 599	Senior Seminar for Secondary Teachers .....	3

Twelve hours (500 level and above) distributed in three of these fields:

Ancient medieval and early modern Europe  
Modern Europe including Britain  
The Third World (Asia, Africa, Latin America)  
The United States  
History of science, technology, and the military

## Supporting courses required:

ECON 110	Principles of Macroeconomics I .....	3
GEOL 100	World Regional Geography .....	3
POLSC 110	Introduction to Political Science .....	3
POLSC	Political science elective .....	3
SOCIO 211	Introduction to Sociology .....	3

**45**

\*A minimum of 12 hours of U.S. history, political science, or world history is required prior to student teaching.

**Political science (EDPLS)\***

## Required:

POLSC 110	Introduction to Political Science .....	3
Eighteen hours of political science courses .....		18

## Supporting courses required:

ECON 110	Principles of Macroeconomics I .....	3
GEOL 100	World Regional Geography .....	3
HIST 101	Western Civilization: The Rise of Europe .....	3
HIST 102	Western Civilization: The Modern Era .....	3
HIST 251	United States History to 1877 .....	3
SOCIO 211	Introduction to Sociology .....	3
U.S. or world history courses .....		6

**45**

\*A minimum of 12 hours of U.S. history, political science, or world history is required prior to student teaching.

**Sociology (EDSOC)\***

## Required:

SOCIO 211	Introduction to Sociology .....	3
SOCIO 520	Methods of Social Research I .....	4
SOCIO 511	Comparative Social Theories .....	3
Nine hours of sociology (400 level and above) .....		9
Nine hours of sociology (500-799) .....		9
Six hours social science electives:		
U.S. history or political science courses .....		6

## Supporting courses required:

ECON 110	Principles of Macroeconomics I .....	3
GEOL 100	World Regional Geography .....	3
HIST 102	Western Civilization: The Modern Era .....	3
HIST 251	United States History to 1877 .....	3
HIST 252	United States History Since 1877 .....	3
POLSC 110	Introduction to Political Science .....	3
POLSC	Political science electives .....	3

**55**

\*A minimum of 12 hours of U.S. history, political science, or world history is required prior to student teaching.

**Social science: U.S. history****U.S. government, and world history**

HIST 101	Rise of Europe .....	3
HIST 102	Modern Era .....	3
HIST 568	Junior Seminar .....	3
HIST	Early U.S. history course 500 level and above .....	3
HIST	Recent U.S. history course 500 level and above .....	3
POLSC 301	Introduction to Political Thought .....	3
POLSC 325	U.S. Politics .....	3
POLSC 333	World Politics .....	3
POLSC 344	Introduction to Comparative Politics .....	3

GEOG 100	World Regional Geography .....	3
ECON 110	Economics I .....	3
ECON 120	Economics II .....	3
SOCIO 211	Introduction to Sociology .....	3
ANTH 200	Introduction to Cultural Anthropology .....	3
Nine hours from the following:		
HIST 599	Senior Seminar .....	3
POLSC 400	Political Inquiry and Analysis .....	3
HIST	U.S. history 500 level and above .....	3
One non-Western social science	.....	3
HIST	One European history course 500 level and above .....	3
One social science women's studies course	.....	3
One social science American ethnic studies course	.....	3
		<b>51</b>

## Speech (EDSPH)

All speech education majors are required to complete 36 hours of speech and theatre courses in addition to SPCH 105 or 106, Public Speaking IA or I.

The following courses are required:

SPCH 325	Argumentation and Debate .....	3
SPCH 321	Public Speaking II .....	3
SPCH 330	Rhetoric in Western Thought .....	3
SPCH 426	Coaching and Directing Speech Activities .....	3
SPCH	500 level or above in general speech .....	3
or		
THTRE	500 level or above in theatre .....	3
SPCH 322	Interpersonal Communication .....	3
or		
SPCH 326	Small Group Discussion .....	3
THTRE 261	Fundamentals of Acting .....	3
THTRE 263	Oral Interpretation of Literature .....	3
THTRE 266	Technical Production I .....	3
THTRE 370	Dramatic Structure .....	3
THTRE 565	Principles of Directing .....	3
MC 235	Introduction to Mass Communications .....	3
or		
SPCH 235	Introduction to the Art of Film .....	3
		<b>36</b>

## Optional Secondary Certification Programs

Certification in one or more of these optional programs is available only to students who have successfully completed an approved full certification program in another (first or primary) teaching area.

These optional programs give individuals the opportunity to teach in more than one area. These options lead to full certification in the subject or subject area for grades 7 through 12. A cumulative 2.5 grade point average is required in all courses attempted in the subject or subject area. K-State will recommend an endorsement to the teaching certificate for any additional teaching area when all requirements have been completed, provided all requirements of the approved degree program and the secondary area of certification have also been completed.

## Art

ART 100	Design I .....	2
ART 190	Drawing I .....	2
ART 195	Survey of Art History I .....	3

ART 196	Survey of Art History II .....	3
ART 200	Design II .....	2
ART 210	Drawing II .....	2
ART 220	Water Color I .....	2
ART 230	Sculpture I .....	2
ART 235	Printmaking I .....	2
ART 245	Painting I .....	2
ART 265	Ceramics I .....	2
ART 270	Metalsmithing and Jewelry .....	2
ART 275	Weaving I .....	2
ART 295	Photography in Art .....	2
ART 545	Twentieth Century Art History I .....	3

Six additional hours in an area of concentration in one of the following: painting, printmaking, sculpture, metals, drawing, graphic design, or ceramics .....

EDSEC 476	Methods of Teaching in the Secondary Schools .....	2
		<b>41</b>

## Business

EDSEC 215	Information Processing .....	3
EDSEC 315	Administrative Data Applications .....	3
EDSEC 415	Administrative Support Services and Technology .....	1
EDSEC 416	Office Management .....	3
EDSEC 476	Methods of Teaching Business in the Secondary School .....	2
ACCTG 231	Accounting for Business Operations .....	3
ACCTG 241	Accounting for Investments and Finances .....	3
MANGT 390	Business Law I .....	3
MKTG 400	Marketing .....	3
ECON 110	Principles of Macroeconomics .....	3
ECON 530	Money and Banking .....	3
CIS 200	Fundamentals of Computer Programming .....	3
CIS 203	Fundamentals of Computer Programming Laboratory .....	1
		<b>34</b>

This prepares a student to teach typing, business law, business economics, bookkeeping, office practice, and data processing.

## Computer studies

Computer science component (a or b, followed by c)

a. CIS 200	Fundamentals of Computer Programming .....	3
CIS 203	Fundamentals of Computer Programming Laboratory .....	1
or		
b. CIS 591	Computer Science Applications .....	3
Followed by		
c. CIS 300	Algorithmic Processes .....	3

Professional knowledge component

EDSEC 476	Methods of Teaching in the Secondary School (Computer Studies) ..	2
EDETC 718	Microcomputers in Instruction .....	2
EDETC 719	Microcomputers in Instruction Lab .....	1
EDETC 786	Microcomputers in Management of Instruction .....	3
or		
CIS 110	Introduction to Personal Computing .....	3
		<b>14-15</b>

## English

Select two of the following four courses:

ENGL 361	British Survey I .....	3
ENGL 362	British Survey II .....	3
ENGL 381	American Survey I .....	3
ENGL 382	American Survey II .....	3
ENGL 350	Introduction to Shakespeare .....	3
ENGL 400	Advanced Expository Writing for Prospective Teachers .....	3
ENGL 430	The Structure of English .....	3
ENGL 490	Development of the English Language ..	3
ENGL 515	Literature and Society .....	3
ENGL 545	Literature for Adolescents .....	3

EDSEC 476	Methods of Teaching English in Secondary School .....	2
PSYCH 650	Psychology of Language .....	3
		<b>29</b>

## Journalism

MC 400	News and Feature Writing .....	3
MC 440	Editing and Design .....	3
MC 500	Advanced News and Feature Writing ....	3
MC 565	Law of Mass Communications .....	3
EDSEC 476	Methods of Teaching English/Journalism in the Secondary School .....	2
		<b>14</b>

## Health

FN 352	Concepts of Personal Health .....	3
FN 655	Community Health Programs .....	3
FN 132	Basic Nutrition .....	3
or		
FN 502	Principles of Nutrition .....	3
HDFS 412	Consumer Rights and Responsibilities ..	3
HDFS 465	You and Your Sexuality .....	3
BIOL 198	Principles of Biology .....	4
BIOL 240	Structure and Function of the Human Body .....	6
PSYCH 202	Drugs and Behavior .....	2
EDSEC 476	Methods of Teaching Health in the Secondary School .....	2
EDSEC 576	Safety Education .....	2
		<b>31</b>

(First aid and CPR certification is also required)

## Mathematics

MATH 220	Analytic Geometry and Calculus I .....	4
MATH 221	Analytic Geometry and Calculus II .....	4
MATH 222	Analytic Geometry and Calculus III .....	4
MATH 572	Foundations of Geometry .....	3
MATH 511	Introduction to Algebraic Systems .....	3
or		
MATH 512	Introduction to Modern Algebra .....	3

Six semester hours of electives chosen from the following:

MATH 240	Elementary Differential Equations .....	4
MATH 570	History of Mathematics .....	3
MATH 312	Finite Applications of Mathematics .....	3
MATH 520	Foundations of Analysis .....	3
MATH 521	The Real Number System .....	3

Supporting courses required:

STAT 320	Elements of Statistics .....	3
CIS	Computer Science with Language Course .....	3-4
EDSEC 476	Methods of Teaching Mathematics in the Secondary School .....	2
		<b>32-33</b>

A supporting course in physics is recommended.

## General mathematics

MATH 100	College Algebra .....	3
MATH 308	Topics in Mathematics for Elementary School Teachers .....	4
or		
MATH 521	The Real Number System .....	3
MATH 205	General Calculus and Linear Algebra ...	3
MATH 312	Finite Applications in Mathematics .....	3
MATH 570	History of Mathematics .....	3
MATH 572	Foundations of Geometry .....	3
EDSEC 476	Methods of Teaching Secondary School Mathematics .....	2
STAT 320	Elements of Statistic .....	3
CIS	Computer Science with Language .....	3-4
		<b>26-28</b>

## Modern foreign language

Students seeking modern language endorsement must demonstrate proficiency in speaking and understanding the foreign language during the semester preceding student

teaching by making a satisfactory score on the Modern Language Department Oral Proficiency Interview. The interview is conducted by members of the modern language department faculty by arrangement with each individual. Contact the modern language education advisor for additional information.

### French

FREN 211	French III .....	4
FREN 213	French IV .....	3
FREN 214	French Conversation IVA .....	2
FREN 511	Masterpieces of French Literature I .....	3
	<b>or</b>	
FREN 512	Masterpieces of French Literature II .....	3
FREN 513	French Composition and Grammar .....	3
FREN 514	French Civilization .....	3
FREN	French electives at 500 or above .....	6
EDSEC 476	Methods of Teaching Foreign Language in the Secondary School .....	2
		<b>26</b>

### German

GRMN 221	German III .....	4
GRMN 223	German IV .....	3
GRMN 224	German Conversation IVA .....	2
GRMN 521	Introduction to German Literature I .....	3
	<b>or</b>	
GRMN 522	Introduction to German Literature II .....	3
GRMN 523	German Composition .....	3
GRMN 530	German Civilization .....	3
GRMN	German electives at 500 or above .....	6
EDSEC 476	Methods of Teaching Foreign Language in the Secondary School .....	2
		<b>26</b>

### Spanish

SPAN 261	Spanish III .....	4
SPAN 263	Spanish IV .....	3
SPAN 264	Elementary Spanish Conversation IVA .....	2
SPAN 564	Spanish Composition and Grammar .....	3
SPAN 565	Spanish Civilization .....	3
	<b>or</b>	
SPAN 566	Hispanic-American Civilization .....	3
SPAN	Spanish electives at 500 or above .....	6
SPAN 563	Spanish-American Masterpieces .....	3
	<b>or</b>	
SPAN 567	Spanish Masterpieces .....	3
EDSEC 476	Methods of Teaching Foreign Language in the Secondary School .....	2
		<b>26</b>

### Modern foreign language elementary school

Certification to teach elementary school foreign language is an optional extension of secondary school certification. The following must be added to the requirements for secondary modern foreign language certification:

EDSEC 720	Foreign Language Methods for Elementary Schools (offered spring of even years) .....	3
EDSEC 585	Teaching Participation in the Elementary School .....	Var.

## Natural science

### Biology

Core:		
BIOL 198	Principles of Biology .....	4
BIOL 201	Organismic Biology .....	5
BIOL 303	Ecology of Environmental Problems .....	3
	<b>or</b>	
BIOL 529	Fundamentals of Ecology .....	3
CHM 110	General Chemistry .....	5
	<b>or</b>	
CHM 210	Chemistry I .....	4
EDSEC 614	Laboratory Techniques in Teaching Science .....	3
EDSEC 476	Methods of Teaching Science in the Secondary School .....	2

Plus a minimum of 8 semester hours chosen from the following:

BIOL 310	Bioethics .....	3
ENTOM 312	General Entomology .....	2
ENTOM 313	General Entomology Laboratory .....	1
BIOL 410	Biology of the Cancer Cell .....	2
BIOL 430	Population Biology .....	4
	<b>or</b>	
ASI 500	Genetics .....	3
	<b>or</b>	
BIOL 400	Human Genetics .....	3
BIOL 455	General Microbiology .....	4
MATH 100*	College Algebra .....	3
MATH 150*	Plane Trigonometry .....	3
MATH 312*	Finite Applications of Math .....	3

**38-39**

\*Higher-level math courses may meet this requirement.

Other biology department courses may be considered for meeting the above requirements. It is important that they be approved in advance by a science education advisor, however, since most biology courses are designed to meet the needs of curricula other than the classical natural sciences and would *not* satisfy the requirements.

Highly recommended, but not required:

CHM 230	Chemistry II .....	4
PHYS 115	Descriptive Physics .....	4
GEOL 512	Earth Science .....	3

### Chemistry

CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
CHM 350	General Organic Chemistry .....	3
CHM 352	General Organic Chemistry Lab .....	2
BIOL 198	Principles of Biology .....	4
PHYS 113	General Physics I .....	4
	<b>or</b>	
PHYS 115	Descriptive Physics .....	4
EDSEC 614	Laboratory Techniques in Teaching Science .....	3
EDSEC 476	Methods of Teaching Science in the Secondary School .....	2
MATH 100*	College Algebra .....	3
MATH 150*	Plane Trigonometry .....	3
MATH 312*	Finite Applications of Math .....	3

\*Higher-level math courses may meet this requirement.

Plus a minimum of 3 semester hours chosen from the following:

BIOL 201	Organismic Biology .....	5
CHM 500	General Physical Chemistry .....	3
GEOL 512	Earth Science .....	3
GEOL 100	Introductory Geology .....	3
PHYS 114	General Physics II .....	4
PHYS 191	Descriptive Astronomy .....	3

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Other natural science courses may be considered for meeting the above requirements. It is important that they be approved in advance by a science education advisor, however, since most science courses are designed to meet the needs of curricula other than the classical natural sciences and would *not* satisfy the requirements.

### Earth science or space science

Core:		
GEOL 100	Introductory Geology .....	3
GEOL 130	Elementary Geology Laboratory .....	1
GEOL 300	Historical Geology .....	4
BIOL 198	Principles of Biology .....	4
CHM 210	Chemistry I .....	4
GEOG 220	Environmental Geography I .....	4
PHYS 113	General Physics I .....	4
	<b>or</b>	
PHYS 115	Descriptive Physics .....	4
EDSEC 614	Laboratory Techniques in Teaching Science .....	3
EDSEC 476	Methods of Teaching Science in the Secondary School .....	2

Plus a minimum of one course chosen from the following:

GEOL 221	Environmental Geography II .....	4
GEOL 502	Mineralogy .....	3
	<b>or</b>	
GEOL 503	Petrology .....	3

GEOL 520	Geomorphology .....	2
GEOL 105	Oceanography .....	3
PHYS 191	Descriptive Astronomy .....	3
MATH 100*	College Algebra .....	3
MATH 150*	Plane Trigonometry .....	3
MATH 312*	Finite Applications of Math .....	3

**40-42**

\*Higher-level math courses may meet this requirement.

Other geology or physics courses may be considered for meeting the above requirements. It is important that they be approved in advance by a science education advisor, however, since most science courses are designed for curricula other than the classical natural sciences and would not satisfy the requirements.

### General science

Core:		
BIOL 198	Principles of Biology .....	4
CHM 110	General Chemistry .....	5
	<b>or</b>	
CHM 210	Chemistry I* .....	4
GEOL 100	Introductory Geology .....	3
	<b>and</b>	
GEOL 130	Elementary Geology Lab .....	1
	<b>or</b>	
Earth science	.....	3
GEOL 512	Earth Science .....	3
PHYS 113	General Physics I .....	4
	<b>or</b>	
PHYS 115	Descriptive Physics .....	4
EDSEC 614	Laboratory Techniques in Teaching Science .....	3
EDSEC 476	Methods of Teaching Science in the Secondary School .....	2

**20-22**

\*Required for chemistry and physics options.

The core and one of the following options must total a minimum of 27 semester hours.

#### Biology option

BIOL 201	Organismic Biology .....	5
BIOL 303	Ecology of Environmental Problems .....	3
	<b>or</b>	
BIOL 529	Fundamentals of Ecology .....	3

#### Chemistry option

CHM 230	Chemistry II .....	4
CHM 271	Chemical Analysis .....	4
	<b>or</b>	
CHM 350	General Organic Chemistry .....	3
	<b>and</b>	
CHM 351	General Organic Chemistry Lab .....	2

#### Physics option

A minimum of 12 hours		
PHYS 114	General Physics II .....	4
PHYS	One physics course that has Physics II as a prerequisite	
PHYS	Additional physics courses necessary to bring <i>option</i> total to 12 hours.	

#### Earth science option

GEOL 300	Historical Geology .....	4
At least two courses selected from the following:		
GEOL 105	Oceanography .....	3
GEOL 502	Mineralogy .....	3
GEOL 503	Petrology .....	3
GEOL 520	Geomorphology .....	2
PHYS 191	Descriptive Astronomy .....	3
MATH 100*	College Algebra .....	3
MATH 150*	Plane Trigonometry .....	3
MATH 312*	Finite Applications of Math .....	3
STAT 320	Elements of Statistics .....	3

\*Higher-level math courses may meet this requirement.

Other natural science courses may be considered for meeting the above requirements. It is important that they be approved in advance by a science education advisor, however, since most science courses are designed to meet the needs of curricula other than the classical natural science and would *not* satisfy the requirements.

**Physics**

BIOL 198	Principles of Biology .....	4
	<b>or</b>	
BIOL 201	Organismic Biology .....	5
CHM 210	Chemistry I .....	4
PHYS 113	General Physics I .....	4
PHYS 114	General Physics II .....	4
PHYS 452	Contemporary Physics .....	4
GEOL 512	Earth Science .....	3
GEOL 440	Geography of Natural Resources .....	3
	<b>or</b>	
BIOL 303	Ecology of Environmental Problems .....	3
	<b>or</b>	
BIOL 310	Bioethics .....	3
MATH 100*	College Algebra .....	3
MATH 210*	Technical Calculus .....	3
MATH 312*	Finite Applications of Math .....	3
EDSEC 476	Methods of Teaching Science in the Secondary School .....	2
EDSEC 614	Laboratory Techniques in Teaching Science .....	3
		<b>40-41</b>

\*Higher-level courses may meet this requirement.

Other natural science courses may be considered for meeting the above requirements. It is important that they be approved in advance by a science education advisor, however, since most science courses are designed to meet the needs of curricula other than the classical natural sciences and would *not* satisfy the requirements.

**Physical science**

PHYS 113	General Physics I .....	4
	<b>or</b>	
PHYS 115	Descriptive Physics .....	4
CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
BIOL 198	Principles of Biology .....	4
GEOL 100	Introductory Geology .....	3
GEOL 130	Elementary Geology Lab .....	1
GEOL 300	Historical Geology .....	4
MATH 100*	College Algebra .....	3
MATH 210*	Technical Calculus I .....	3
MATH 312*	Finite Applications of Math .....	3
EDSEC 614	Laboratory Techniques in Teaching Science .....	3
EDSEC 476	Methods of Teaching Science in the Secondary School .....	2
		<b>38</b>

\*Higher-level courses may meet this requirement.

**Physical education**

KIN 325	History and Philosophy of Physical Education .....	3
	<b>or</b>	
KIN 340	Social and Psychological Dimensions of Physical Activity .....	3
Required:		
KIN 225	Individual and Dual Sports for Secondary Schools .....	2
KIN 230	Team Sports for Secondary Schools .....	2
KIN 315	Treatment of Athletic Injuries .....	3
KIN 320	Motor Development and Learning .....	3
KIN 330	Biomechanics .....	3
KIN 335	Physiology of Exercise .....	3
KIN 510	Measurement and Research Techniques in Kinesiology .....	3
KIN 561	Adapted Physical Education .....	3
EDSEC 359	Administration of Physical Education, Athletic, and Intramural Programs .....	3
EDSEC 410	Gymnastics and Aquatics in Physical Education .....	3
EDSEC 421	Rhythms in Physical Education .....	3
EDSEC 476	Methods of Teaching Physical Education in the Secondary School .....	2
First Aid and CPR*		<b>36</b>

\*Current first aid and CPR certification required at time of petition.

Students are advised to include the following courses in their general education requirements. These courses are prerequisites to the requirements listed above.

SOCIO 211	Introduction to Sociology .....	3
STAT 320	Elements of Statistics (Pr.: MATH 100) .....	3
BIOL 198	Principles of Biology .....	4
BIOL 240	Structure and Function of the Human Body .....	6

**Psychology**

PSYCH 110	General Psychology .....	3
PSYCH 350	Experimental Methods in Psychology ...	5
PSYCH 520	Life Span Personality Development .....	3
PSYCH 535	Social Psychology .....	3
PSYCH 460	Cognitive Psychology .....	3
	<b>or</b>	
PSYCH 475	Principles of Learning .....	3
	<b>or</b>	
PSYCH 480	Fundamentals of Perception and Sensation .....	3

Supporting courses required:

STAT 320	Elements of Statistics .....	3
	<b>or</b>	
STAT 330	Elementary Statistics for the Social Sciences .....	3
EDCEP 715	Principles of Measurement .....	3
EDSEC 476	Methods of Teaching Social Science in the Secondary School .....	2
		<b>25</b>

**Social science**

The following three social science teaching fields may be completed only in conjunction with U.S. history, world history, and U.S. government.

**Anthropology and sociology**

ANTH 260	Introduction to Archaeology .....	3
SOCIO 540	Social Organization .....	3
SOCIO 550	Introduction to Social Interaction .....	3
Select one of the following:		
ANTH 220	Introduction to Linguistics Anthropology .....	3
ANTH 508	Male and Female: Cross-Cultural Perspectives .....	3
ANTH 519	Practical Anthropology .....	3
SOCIO 530	Population: Human Ecology .....	3
ANTH 532-550	Ethnography courses .....	3
ANTH 604	Culture and Personality .....	3
SOCIO 640	Sociology of the Family .....	3
		<b>12</b>

**Geography**

GEOL 500	Geography of the United States .....	3
Select one of the following:		
GEOL 440	Geography of Natural Resources .....	3
GEOL 450	Geography of Economic Behavior .....	3

One 600-level regional geography course or one 700-level systematic geography course (course 710 through 780) ... **3**  
**9**

**Economics**

ECON 510	Intermediate Macroeconomics .....	3
ECON 520	Intermediate Microeconomics .....	3
ECON 530	Money and Banking .....	3
ECON 636	Capitalism and Socialism .....	3
		<b>12</b>

**Social science comprehensive**

The following must be used in conjunction with the teaching fields of economics, geography, history, political science, or sociology.

HIST 599	Senior Seminar .....	3
HIST 102	Modern Era .....	3
HIST 101	Western Civilization: The Rise of Europe .....	3
HIST 251	United States History to 1877 .....	3

HIST 252	United States History Since 1877 .....	3
ECON 110	Principles of Macroeconomics .....	3
GEOL 100	World Regional Geography .....	3
POLSC 110	Introduction to Political Science .....	3
POLSC 325	U.S. Politics .....	3
SOCIO 211	Introduction to Sociology .....	3
ANTH 200	Introduction to Cultural Anthropology ..	3
HIST	History courses (300 or above) .....	9
POLSC	Political science courses (300 or above) .....	3
One course in economics or geography or sociology .....		3
EDSEC 476	Methods of Teaching Social Studies in the Secondary School .....	2
		<b>50</b>

Satisfactory completion of this program will qualify a person to be certified to teach American history, world history, economics, geography, political science, and sociology.

**Speech**

SPCH 321	Public Speaking II .....	3
THTRE 263	Oral Interpretation of Literature .....	3
SPCH 426	Coaching and Directing Speech Activities .....	3
SPCH 325	Argumentation and Debate .....	3
THTRE 160	Introduction to Theatre .....	3
SPCH 322	Interpersonal Communications .....	3
	<b>or</b>	
SPCH 326	Small Group Discussion .....	3
EDSEC 476	Methods of Teaching Speech in the Secondary School .....	2
		<b>20</b>

## Secondary Education Programs Outside the College of Education

The general education requirements as outlined in an earlier section must be completed by all students expecting to be certified to teach with the exception of students in agriculture. Students in these fields should see their academic advisor for specific requirements.

Students who pursue degrees in certifiable majors in the College of Arts and Sciences are responsible for satisfying all the requirements for teacher education as well as the degree requirements of arts and sciences.

**Agricultural education (AED)**

Students planning to be agricultural education teachers must complete the approved teacher certification program as part of the requirement for the bachelor of science in agricultural education in the College of Agriculture. Completion of this program satisfies state of Kansas program requirements for agricultural education certification for grades 7-12.

**Professional education requirements**

EDSEC 400	Leadership and Personal Development in Agricultural Education .....	1
EDSEC 503	Teaching Adult Classes in Agriculture ..	1
EDSEC 505	Field Experiences in Agricultural Education .....	1
EDSEC 620	Principles and Philosophy of Vocational Education .....	3
EDSEC 621	Program Planning in Vocational Education .....	3
HDFS 110	Introduction to Human Development ..	3
ATM 659	Agricultural Mechanic Methods .....	3

The following courses must be completed before admission to the professional semester:

EDSEC 300	Introduction to Agricultural Education .....	1
EDCEP 315	Educational Psychology .....	3
EDSP 323	Exceptional Students in the Secondary School .....	3
EDSEC 376	Core Teaching Skills and Lab .....	3
EDSEC 477	Middle Level/Secondary Reading .....	2
EDSEC 420	Block II Lab Content and Reading Methods .....	1
EDETC 318	Instructional Media and Technology ...	2

**Professional semester (see information earlier for specific prerequisites)**

EDCIP 455	Teaching in a Multicultural Society ....	1
EDCEP 525	Interpersonal Relations in the Schools ..	1
EDSEC 476	Content Area Methods in the Secondary School: Agricultural Education .....	2
EDSEC 586	Teaching Participation in the Secondary Schools and Professional Development Seminar .....	10
		<b>44</b>

## Home economics education (HED)

Students planning to be vocational home economics teachers must complete the approved teacher certification program as part of the requirements for the bachelor of science in human ecology degree program in the College of Human Ecology, home economics education. Completion of this program satisfies state of Kansas program requirements for vocational home economics certification for grades 7–12.

**Professional education requirements**

DED 120	Teaching as a Career .....	1
HDFS 110	Introduction to Human Development...	3

The following courses must be completed before entry into the professional semester:

EDCEP 315	Educational Psychology .....	3
EDSP 323	Exceptional Students in the Secondary School .....	2
EDSEC 376	Core Teaching Skills and Lab .....	3
EDSEC 420	Content and Reading Methods Lab .....	1
EDSEC 476	Content Area Methods in Secondary School: Home Economics Education ..	2
EDSEC 620	Principles and Philosophy of Vocational Education .....	3
EDETC 318	Instructional Media and Technology ...	2
EDSEC 477	Middle Level/Secondary Reading .....	2
EDSEC 710	Occupational Home Economics .....	2

**Professional semester (see information earlier for specific prerequisites):**

EDCEP 525	Interpersonal Relations in the School ..	1
EDCIP 455	Teaching in a Multicultural Society ....	1
EDSEC 621	Program Planning in Vocational Education .....	2
EDSEC 586	Teaching Participation in Secondary School .....	12
		<b>40</b>

## Music education (MUSED)

Students planning to be music teachers must complete the approved teacher certification program as part of the requirements for the bachelor of music education in the College of Arts and Sciences. Completion of this program satisfies state of Kansas program requirements for certification for grades K–12.

The following course is required for admission to teacher education:

DED 102	Teaching as a Career .....	1
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The following course may be taken before the student is admitted to teacher education:

HDFS 110	Introduction to Human Development ..	3
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The application for admission to a teacher education program must be filed and approved before a student may enroll in any of the following courses which must be completed before entry into the professional semester. Refer to an earlier section for specific requirements for admission to teacher education.

EDETC 318	Instructional Media and Technology ...	2
MUSIC 511	Music in the Schools K–6 .....	4
MUSIC 512	Music in the Junior/Senior High School .....	4
EDCEP 315	Educational Psychology .....	3
EDSP 323	Exceptional Students in the Secondary School .....	2
EDCIP 410	Foundations of Education .....	3
EDCEP 525	Interpersonal Relations in the School ..	1
EDSEC 376	Core Teaching Skills and Lab .....	3
EDCIP 455	Teaching in a Multicultural Society ....	1
EDSEC 477	Middle Level/Secondary Reading .....	2
MUSIC 670	Advanced Studies in Music Education ..	2

Professional semester (see information earlier for specific prerequisites):

EDSEC 582	Teaching Participation in Music* .....	12
		<b>43</b>

\*A full semester of student teaching is required in music education.

## Early childhood education

Bachelor of science in human development and family studies

Minimum of 125 hours required

Early childhood certification, birth to kindergarten eligibility

Students planning to be certified as early childhood teachers must complete the approved program in early childhood education in the College of Human Ecology, Department of Human Development and Family Studies.

The general education requirements as outlined in an earlier section must be completed. Reference should be made to the section Admission to Teacher Education at the beginning of the College of Education section of this catalog.

## Speech–language pathologist and school audiologist

The speech pathology–audiology program at K-State meets the requirements for the Certificate of Clinical Competence of the American Speech–Language–Hearing Association, and the Kansas Department of Education requirements for speech–language pathologist and school audiologist. The approved program requires both undergraduate- and graduate-level course work in the speech department of the College of Arts and Sciences resulting in the M.A. degree from the Graduate School. Students interested in the program are encouraged to obtain an advisor in the speech pathology/audiology program, Department of Speech, as early as possible. However, late entry into the program as a junior or senior is possible.

# General Courses

## General courses in education

**DED 010. Introduction to the Honors Program.** (0) I, II. Direction and goals for the honors program in the College of Education. Meets twice during the semester. Pr.: Nine hours of college work completed.

**DED 020. Honors Program.** (0) I, II. All students accepted into the College of Education honors program must

enroll each semester. Pr.: Sophomore or higher standing, 3.5 cumulative grade point average, acceptance into the honors program.

**DED 051. Study Skills Laboratory.** (1–3) I, II. Helps the student to learn effective study methods, analyze difficulties in reading and studying, and prepare for and improve performance in examinations.

**DED 100. Pre-Professional Laboratory Experiences.** (1) I, II. Supervised experiences in education designed to facilitate orientation and investigation of teaching through the teacher aide program. Maximum credit of 3 hours. No more than 1 credit per semester.

**DED 102. Teaching as a Career.** (1) I, II. Introduction to teaching as a career and to teacher preparation. Includes visits to and teacher aiding in public school classrooms with emphasis on the teacher's role. For lower-division students not yet admitted to teacher education.

**DED 105. Introduction to Women's Studies.** (3) I, II. A systematic introduction to women's studies as an academic discipline, drawing research from humanities, social science, education, human ecology, and management to analyze images of women, status of women, sex differences, gender roles and stereotypes, patterns of success, women and relationships, current controversial issues affecting women, and feminism as a social and historical movement. An academic perspective on issues of equality and justice for women, emphasizing scholarship on how women perceive their own lives.

**DED 160. Introduction to American Ethnic Studies.** (3) I. This course introduces students to the major concepts related to ethnicity and to some of the major American ethnic groups.

**DED 315. Introduction to Gerontology.** (3) II. A multidisciplinary introduction to the field of aging. Examines social, psychological, developmental, organizational, and economic aspects of aging. Theoretical, methodological, and applied issues of aging will be related to contemporary American society. Same as DAS 315; also offered through the Colleges of Agriculture, Architecture and Design, and Human Ecology.

**DED 320. Honors Seminar.** (1) I, II. Selected topics in education. May be taken more than once for credit. For students in honors program only.

**DED 405. Senior Seminar in Women's Studies.** (3) I. An intercollegiate, interdisciplinary course organized topically with students presenting papers which draw upon previous and concurrent academic experience and which approach a given topic with a consistent focus on the role of women. Provides supervised independent study and subsequent discussion, allowing students to integrate and order their perceptions about the unique roles, problems, and contributions of women. Pr.: DED 105 Introduction to Women's Studies and 15 hours of women's studies courses.

**DED 415. Senior Seminar in Gerontology.** (3) I. Integration of course work in gerontology with an in-depth project in a special interest area. Pr.: Completion of 15 hours of course work in gerontology second major. Same as DAS 315; also offered through the Colleges of Agriculture, Architecture and Design, and Human Ecology.

**DED 420. Honors Research.** (1–3) I, II. Individual research projects under the supervision of a professor in the College of Education. For students in honors program only. Pr.: A minimum of 2 hours credit in DED 320 or 1 hour credit in DED 320 and 1 hour selected from GENAG 310, DAS 399, GNHE 399.

**DED 499. Senior Seminar in American Ethnic Studies.** (3) Guided research in American ethnic studies. Students prepare a research paper on a relevant subject of their choice. Each student is responsible for arranging to work with a member of the American ethnic studies faculty. Pr.: DED 160 Introduction to American Ethnic Studies.

**DED 500. Topics in Women's Studies.** (Var.) I, II, S. Exploration of an interdisciplinary topic in women's studies. Cross-listed with the Dean of Human Ecology and the Dean of Arts and Sciences.

**DED 505. Independent Study in Women's Studies.** (1–3) I, I. Independent, interdisciplinary, supervised studies in an area of women's studies which does not fall within the boundaries of a traditional department. May be repeated

once for credit with change of topic. Pr.: Junior standing, consent of instructor(s), and approval of women's studies faculty.

**DED 506. Contemporary Feminist Frameworks.** (3) I. Surveys major contemporary U.S. theories of gender and their development, including impact of feminist movement on the development of theory, interactions of race and gender, women's culture, and men's roles. Compares approaches of social sciences and humanities. Pr.: Six semester hours women's studies.

**DED 560. Topics in American Ethnic Studies.** (1-4) I or II. Selected topics of special interest in American ethnic studies. Repeatable with change of topic. Pr.: DED 160 Introduction to American Ethnic Studies. Cross-listed with the Dean of Human Ecology and the Dean of Arts and Sciences.

## Counseling and Educational Psychology

Peggy Dettmer, Chair

Professors Benton,\* Bradley,\* Dettmer,\* Hanna,\* M. Holen,\* Hoyt,\* Neely,\* Newhouse,\* Newton,\* and Sinnett;\* Associate Professors Dannels,\* Lynch,\* and Steffen;\* Assistant Professors Butler and Hughey;\* Courtesy appointments: Cashin,\* Rowlett, Sanderson, Scott, and Werring; Emeritus: Danskin and Kaiser.

The Department of Counseling and Educational Psychology contributes to the undergraduate teacher preparation program through its offerings in educational psychology and interpersonal relations in schools.

## Counseling and educational psychology courses

### Undergraduate credit

**EDCEP 111. The University Experience.** (1-3) I, II. Introduction to the university experience through participation in weekly small group meetings and informational lectures. Study of such topics as academic skills, including communication and critical thinking, academic and career planning and goal setting, and social issues that challenges many college students. Pr.: New students or instructor consent.

**EDCEP 211. Leadership Training Seminar.** (2) I, II. 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.

**EDCEP 215. Educational Implications of Growth and Development.** (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.

**EDCEP 311. Interaction and Guidance for the Paraprofessional.** (3) I, II. Application of a systematic approach to interaction skills in a paraprofessional helping relationship. Includes background knowledge of listening skills and practice in emitting skills which influence interaction quality. Pr.: Junior standing.

**EDCEP 315. Educational Psychology.** (3) I, II, S. The application of psychological principles to the teaching-learning process with special emphasis on principles of learning, motivation, information processing, individual differences, and measurement. Pr.: Admission to teacher

education, and HDFS 110. Secondary education students must take this course simultaneously with EDSP 323 and EDECEP 376.

### Undergraduate and graduate credit in minor field

**EDCEP 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.

**EDCEP 525. Interpersonal Relations in the Schools.** (1) I, II. A didactic and experiential course designed to develop an understanding of human relations skills in the schools. Provides knowledge and skills necessary to work effectively with students, parents, and school personnel. Particular emphasis is on the basis for interpersonal relations in education, communication skills, the facilitative relationship, working with students in groups, and conducting meetings with parents and school personnel. Pr.: EDSEC 420, 476, and 477. Simultaneous enrollment required for EDCIP 455, EDCEP 525, and EDSEC 586.

### Undergraduate and graduate credit

**EDCEP 711. Middle School Classroom Guidance.** (3) On sufficient demand. Techniques of integrating guidance principles for pre- and early teens into a middle school concept; investigation of classroom dynamics for middle school teachers as members of the guidance team; involvement of teachers in model guidance programs. Pr.: EDCEP 315.

**EDCEP 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.: EDCEP 315.

**EDCEP 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 HDFS 110.

**EDCEP 775. Readings in Education.** (1-3) I, II, S. Readings in research and application in specialized areas in education. May be taken more than once. Pr.: HDFS 110.

**EDCEP 786. Topics in Education.** (1-3) I, II, S. Examination of current topic in specialization of faculty. Varied topics offered each semester so course may be repeated. Pr.: HDFS 110.

**EDCEP 795. Problems in Education.** 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.

## Educational Administration

G. Kent Stewart, Chair

Professors Bailey,\* Shoop,\* Stewart,\* and Wilson;\* Associate Professor Thompson;\* Assistant Professor Campbell; Other: Livingston,\* Emeritus: Keys.

## Educational administration courses

### Undergraduate and graduate credit in minor field

**EDADM 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.

### Undergraduate and graduate credit

**EDADM 775. Readings in Education.** (1-3) I, II, S. Readings in research and application in specialized areas in education. May be taken more than once. Pr.: HDFS 110.

**EDADM 786. Topics in Education.** (1-3) I, II, S. Examination of current topic in specialization of faculty. Varied topics offered each semester so course may be repeated. Pr.: HDFS 110.

**EDADM 795. Problems in Education.** 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.

## Elementary Education

Ray Kurtz, Chair

Professors Burden,\* Kurtz,\* Schell,\* and Staver;\* Associate Professors Fallin,\* Heller,\* Perl,\* and Smith;\* Assistant Professors Hancock,\* K. Holen, Kellstrom, Shroyer, and Simons; Others: Borchers; Emeriti: Bloomquist, Brookhart, Craig, McAnarney, and Trennepohl.

The Department of Elementary Education offers a four-year program leading to certification in the elementary school. The program prepares students for teaching kindergarten through the ninth grade. The studies for the bachelor's degree include three areas: general education, professional education, and area of concentration.

## Elementary education courses

### Undergraduate credit

**EDEL 218. Elementary Teacher Education Colloquium.** (1-2) On sufficient demand. Discussion, assigned readings, and lectures over selected trends, developments, and problems in the field of teaching.

**EDEL 220. Orientation to Elementary/Middle School.** (1) I, II. Orientation to the undergraduate elementary/middle school teacher preparation program including field experiences and general information relative to the education profession.

**EDEL 300. Principles of Elementary Education.** (3) I, II. An overall view of the elementary school: organization, management, purpose, curriculum trends, and pupil characteristics. Pr.: EDEL 220.

**EDEL 379. Elementary/Middle-Level Physical Education Methods.** (2) I, II. Materials, techniques, and programs in physical education suitable for the developmental levels in the elementary and middle school. Two contact hours required and two hours of lab per week. Pr.: Sophomore standing and EDEL 220.

**EDEL 405. Middle-Level Education.** (3) I. This course provides an overview of the characteristics of middle schools; the social, psychological, and physical characteristics of early adolescent development; middle-level curriculum; ways to organize for instruction; and the teacher's role in the guidance of students at the middle level. Cross-listed with EDSEC 405. Pr.: Admission to teacher education.

**EDEL 420. Block A Clinical Experience.** (1) I, II. Application of media/technology, mathematics, and science methods at the elementary/middle school level. Pr.: Admission to teacher education and conc. enrollment in EDEL 470, 473, and EDETC 318.

**EDEL 430. Block B Practicum.** (1) I, II. A field experience designed to give students opportunities in applying teaching methods in language arts, reading, and social studies. Pr.: Admission to teacher education and conc. enrollment in EDEL 471, 472, and 474.

**EDEL 445. Movement Exploration and Creative Dance for Children.** (3) I. Application of scientific principles to the teaching of basic movement concepts and creative dance for grades K–6. Emphasis upon a guided discovery and problem-solving approach. One hour lec. and four hours lab a week. Pr.: KIN 320, 330, and 335 (or any two and conc. enrollment in the third).

**EDEL 469. Physical Education in Elementary Schools.** (3) I, II. Methods of teaching and organization of materials in a progression for an elementary physical education program. Pr.: Admission to teacher education, KIN 206, and at least two courses from the elementary physical education specialization.

**EDEL 470. Elementary/Middle-Level Science Methods.** (3) I, II. An introduction to the principles and methods of teaching science in the elementary and middle school, including the nature of science, student learning, curriculum, instructional methods and activities, equity issues, and student assessment. Pr.: Admission to teacher education.

**EDEL 471. Elementary/Middle-Level Language Arts Methods.** (3) I, II. An introduction to the content, methods, and materials of the elementary and middle school language arts curriculum, which encompasses oral language, listening, reading, and writing. Pr.: Admission to teacher education.

**EDEL 472. Elementary/Middle-Level Social Studies Methods.** (3) I, II. Methods and resources for teaching social studies in elementary and middle schools with the goal of helping elementary and middle school students develop the ability to make informed and reasoned decisions for the public good as citizens of a culturally diverse, democratic society in an independent world. Pr.: Admission to teacher education.

**EDEL 473. Elementary/Middle-Level Mathematics Methods.** (3) I, II. The teaching of mathematics in the elementary and middle school, including the nature of mathematical processes, curriculum, methods of instruction, instructional materials, and the evaluation of outcomes. Pr.: Admission to teacher education.

**EDEL 474. Elementary/Middle-Level Reading Methods.** (3) I, II. An introduction to the objectives, content, methods, and resources of the total reading program in the elementary and middle school. Pr.: Admission to teacher education.

### Undergraduate and graduate credit in minor field

**EDEL 502. Independent Study in Education.** (1–3) I, II, S. Selected topics in professional education. Maximum of 3 hours applicable toward degree requirements. Pr.: Consent of department head.

**EDEL 585. Teaching Participation in the Elementary School.** (Var.) I, II. Observation and teaching participation under the direction of selected elementary teachers. Pr.: EDEL 300, 470, 471, 472, 473, 474, and admission to student teaching. Conc. successful completion of EDEL 600 required.

### Undergraduate and graduate credit

**EDEL 600. Reading with Practicum.** (3) I, II. Supervised observation and teaching of reading in approved school classrooms. Pr.: EDEL 474 or teaching experience. May not apply to reading specialist endorsement.

**EDEL 717. Corrective Reading Instruction.** (1–3) On sufficient demand. Supervised tutoring of children with reading difficulties. Not open to students with credit in EDEL 847. Pr.: Student teaching experience.

**EDEL 720. Foreign Language Methods for Elementary Schools.** (3) On sufficient demand. Methods of teaching and organization of materials for the foreign language pro-

gram in the elementary school. Pr.: Educational Psychology II, 24 hours in the foreign language, and conc. enrollment in either Preprofessional Lab (DED 100, 1 cr.) or Teaching Participation in the Elementary School (EDEL 585, 4 cr.).

**EDEL 739. Environmental Education.** (1–3) On sufficient demand. 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 course in environmental studies.

**EDEL 775. Readings in Education.** (1–3) I, II, S. Readings in research and application in specialized areas in education. May be taken more than once. Pr.: HDFS 110.

**EDEL 779. Primary School Education.** (3) On sufficient demand. 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.: HDFS 110.

**EDEL 780. Kindergarten Education.** (3) On sufficient demand. 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.: HDFS 110, EDEL 300, and junior standing.

**EDEL 786. Topics in Education.** (1–3) I, II, S. Examination of current topic in area of specialization of faculty. Varied topics offered each semester so course may be repeated. Pr.: HDFS 110.

**EDEL 795. Problems in Education.** (Var.) I, II, S. Independent study of a specific problem in curriculum or instruction. Pr.: Junior standing or higher.

## Foundations and Adult Education

Robert C. Newhouse, Interim Chair

Professors Baptiste, Boyer,\* Byrne,\* Litz,\* Meisner,\* Parish,\* Price,\* Oaklief,\* Rankin,\* Spikes,\* and Wright;\* Associate Professors Carter,\* Griffith,\* McGrath,\* and Polson;\* Assistant Professors Knupfer\* and Spears;\* Other: Abbott, Hunter, and Marshall; Emeritus: Hausmann and Littrell.

### Adult and continuing education courses

#### Undergraduate credit

**EDACE 318. Adult and Continuing Education Colloquium.** (Var.) On sufficient demand. Discussion, assigned readings, and lectures over selected trends, developments, and problems which are peculiar to the overall field of adult and continuing education. Students are encouraged to engage in self-study concerning their place in the profession of adult and continuing education. No more than 6 hours may apply to a degree.

#### Undergraduate and graduate credit in minor field

**EDACE 502. Independent Study in Education.** (1–3) I, II. Selected topics in professional education. Maximum of 3 hours applicable toward degree requirements. Pr.: Consent of department head.

#### Undergraduate and graduate credit

**EDACE 704. 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. Cross-listed as EDSEC/EDACE 704. Pr.: Consent of instructor.

**EDACE 706. 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. Cross-listed as

EDSEC/EDACE 706. Pr.: Senior standing, juniors by consent of instructor.

**EDACE 713. Occupational Analysis.** (2–3) I, II, S. An introduction to various techniques used in analyzing occupations and jobs. Emphasis on developing and organizing related instructional materials and content. Cross-listed with EDACE/EDSEC 713. Pr. or conc.: EDSEC 620.

**EDACE 714. International Education.** (3) On sufficient demand. Contemporary overview of the field of international education and an introduction to three of its parts: comparative education, intercultural education, and development education. Pr.: PSYCH 110.

**EDACE 725. Adult Basic Education Techniques.** (3) On sufficient demand. Emphasis on providing students with an understanding of the selection, utilization, and development of adult basic education reference, resources, and other materials. Pr.: HDFS 110.

**EDACE 733 and 738. Practica in Adult 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.

**EDACE 733. Adult Education.**

**EDACE 738. Occupations in Business and Industry.**

**EDACE 739. Coordination of Cooperative Vocational Education.** (2–3) I, II, S. Emphasis on the legal aspects and other minimum requirements essential to conducting cooperative vocational education programs at the secondary and postsecondary levels. Pr. or conc.: EDSEC 620.

**EDACE 750. Women, Education, and Work.** (2–3) II, S. Emphasizes the collective and individual educational needs of women in and out of the work force and the part that occupational/educational preparation contributes to their participation in the work force. Pr.: SOCIO 211 or equiv.

**EDACE 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.

**EDACE 754. Adult Basic Education.** (3) On sufficient demand. 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.

**EDACE 775. Readings in Adult Education.** (1–3) I, II, S. Readings in research and application in specialized areas in education. May be taken more than once. Pr.: HDFS 110. No more than 3 hours may apply to a graduate degree.

**EDACE 780. 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.

**EDACE 782. Educational Gerontology.** (3) On sufficient demand. For both the practitioner and those interested in educational gerontology as a field of inquiry, this course will combine practice and theory. It will examine education for and about aging, with particular reference to the role, needs, and ability of persons in the later years as learners. Stressing current trends and prospective new developments in the field, it will include a review of present programs and discussion of the teaching-learning process for older adults. Pr.: EDACE 780.

**EDACE 786. Topics in Adult Education.** (1–3) I, II, S. Examination of current topic in area of specialization of faculty. Varied topics offered each semester so course may be repeated. Pr.: HDFS 110.

**EDACE 790. Characteristics of the Adult Learner.** (3) II, S. For teachers and administrators in adult and occupational programs who need a familiarity with the major characteristics of adulthood which affect the adult as a learner. Includes an examination of early, middle, and late adulthood. Pr.: EDACE 780 or HDFS 110 or PSYCH 110.

**EDACE 791. Career Education.** (2–4) On sufficient demand. Emphasis on providing for prevocational and adult experiences including orientation and exploratory and applied experiences in school and nonschool situations.

Cross-listed with EDACE/EDSEC 791. Pr.: Teaching experience or consent of instructor.

**EDACE 792. Hospital and Industry Adult Education.** (3) On sufficient demand. An introduction to principles, roles, organization, procedures, and problems of adult education in hospitals, industry, and related agencies.

**EDACE 795. Problems in Adult and Continuing Education.** (Var.) I, II, S. Independent study of specific problems in the areas of adult or occupational education.

## Curriculum, instruction, and policy courses

### Undergraduate credit

**EDCIP 410. Foundations of Education.** (2–3) I, II, S. For prospective teachers. The philosophical, historical, sociological, and political influences on education as they relate to and explain contemporary issues in education in the United States. Pr.: Junior standing and admission to teacher education.

**EDCIP 455. Teaching in a Multicultural Society.** (1) I, II. Application of multicultural understandings to teaching in a multicultural society. Strategies for working effectively with students to achieve educational equity. Pr.: EDSEC 420, 476, and 477. Simultaneous enrollment required for EDCIP 455, EDCEP 525, and EDSEC 586.

### Undergraduate and graduate credit in minor field

**EDCIP 502. Independent Study in Education.** (1–3) I, II, S. Selected topics in professional education. Maximum of 3 hours applicable toward degree requirements. Pr.: Consent of department head.

### Undergraduate and graduate credit

**EDCIP 611. Educational Sociology.** (3) I, II, S. A study to gain an understanding of the ways in which the school can effectively use 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.

**EDCIP 704. Extra-Class Activities.** (3) On sufficient demand. Organization, sponsorship, and objectives of clubs, publications, athletics, dramatics, musical organizations, assemblies, home room, and student council in junior and senior high schools. Pr.: Senior standing or consent of instructor.

**EDCIP 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.: EDSEC 586 or teaching experience.

**EDCIP 721. 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.: Senior standing or higher.

**EDCIP 725. The Teacher and Child Abuse.** (3) On sufficient demand. An exploration of child abuse and neglect with specific references to legal and moral responsibilities of teaching. Suggestions for detection, reporting, and responsive instruction for suspected cases of child abuse and neglect. Pr.: PSYCH 110 and junior standing.

**EDCIP 730. Education of the Disadvantaged.** (3) On sufficient demand. Consideration of the life-space of the disadvantaged learner and its relationship to curriculum, organization, and interpersonal relationships in schools. The development of realistic, relevant goals for the teacher of the disadvantaged. Pr.: EDAF 410 or 611.

**EDCIP 733. Curriculum Materials for Ethnic Diversity.** (3) On sufficient demand. An examination and analysis of recent materials and practices of schools serving multiethnic student bodies, particularly minorities from disadvantaged backgrounds. Materials include any items used by the school in implementing the curriculum. Pr.: Senior standing or higher.

**EDCIP 735. Curriculum Materials for Nonsexist Teaching.** (3) II, S. Analysis of recent materials from per-

spective of concern with their potential for sex-role stereotyping. Examination of teaching resource materials for curriculum intended to facilitate nonsexist teaching. Pr.: Junior standing or higher.

**EDCIP 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.

**EDCIP 775. Readings in Education.** (1–3) I, II, S. Readings in research and application in specialized areas in education. May be taken more than once. Pr.: EDCEP 215.

**EDCIP 786. Topics in Education.** (1–3) I, II, S. Examination of current topic in area of specialization of faculty. Varied topics offered each semester so course may be repeated. Pr.: HDFS 110.

**EDCIP 795. Problems in Education.** (Var.) I, II, S. Independent study of a specific problem in curriculum or instruction. Pr.: Junior standing or higher.

## Secondary Education

John D. Parmley, Chair

Professors Hause,\* Heerman,\* and Welton;\* Associate Professors Alexander,\* Hortin,\* Laurie,\* Parmley,\* Scharmann,\* Sturr,\* Talab,\* and Wissman;\* Assistant Professors Byars,\* Dalida, Harbstreit,\* McLellan,\* and Royse; Instructors Jankovich, Kane, and Stone; Courtesy appointments: McFarlin and B. Newhouse; Emeriti: Bartel, Carpenter, Goodenow, Prawl, Terrass, Wauthier, and Weimer.

The Department of Secondary Education offers a four-year degree program leading to certification as a secondary school teacher in one or more of the following fields: art, business, English, journalism, mathematics, modern languages, speech, natural sciences, physical education, and social science. In addition, the department provides teaching methods courses and secondary education student teaching experiences to serve students in music education. The department also provides similar courses for students in agricultural education and home economics education.

## Secondary education courses

**EDSEC 050. Developmental Reading Laboratory.** (3) I, II. Improves the college student's reading skills, rates of comprehension, vocabulary, and study skills. Pr.: Consent of instructor.

### Undergraduate credit

**EDSEC 215. Information Processing.** (3) I. Application of technical knowledge and decision-making skills in development of usable printed business documents. Emphasis is placed upon teaching theories and strategies as they apply to keyboarding.

**EDSEC 218. Secondary Teacher Education Colloquium.** (1–2) On sufficient demand. Discussion, assigned readings, and lectures over selected trends, developments, and problems in the field of teaching.

**EDSEC 250. Scientific Principles of Coaching.** (3) II. Physiological, psychological, and kinesiological principles of coaching. Topics include training and conditioning, motivation, psychological factors affecting sport skill in performance, and mechanical principles underlying sport performance. Not for kinesiology majors.

**EDSEC 298. Coaching and Officiating Wrestling.** (2) On sufficient demand. Study of rules, theory, and practices; methods of coaching. Pr.: KIN 250.

**EDSEC 299. Coaching and Officiating Swimming.** (2) II, in even years. Study of rules, theory, and practices; methods of coaching. Pr.: KIN 250.

**EDSEC 300. Introduction to Agricultural Education.** (1) I, II. Introduction to the program responsibilities, methodology, organization, current trends and issues, and future direction of programs in agricultural education. Students will be actively involved in the discussion and application of course material both in the classroom and in early field experiences conducted as a part of this course.

**EDSEC 301. Coaching and Judging Gymnastics.** (2) On demand. Study of rules, theory, and practices; methods of coaching. Pr.: KIN 250.

**EDSEC 302. Coaching and Officiating Basketball.** (2) II. Study of rules, theory, and practices; methods of coaching. Pr.: KIN 250.

**EDSEC 303. Coaching and Umpiring Baseball.** (2) I, in even years. Study of rules, theory, and practices; methods of coaching. Pr.: KIN 250.

**EDSEC 304. Coaching and Officiating Track and Field.** (2) II, in odd years. Study of rules, theory, and practices; methods of coaching. Pr.: KIN 250.

**EDSEC 305. Coaching and Officiating Football.** (2) I. Study of rules, theory, and practices; methods of coaching. Pr.: KIN 250.

**EDSEC 306. Coaching and Officiating Volleyball.** (2) I. Study of rules, theory, and practices; methods of coaching. Pr.: KIN 250.

**EDSEC 309. Coaching and Officiating Tennis and Golf.** (2) I, in odd years. Study of rules, theory, and practices; methods of coaching. Pr.: KIN 250.

**EDSEC 315. Administrative Data Applications.** (3) II. Principles and practices of treatment, taping, and care of minor athletic injuries. Pr.: EDSEC 250 or BIOL 240 or conc. enrollment in BIOL 240.

**EDSEC 320. Treatment of Athletic Injuries.** (3) I, II. Principles and practices of treatment, taping, and care of minor athletic injuries. Pr.: EDSEC 250 or BIOL 240 or conc. enrollment in BIOL 240.

**EDSEC 359. Administration of Physical Education, Athletic, and Intramural Programs.** (3) I. Study of problems associated with the conduct of activity programs. Specifically considered are selection and care of equipment and facilities, public relations, legal liability, and scheduling. Pr.: Junior standing.

**EDSEC 376. Core Teaching Skills: Secondary/Middle.** (3) I, II. General teaching practices and the opportunity to apply that information in a laboratory setting. Two hours of lec. and two of lab a week. Pr.: Admission to teacher education, DED 102, and HDFS 110. Must be taken simultaneously with EDCEP 315 and EDSP 323.

**EDSEC 400. Leadership and Personal Development in Agricultural Education.** (1) I, II. An examination of the role of the FFA advisor in the leadership and personal development of agricultural education students.

**EDSEC 405. Middle-Level Education.** (3) I. This course provides an overview of the characteristics of middle schools; the social, psychological, and physical characteristics of early adolescent development; middle-level curriculum; ways to organize for instruction; and the teacher's role in the guidance of students at the middle level. Cross-listed with EDEL 405. Pr.: Admission to teacher education.

**EDSEC 410. Gymnastics and Aquatics in Physical Education.** (3) I. Application of scientific principles to the teaching of gymnastics. Emphasis upon skill technique and spotting procedures for grades K–12. Pr.: KIN 320, 330, and 335 (or any two and conc. enrollment in the third).

**EDSEC 415. Administrative Support Services and Technology.** (1) II. Intended to develop subject matter competencies needed for careers in the business office: Computer usage (desktop publishing), uses of various office equipment and procedures, and awareness of computer networking, telecommunication and emerging technology.

**EDSEC 416. Office Management.** (3) I. An examination of the management and operation of the office from a practical viewpoint including a study of administrative systems, the ergonomic environment of the office, and the management of human resources in the office.

**EDSEC 420. Block II Lab: Content and Reading Methods.** (1) I, II. Field-based experience to help the pre-professional teacher practice the incorporation of specific content area with reading methods in the secondary and middle schools. Pr.: EDCEP 315, EDSP 323, and EDSEC 376. Simultaneous enrollment required for EDSEC 420, 476, and 477.

**EDSEC 421. Rhythms in Physical Education.** (3) II. Application of scientific principles to the teaching of rhythmical skills. Emphasis on methods of teaching creative, folk, square, and social dance in grades K–12. Pr.: KIN 320, 330, and 335 (or any two and conc. enrollment in the third).

**EDSEC 427. Sports Skill Progressions.** (3) II. Strategies for the effective teaching of team and individual and dual sports for secondary physical education. Emphasis will be on learning skill progressions, written preparation of lesson and unit plans, and writing effective objectives for an activity program. Additional course work will cover skill analysis and peer teaching opportunities for physical education majors.

**EDSEC 461. Observation in Physical Education.** (2) I, II. Observation of students engaged in school or community physical activity programs. Emphasis upon developmental assessment, interaction with students, and limited planning and organization of appropriate physical education activities. Two hours lab a week and one hour rec. Pr.: Junior standing and one or more physical education methods courses.

**EDSEC 476. Content Area Methods in the Secondary School.** (2–3) I, II. Principles of teaching applied to content area instruction in the secondary school; motivation; organization of subject matter; lesson planning; evaluation and reporting; challenging the levels of ability; organization and management of the classroom; methodology and materials of the secondary schools. Pr.: EDCEP 315, EDSP 323, and EDSEC 376. Simultaneous enrollment required for EDSEC 420, 476, and 477.

**EDSEC 477. Middle Level/Secondary Reading.** (2) I, II. Introduction and development of effective study/skilled reading strategies and abilities for learning from content area text material. Pr.: EDCEP 315, EDSP 323, and EDSEC 376. Simultaneous enrollment required for EDSEC 420, 476, and 477.

### Undergraduate and graduate credit in minor field

**EDSEC 502. Independent Study in Education.** (1–3) I, II, S. Selected topics in professional education. Maximum of 3 hours applicable toward degree requirements. Pr.: Consent of department head.

**EDSEC 503. Teaching Adult Classes in Agriculture.** (2–3) On sufficient demand. Organization and preparation of materials and methods used in teaching adult classes in vocational education in agriculture for young farmers and adults. Departments are visited for evaluation of programs and results. Pr.: EDSEC 620.

**EDSEC 505. Field Experience in Agricultural Education.** (2–3) On sufficient demand. A course for prospective teachers to help bridge the gap between classroom theory and student teaching. Emphasis will be on observation of and participation in school and community organizations and programs. Pr.: EDSEC 300 and HDFS 110 and consent of instructor.

**EDSEC 551. Evaluation and Emergency Management of Athletic Injuries.** (3) I. An in-depth study of evaluation techniques for athletic injuries by the athletic trainer. Pr.: EDSEC 320 and BIOL 240.

**EDSEC 555. Therapeutic Modalities in Athletic Training.** (3) II. The theory and application of the various energy systems used in the treatment of athletic injuries. Practical experiences will be emphasized. Pr.: EDSEC 320, PHYS 115.

**EDSEC 556. Rehabilitation and Conditioning for Athletic Injuries.** (3) II. A study of applied rehabilitation and conditioning techniques used by athletic trainers. Pr.: EDSEC 320 and KIN 330.

**EDSEC 557. Seminar in Issues in Administration of Athletic Training Programs.** (3) I. Application of various problems and issues affecting the athletic trainers in their roles as administrators in the areas of role delineation, budget designs, legal aspects of sport, facility design, and drug testing/drug education.

**EDSEC 560. Art for Exceptional Children.** (3) II. Use of art courses and activities to meet the needs of the mentally retarded, physically impaired, emotionally disturbed, or gifted child. Three hours lec. Pr.: PSYCH 110. Same as ART 560.

**EDSEC 576. Safety Education.** (2) II, S. Personal safety in home, school, community, and work place will be addressed. Special attention is given to local, state, and national resources related to safety practice and safety education.

**EDSEC 582. Teaching Participation in Music.** (8–12) I, II. Observation and teaching under the direction of selected music teachers in elementary, middle level, and secondary school music programs. Pr.: Admission to student teaching.

**EDSEC 585. Internship in Athletic Training.** (1–4) I, II. Supervised clinical application of practical skills in athletic training. Pr.: EDSEC 320. May be repeated for a total of 4 credit hours with additional prerequisite of KIN 330 and 335 required for last four semesters.

**EDSEC 586. Teaching Participation in the Secondary Schools and Professional Development Seminar.** (Var.) I, II. Guided observation, teaching participation, and study of teaching practices under direction of selected teachers in middle/junior and senior high schools. Student teachers will participate in seminar sessions to discuss issues and experiences encountered during this school-based experience. Pr.: EDSEC 420, 476, and 477. Simultaneous enrollment required for EDCIP 455, EDCEP 525, and EDSEC 586.

**EDSEC 587. Supervised Practicum for Athletic Coaches.** (2) I, II. Observation and coaching participation under the direction of selected coaches in public school, club, city recreation, or other nonpublic school sport settings. Pr.: EDSEC 250, 320, and one coaching and officiating course.

### Undergraduate and graduate credit

**EDSEC 611. Coordination Techniques.** (1) II. Acquaints students with techniques in selecting, implementing, and coordinating occupational programs between the school and the business community. Pr.: EDSEC 620.

**EDSEC 612. Job Analysis.** (1) II. Acquaints students with techniques of analyzing jobs and tasks related to occupations. Pr.: EDSEC 620.

**EDSEC 614. Laboratory Techniques in Teaching Science.** (3) 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.: EDSEC 476 (Science).

**EDSEC 615. Laboratory and Safety Techniques in Teaching Agriculture.** (3) I. The course is designed to provide students with the knowledge and skills necessary to design, organize, and conduct programs in agricultural laboratory instruction in secondary agricultural education programs. Students will gain experiences in the development of laboratory lesson plans, safety and technical demonstrations, student management in a laboratory setting, laboratory design, and laboratory curriculum development. Pr.: Conc. enrollment in EDSEC 420 Block II Lab/Ag.

**EDSEC 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.: EDCEP 315.

**EDSEC 621. Program Planning in Vocational Education.** (2–3) I, II, S. The program development and planning process; development of guides for teaching and evaluating reimbursable secondary programs. Pr.: EDSEC 620.

**EDSEC 701. Administration and Supervision of Vocational Education.** (2–3) II, S. On sufficient demand. 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.

**EDSEC 704. 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. Cross-listed as EDSEC/EDACE 704. Pr.: Senior standing or consent of instructor.

**EDSEC 705. Organization Problems in Teaching Agricultural Mechanics.** (Var.) On sufficient demand. Analysis of the agricultural mechanics course of study; needs and interests of students; learning difficulties; skills and technical knowledge required; correlation with agriculture; application of laws of learning to the teaching process; determination of objectives. Pr.: EDSEC 586.

**EDSEC 706. 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. Cross-listed as EDSEC/EDACE 706. Pr.: Senior standing, juniors by consent of instructor.

**EDSEC 710. Occupational Home Economics Education.** (2) I. Principles and procedures in planning and organizing home economics-related occupational programs. The course includes an approved occupational experience in business/industry and consideration of methods and teaching materials peculiar to these programs. Pr.: HDFS 110 or conc. enrollment.

**EDSEC 713. Occupational Analysis.** (2–3) I, II, S. An introduction to various techniques used in analyzing occupations and jobs. Emphasis on developing and organizing related instructional materials and content. Cross-listed with EDACE/EDSEC 713. Pr. or conc.: EDSEC 620.

**EDSEC 715. Reading in the Content Areas.** (3) On sufficient demand. Information concerning the reading process and techniques for helping students develop reading and study skills needed in the content areas. Course is designed for classroom middle level and secondary teachers. Pr.: Senior standing.

**EDSEC 732–737. Practica in 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.

**EDSEC 732. Career Education.**

**EDSEC 734. Agriculture-Related Occupations.**

**EDSEC 735. Business and Office Occupations.**

**EDSEC 736. Extension Education.**

**EDSEC 737. Home Economics-Related Occupations.**

**EDSEC 740. Advising Youth Organizations.** (2–3) On sufficient demand. An examination of the role of an advisor in the effective operation of a youth organization. Pr.: PSYCH 110.

**EDSEC 741. German Culture in Second-Language Learning.** (3) Emphasis on the study of German culture and application to German curriculum, including the development of materials. Pr.: Twenty-four credits in 200 and above in German or equiv. (Same as GRMN 741).

**EDSEC 743. French-Speaking Cultures in Second Language Learning.** (3) On sufficient demand. Emphasis on the study of French culture and applications to the French curriculum, including the development of materials. Pr.: 24 credits at 200 or above in French, or equiv. Cross-listed with modern languages FREN 743.

**EDSEC 770. Methods for Second Language Acquisition/Learning.** (3) On sufficient demand. Study of the development of second language instruction, both historical and current. Syntax, morphology, discourse analysis, and global proficiency evaluation are foci for analysis of methods and for the development of a personal method of teaching. Pr.: EDSEC 476 and 24 credits in one second language at 200 level and above or equivalent.

**EDSEC 775. Readings in Education.** (1–3) I, II, S. Readings in research and application in specialized areas in education. May be taken more than once. Pr.: HDFS 110.

**EDSEC 776. Teaching in the Middle/Junior High School.** (3) On sufficient demand. Several instructional approaches consistent with the characteristics of the emerging adolescent student (grades 5–9) will be examined in relation to current research. Direct development of alternative curricular programs, appropriate use of interdisciplinary activities and nontraditional materials will be emphasized. Pr.: EDCEP 315, middle-level field experience, elementary or secondary content methods course.

**EDSEC 777. Hispanic Cultures in Second-Language Learning.** (3) Emphasis on the study of Spanish culture and applications to the Spanish curriculum, including the development of materials. Pr.: Twenty-four credits in Spanish at 200 or above or equivalent. Same as SPAN 777.

**EDSEC 786. Topics in Education.** (1–3) I, II, S. Examination of current topic in area of specialization of faculty. Varied topics offered each semester so course may be repeated. Pr.: HDFS 110.

**EDSEC 791. Career Education.** (2–4) On sufficient demand. Emphasis on providing for prevocational and adult experiences including orientation and exploratory and applied experiences in school and nonschool situations. Cross-listed with EDACE/EDSEC 791. Pr.: Teaching experience or consent of instructor.

**EDSEC 795. Problems in Education.** (Var.) I, II, S. Independent study of a specific problem in curriculum or instruction. Pr.: Junior standing or higher.

## Educational technology and computer education courses

### Undergraduate credit

**EDETC 318. Instructional Media and Technology.** (2) I, II. Experiences in the selection, production, use, and evaluation of instructional materials. Applications of technology in education, including microcomputer use, but not programming. Operation and simple maintenance of equipment. Pr.: Admission to teacher education.

### Undergraduate and graduate credit in minor field

**EDETC 502. Independent Study in Education.** (1–3) I, II, S. Selected topics in professional education. Maximum of 3 hours applicable toward degree requirements. Pr.: Consent of department head.

### Undergraduate and graduate credit

**EDETC 705. Organization and Processing of Instructional Materials.** (2) I. Supervisory experiences in cataloging, organization, arrangement, and processing of print and nonprint materials for media centers and libraries. Issues in and approaches to coding and bibliographic concepts are explored. Pr.: EDETC 318 and ENGL 355 or 545.

**EDETC 718. Microcomputers in Instruction.** (2) I, II, S. Trends in computer applications in instruction, major components and functions of microcomputer instructional systems, and use of authoring systems for computer-assisted instruction. Does not prepare the student to teach computer programming. Pr.: EDEL 585 or EDSEC 586.

**EDETC 719. Microcomputers in Instruction Lab.** (1) I, II, S. Applications of BASIC and PASCAL to design of computer-assisted instruction and other classroom application of microcomputers. One two-hour lab a week. Conc. with EDETC 718. Pr.: CIS 200 and 203.

**EDETC 723. Computer Applications in Subject Areas.** (1–3) On sufficient demand. Theory and practice of using computer software to enhance teaching and learning in specific subject areas. Subjects covered will vary. May be repeated for credit in different subject areas. Pr.: EDETC 318 and EDCEP 315.

**EDETC 756. Visual Communication.** (3) I, alternate S. Implications of visual communication and learning for the design of instructional programs. Pr.: Graduate standing or EDETC 318 and EDCEP 315.

**EDETC 762. Instructional Television.** (3) II, alternate S. The principles of instructional television: its development,

programming, techniques, and application. Pr.: Junior standing.

**EDETC 763. Instructional Design.** (3) I, alternate S. Implications of the major theories and models of instructional design to the development of instructional programs. Pr.: EDETC 318 and EDCEP 315.

**EDETC 764. Telecommunications in Education.** (Var. 2–3) Alternate S. Examination of the relationship of current telecommunications media and hardware to the design of instruction. Pr.: EDETC 318 and permission of instructor or graduate standing.

**EDETC 765. Planning and Developing Instructional Materials.** (3) II, S. 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.: EDETC 861 or consent of instructor.

**EDETC 775. Readings in Education.** (1–3) I, II, S. Readings in research and application in specialized areas in education. May be taken more than once. Pr.: HDFS 110.

**EDETC 786. Topics in Education.** (1–3) I, II, S. Examination of current topic in area of specialization of faculty. Varied topics offered each semester so course may be repeated. Pr.: HDFS 110.

**EDETC 795. Problems in Education.** (Var.) I, II, S. Independent study of a specific problem in curriculum or instruction. Pr.: Junior standing or higher.

## Special Education

Norma Dyck, Chair

Professors Dettmer,\* Dyck,\* White,\*  
M. K. Zabel,\* and R. Zabel;\* Associate  
Professor Thurston;\* Assistant Professors  
Knackendoffel and Navarette; Emeritus:  
DeMand and Ohlsen.

Studies in special education 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. Program focus is to work with students with mild/moderate disabilities or students with high abilities at the preschool, elementary, and secondary levels.

## Special education courses

### Undergraduate credit

**EDSP 323. Exceptional Students in the Secondary School.** (2) I, II, S. Designed for regular classroom teachers in meeting the needs of exceptional adolescents. Support strategies for teachers and exceptional students in the mainstream of education. Pr.: Admission to teacher education, and HDFS 110. Must be taken simultaneously with EDCEP 315 and EDSEC 376.

**EDSP 324. Exceptional Child in the Regular Classroom.** (3) I, II. Designed for general education teachers in meeting the needs of exceptional children. Support strategies for teachers and exceptional children in the mainstream of education will be explored. Pr.: Admission to teacher education, and EDCEP 315 (may be taken simultaneously).

### Undergraduate and graduate credit in minor field

**EDSP 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 chair.

## Undergraduate and graduate credit

**EDSP 700. Introduction to Human Exceptionality.** (3) I, II, S. Survey of history and legal aspects of service, etiologies, characteristics, and special needs of exceptional individuals. Pr.: EDCEP315 or PSYCH 110.

**EDSP 710. Education of Exceptional Individuals.** (3) I, II. A general study of special education, with emphasis on legislation, Individual Education Plans, cross-cultural assessment and intervention, and strategies for exceptional students at the preschool, elementary, and secondary levels. Pr.: EDCEP 315 and EDSP 323 or EDSP 324 or EDSP 700.

**EDSP 721. Characteristics of Learning Disabilities.** (3) I, 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.: EDSP 323 or 324, and EDCEP 315.

**EDSP 724. Characteristics of Mental Retardation.** (3) On sufficient demand. Etiological, psychological, sociological, and educational aspects of mental retardation. Pr.: EDSP 323 or 324, and EDCEP 315.

**EDSP 728. Characteristics of Emotional and Behavioral Disorders.** (3) I, II. Study of conceptional models for understanding emotional and behavioral disorders of childhood and adolescents, and their implications for educators. Pr.: EDCEP 315 and EDSP 323 or EDSP 324 or EDSP 700.

**EDSP 730. Assessment in Special Education.** (2) II. Strategies and techniques for systematically collecting data upon which decisions about education programs for exceptional students may be made. Pr. EDSP 710, EDCEP 715.

**EDSP 750. Introduction to Education of the Gifted.** (3) On sufficient demand. An overview of historical perspectives related to gifted child education, various facets of intellectual and creative functioning, national and state guidelines for planning and implementing gifted programs, modifying curriculum and classroom strategies to nurture gifted potential, current issues in gifted education. Pr.: EDSP 323 or 324 or 700.

**EDSP 755. Guidance 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 preschool, elementary, secondary, post-secondary, and adult settings. Pr.: EDSP 722 or 763.

**EDSP 775. Readings in Special Education.** (1–3) I, II, S. Readings in research and application in specialized areas in education. May be taken more than once. Pr.: EDCEP 215.

**EDSP 777. Behavior Management for Exceptional Individuals.** (3) II, S. Theoretical and practical applications of behavior analysis with emphasis on preventing and remediating behavior problems of students with disabilities. Pr.: EDCEP 315.

**EDSP 778. Technology for Special Education.** (2) I. Designed to help special educators develop an awareness of technology that can assist in the lives and learning of students receiving special education. Administrative applications of technology related to special education will also be covered. Pr.: EDETC 718.

**EDSP 786. Topics in Education.** (1–3) I, II, S. Examination of current topic in specialization of faculty. Varied topics offered each semester so course may be repeated. Pr.: EDCEP 215.

**EDSP 787. Field Experiences in Special Education.** (1–3) On sufficient demand. Observation and supervised activities in schools, camps, clinics, or institutions related to student's area of special interest or preparation. Pr.: EDSP 722 or 763.

**EDSP 795. Problems in Special Education.** 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.

# Engineering

Donald E. Rathbone, Dean  
Kenneth K. Gowdy, Associate Dean  
Tom C. Roberts, Assistant Dean  
Ray E. Hightower, Assistant Dean  
Karen Martin, Director of Minorities Programs

142 Durland Hall  
532-5592

A course of study leading to a degree in the College of Engineering provides a well-rounded university education and equips students with a broad theoretical and practical background to meet the new and demanding problems of our technological society.

The College of Engineering offers the bachelor of science degree in the following fields: architectural engineering, biological and agricultural engineering, chemical engineering, civil engineering, computer engineering, computer science, construction science and management, electrical engineering, industrial and manufacturing systems engineering, information systems, mechanical engineering, nuclear engineering, and nuclear reactor technology.

The College of Engineering at K-State is the most comprehensive college of engineering in Kansas. All degree programs are nationally accredited.

## General Requirements

### High school graduates

Admission to the College of Engineering is granted to any individual who has graduated from an accredited Kansas high school. Out-of-state students are expected to have a strong academic rank in class and good ACT scores.

### Transfer students

Applicants with previous college credit, earned after graduation from high school, must apply as transfer students. Except for the programs in construction science and computing and information sciences, all applicants to the college after July 1, 1994, with 12 combined or more transfer hours, must have a 2.75 cumulative GPA or higher. Given extenuating circumstances, exceptions to this policy may be granted with the recommendation of the pre-engineering advisor at the transfer institution.

### International students

Applications for admission of international students are judged by several factors, including, but not limited to: secondary school record, test scores, academic record at the col-

lege and university level, trend in grades, and grades in mathematics, physical sciences, and related areas.

Because of a limitation on the number of international students that can be accommodated, the College of Engineering reserves the right to apply more rigorous admissions criteria to applicants who are not U.S. citizens.

### Scholarships

All students applying for College of Engineering scholarships must complete the K-State scholarship application. Obtain an application from your high school counselor, community college financial aid office, or the Office of Student Financial Assistance. In addition to scholarships awarded by the Office of Student Financial Assistance, the College of Engineering awards numerous scholarships directly to incoming and continuing students. Initial inquiries by prospective students for engineering scholarships should be directed to the Office of Student Affairs, College of Engineering.

### Selection of a major

Students often select a curriculum or major when entering the college. They are provided academic advisors by their major departments. Entering students who are undecided as to a major in engineering may enroll in general engineering for one year. These students are assigned an advisor from the dean's office. Students are encouraged to choose a major by the beginning of their sophomore year.

### Extracurricular activities

Leadership, communication, and interpersonal skills are essential for today's engineering graduate. The College of Engineering offers many opportunities to become involved on campus through departmental student chapters, open house, student government, competition teams, and much more. Each contributes to greater personal and professional development.

### Engineering equipment fee

The engineering equipment fee is in addition to the normal university fees. For further information see the Fees section of this catalog. Questions should be referred to the College of Engineering Student Affairs Office.

### Grade requirements

In addition to the university standards and policies for grades, the College of Engineering has the following standards:

### Prerequisite courses

Before attempting a course taught in the College of Engineering, a grade of C or better must be earned in the prerequisite courses.

### 500-level course or higher

Effective fall 1995, the following policy will be applicable for all engineering courses, except those offered by construction science and computing and information sciences.

- a. To take 500-level courses or higher in the College of Engineering, a junior (60–89 hours) must have at least a 2.3 overall GPA in resident course work. 500-level courses in the fourth semester of the published curriculum are excluded from this policy.
- b. New transfer students may take 500-level courses or higher in the College of Engineering if they meet the college admissions requirements and satisfy the course prerequisites.
- c. Students may pre-enroll in a 500-level course or higher in the College of Engineering without meeting the criteria in (a) or (b); however, they must satisfy the criteria to remain in the course after the start of classes.
- d. If an engineering junior, who has completed one or more 500-level courses or higher in the College of Engineering, fails to maintain at least a 2.3 overall GPA, the following action(s) may be taken by the student with the approval of his/her advisor:
  1. Repeat required courses to raise grades.
  2. Take any humanities or social science courses which satisfy the elective requirements of the curriculum.
  3. Take additional lower-level courses in engineering, mathematics, physics, or chemistry to raise the overall GPA.

During this period, the student may take no new 500-level courses or higher in the college.

### Summer school

Many of the courses appearing in the engineering curricula, not only those which are offered in the College of Engineering but also those 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 MATH 220 Analytical Geometry and Calculus I are urged to investigate the possibility of summer school to remove this mathematics deficiency. MATH 100 College Algebra and MATH 150 Plane Trigonometry are offered during the summer sessions and provide an excellent transition from high school mathematics into the engineering curriculum.

## Degree Programs

Engineering is a profession in which knowledge of mathematics and natural science is applied to develop ways to utilize the materials and forces of nature for the benefit of mankind. The curricula for the College of Engineering is designed to meet the Accreditation Board of Engineering and Technology (ABET) degree program criteria. The overall curriculum provides an integrated educational experience and includes course work in the following areas:

- Physical sciences and mathematics
- Communications
- Humanities and social sciences
- Engineering sciences
- Discipline-specific courses and technical electives.

Many of the fundamental courses required for a degree in engineering may be obtained through pre-engineering programs at other four-year institutions or at community col-

leges. In general, two years of course work will be transferable. However, there are differences among the curricula; students electing this route should work closely with the advisors and K-State to ensure a proper selection of courses. Questions should be referred to the College of Engineering Student Affairs Office.

The accompanying chart indicates the number of transferable credit hours for various courses, and is a guide to courses that current K-State students will be taking. The grade Cr is not acceptable for transfer into College of Engineering programs.

Engineering subjects that normally are offered during the summer include:

CE 333	Statics	3
EECE 241	Introduction to Computer Engineering	3
EECE 510	Circuit Theory I	3
ME 512	Dynamics	3
ME 513	Thermodynamics I	3
ME 571	Fluid Mechanics	3
NE 385	Engineering Computational Techniques	2

## Humanities and social science electives

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 social sciences and humanities. The following list of electives has been approved by the faculty.

Anthropology: Any course  
 Architecture: Any course in history or appreciation of architecture  
 Art: Any course  
 Economics: Any course above 110, which is required  
 Engineering: DEN 299 Honors Seminar in Engineering (2); DEN 399 Honors colloquium in Engineering (1); DEN 450 Impact of Engineering and Technology on Society (3)  
 English: Any course in literature  
 Geography: Any course except 220, 221, 470, 700, 702, and 705  
 History: Any course  
 Mass communications: 235, 530, 560, 660, and 685  
 Modern languages: Any course (except English or the student's native language)  
 Music: Any course in theory, history, or appreciation of music (Music 150 must be the 2-credit-hour-class)  
 Philosophy: Any course except 110, 220, and 510  
 Political science: Any course  
 Psychology: Any course  
 Sociology: Any course except 520, 724, 725, and social work courses

Basic pre-engineering subjects	Use in various curricula; credit hours at K-State												
	ARE	BAE	CHE	CE	CMPEN	CNSM	CS	DEN	EE	IMSE	IS	ME	NE
Accounting		*				3	*		*	3	*		
Biology		4	*		*		*	*			*		*
Chemistry (inorganic)	8	8	8	8	4	*	*	8	8	8	*	8	8
Chemistry (organic)			8	*	*				*				*
Chemical analysis (qualitative)			4	*									*
Computer programming **	2F	2F	1F	2F	5P,C	2F	4P	*	5P, C	2F	4P	2F	2F
Economics (macroeconomics)	3	3	3	3	3	3	*	3	3	3	*	3	3
Expository Writing I ***	3	3	3	3	3	3	6	3	3	3	6	3	3
Geology			*	3	*	3	*		*		*		
Graphics	4	2	*	2	*	4		2	*	2		5	*
Humanities/social science elective†††	13	13	15	13	15	12	24	12	15	14	23	15	13
Mathematics (Analytic Geometry and Calculus, and Elementary Differential Equations)	16	16	16	16	16	6†	8	16	16	16	8	16	16
Physics (calculus-based)	10	10	10	10	10	8††	*	10	10	10	*	10	10
Speech (public speaking)	2	2	2	2	2	2	2	2	2	2	2	2	2
Statics	3	@	*	3	@	3††		@	@	@		3	@
Statistics (calculus-based)	*	*	*	*	3	3††	3	*	3	6	3††	*	

\*Elective.

\*\*Computer programming: F = Fortran, P = Pascal, C = "C" Language.

\*\*\*Expository Writing II is optional for all programs (except CS & IS) if a grade of "A" or "B" is achieved in Expository Writing I.

†Technical calculus.

††Construction science, computer science, and information systems students may take algebra-based courses.

†††Two courses (6 hours) must be junior/senior level (not available at two-year schools). CS and IS are exceptions requiring a prerequisite sequence.

@Confer with Engineering Student Affairs Office on statics requirements. These programs use a 4-hour combined Statics and Dynamics course. (Dynamics is not available at two-year schools).

The grade Cr is not acceptable for transfer into College of Engineering programs.

Students transferring at the junior level may find it advantageous to attend the summer session preceding fall enrollment.

Courses must be selected from at least two areas listed above and at least two advanced level courses must be taken. These are normally 400 level or above, except for modern languages where the third and following courses in a sequence are considered advanced level. Not more than 3 credit hours may be taken in applied art. All courses must be taken for a letter grade.

### Credit by examination

K-State offers students a variety of quiz-out programs through which a student may earn academic credit in specific courses. Engineering students may earn quiz-out credits in chemistry, computer science, english, mathematics, modern languages, and speech.

### ROTC credits

Any student may apply a maximum of four hours of basic ROTC credit toward the degree without being required to take more credits than non-ROTC students.

### Engineering sciences

Engineering sciences apply science and mathematics to the basic engineering areas. Students pursuing a B.S. degree in engineering must satisfy the following requirements:

A minimum of 32 semester hours of engineering science courses.

At least 9 semester hours of engineering science courses outside the student's major department.

At least four of the six subject areas in the following list must be represented in the 32 semester hours.

#### Engineering materials

CHE 350	Engineering Materials .....	2
CHE 352	Engineering Materials .....	3
NE 515	Nuclear Engineering Materials .....	2
EECE 795	Solid State Engineering .....	3

#### Analytical mechanics

<b>Either</b>		
CE 333	Statics .....	3
<b>and</b>		
ME 512	Dynamics .....	3
<b>or</b>		
CE 530	Statics and Dynamics .....	4

#### Circuits, fields, and electronics

EECE 510	Circuit Theory I .....	3
EECE 519	Electrical Circuits and Controls .....	4
EECE 557	Electromagnetic Theory .....	4
EECE 632	Engineering Applications of Microcomputer Systems .....	3

#### Thermodynamics

CHE 515	Chemical Engineering Thermodynamics I .....	2
ME 513	Thermodynamics I .....	3

#### Flow and rate processes

ME 571	Fluid Mechanics .....	3
CHE 530	Transport Phenomena I .....	3

#### Computing and information sciences

There are other courses in these subject areas that may properly be considered as belonging to engineering sciences. In addition, there are areas of engineering science that are not listed.

## Program Options

### Honors program

The honors program in the College of Engineering offers interested students intellectual challenges consistent with their abilities and interests. Entering freshmen with a composite ACT score of at least 29 or in the upper five percent will be invited to join the program. Transfer students with a cumulative GPA of 3.50 or greater on at least 12 semester hours will also 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.

Participation in the honors program will not alter the time required for graduation for most students and should be a stimulating experience. In addition to enrolling in honors sections in course work, students may enroll in a variety of seminars, colloquia, and research problems designed to enrich and challenge them. The honors program in engineering is closely integrated with the honors programs of the other colleges and provides an excellent opportunity for interdisciplinary study. Students in the honors program may elect to withdraw from the program at any time.

To complete the honors program, the student must qualify for an engineering degree with a composite GPA of at least 3.50 and must complete at least four semester hours of engineering honors courses including a minimum of two honors research hours.

### Cooperative education

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 completing the freshman year, engineering students alternate sessions of work and study (alternating schedule), work part-time and go to school part-time (parallel schedule), or work more than one summer (summer schedule).

While the program may extend the time required to earn a degree by one year, students may obtain as much as 20 months of experience and earn a significant portion of their college expenses. Applications for the program are accepted through Career and Employment Services any time after the student is enrolled in the College of Engineering. Final selection is made through formal employment interviews with the participating companies.

### Minors program

A minors program has been created to enable students to take 15 credit hours or more in an area of special interest outside their major field. Minors may be earned in a variety of areas including chemistry, math, business, computer science, and engineering management. Contact the College of Engineering Student Affairs Office for further information.

Upon completion of the requirements established by the faculty responsible for the minor field, an appropriate entry will be made on the student's transcript.

### Integrated master's degree

A five-year integrated program leading to a B.S. degree in any engineering field at the end of four years and a master of science degree at the end of five years is available for promising undergraduate students. In architectural engineering, the comparable numbers are five and six years.

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 advisor, will plan an individualized program of study that 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.

## Interdisciplinary Studies

Although engineering curricula are generally 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, students may petition the advisor and department head for the substitution of required courses. Some of the more popular secondary areas are:

### Bioengineering

Bioengineering is a broad field overlapping the life sciences and many engineering disciplines. Some of the subareas are biomechanics, ergonomics, bioinstrumentation, biomaterials, bioenergetics, water and waste treatment, food engineering, and environmental engineering. In addition to the courses listed in the pre-medicine section, other courses of interest include:

BAE 510	Environmental Design of Agricultural Buildings
BAE 521	Energy in Biological Systems
BAE 700	Agricultural Process Engineering

CHE 715	Biochemical Engineering
CHE 725	Biotransport Phenomena
CE 563	Environmental Engineering Fundamentals
CE 565	Water and Wastewater Engineering
CE 762	Water Treatment Processes
CE 766	Wastewater Engineering: Biological Processes
EECE 771	Control Theory Applied to Bioengineering
EECE 772	Theory and Techniques of Bioinstrumentation
EECE 773	Bioinstrumentation Laboratory
IMSE 623	Industrial Ergonomics
IMSE 625	Work Environments
ME 622	Environmental Engineering I
ME 722	Environmental Engineering II

## Business administration

Increasing numbers of engineers are assuming managerial positions in all phases of industrial operations. Some of the courses listed in the section of dual degrees could be appropriate technical electives for students with goals in management.

## Energy systems engineering

The increasing demand for energy is one of the major problems confronting all nations. 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.

## Pre-medicine

Many recent advances in medical research techniques, patient monitoring systems, artificial limbs and organs, and aerospace and undersea medicine have developed from the partnership of medicine and engineering. Engineering students wishing to satisfy entrance requirements to a typical school of medicine must take at least two semesters of biology and two semesters of organic chemistry, and should take additional social science/humanities electives. The pre-medical advisor 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 advisor in the College of Arts and Sciences should be consulted prior to the junior year.

## Computer science

Computers are powerful tools for the solution of complex engineering and/or management problems. Individuals with training in both engineering and computer science possess the background to attack problems over a broad range of areas. Appropriate courses include:

<b>Languages</b>	
CIS 200	Fundamentals of Computer Programming
CIS 300	Algorithms and Data Structures
CIS 350	Computer Architecture and Organization
CIS 505	Introduction to Programming Languages
<b>Design</b>	
EECE 241	Introduction to Computer Engineering
EECE 444	Computer Engineering Laboratory I
EECE 544	Computer Engineering Laboratory II
EECE 641	Design of Digital Systems I
<b>Computational techniques</b>	
CHE 316	Chemical Engineering Computational Techniques
IMSE 560	Introduction to Operations Research
IMSE 573	Industrial Simulation
ME 760	Engineering Analysis I
NE 696	Nuclear Systems Design

## Mathematics, physics, and chemistry

Engineering students with interests in research should plan on graduate study. Preparation at the undergraduate (B.S.) level could be enhanced by additional courses in mathematics and the basic sciences. Refer to the departmental listings in the College of Arts and Sciences section for possible electives.

## Food engineering

Engineers are needed in the food industry for process development and design, equipment design, and management of operations. Students should select technical electives to augment a background in chemistry, microbiology, agricultural and food sciences, and process engineering.

## Natural resources/environmental sciences secondary major

Increasing national and international concerns have generated opportunities for individuals to contribute to the resolution of environmental and resource problems. These issues are so complex that they lie beyond the scope of any one discipline.

The natural resources and environmental science secondary major broadens students' perspectives through course offerings and interaction with students and faculty from many disciplines. The secondary major prepares students to apply broadly-based knowledge to the use, management, sustainability, and quality of soil, air, water, mineral, biological, and energy resources.

Interested students should contact Steve J. Thien, director, 317B Throckmorton Hall, 532-7207.

## Dual Degrees

Students who want to pursue interdisciplinary interests in depth may wish to enroll in a dual degree program. There are no minimum semester hours required, but the requirements for both degrees must be satisfied. To com-

plete two degrees in an optimum time, students should consult with an assistant dean in the Engineering Student Affairs Office at the earliest opportunity. Students will also be required to consult with the dean's office in the college from which the second degree is earned. Popular combinations are:

### Engineering and business administration

The management option is the most popular, but the option in marketing is an excellent combination for the engineering student planning a career in technical sales. Because of course sequence requirements, students should begin the dual degree program in their sophomore year.

Instead of a dual degree, students with a 3.0 GPA or higher should consider an MBA, or the engineering management option of the M.S. degree in industrial engineering.

### Agricultural engineering and grain science and industry

The two most popular options are feed science and management, and milling science and management.

### Architectural engineering and architecture

Students enrolled in architectural engineering, and construction science and management programs that also earn a dual degree in Architecture have the additional opportunity of becoming a licensed architect.

### Civil engineering and geology

Students interested in specializing in foundation engineering are advised to complete the B.S. degree requirements in civil engineering plus the requirements to qualify for the B.S. degree in geology.

### Chemistry and chemical engineering

In addition to the required courses in chemical engineering, interested students should take courses in foreign languages and chemistry to qualify for the B.S. degree in chemistry.

### Electrical engineering and computer engineering

This dual degree allows a person to function across a wider range of technical areas.

### Electrical engineering and mechanical engineering

Some job opportunities in the fields of energy, controls, and heating and air conditioning require the combined background of these two areas.

## Support Services

### Center for Effective Teaching

Kenneth K. Gowdy, Associate Dean

The Center for Effective Teaching is organized to further the college's goal of excellence in teaching. The center sponsors 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.

The center's activities are coordinated by an advisory committee of students and faculty from the College of Engineering.

### Center for Energy Studies

N. Dean Eckhoff, Director

The center conducts interdisciplinary studies and provides leadership training in the planning, design, and operation of fuel production processes, power generation, and transportation and utilization systems, and in policy matters involving the management of energy resources.

The center carries out basic as well as mission-oriented studies on problems related to energy resources and power production, disseminates the results of these studies through seminars and publication of reports, and provides information to students and personnel from government and industry to upgrade their professional competence.

### Center of Excellence, Advanced Manufacturing Institute

Farhad Azadivar, Director

The Advanced Manufacturing Institute assists in Kansas economic development through research, technology transfer, and technical assistance. AMI supports interdisciplinary research in advanced manufacturing technologies by faculty from the College of Engineering and other K-State colleges. Emphasis is on advanced technologies for manufacturing and production systems, computer-integrated and intelligent manufacturing systems, intelligent processing of engineered materials, and computer vision/image processing.

AMI supports cooperative research with industry to develop and transfer new technology from the laboratory to commercial producers. The institute also assists Kansas companies in expanding services, designing new products, and increasing productivity. A major component of AMI is the Integrated Design, Manufacture, and Assembly Lab. AMI is a Kansas Technology Enterprise Corporation Center of Excellence.

### Center for Hazardous Substance Research

Larry E. Erickson, Director  
Stanley C. Grant, Associate Director

The Center for Hazardous Substance Research is the regional headquarters for the Environmental Protection Agency's Great Plains and Rocky Mountain Hazardous Substance Research Center. The center provides a focal point for research and research communication. Specific goals and objectives are to: (1) provide leadership and foster the conduct of hazardous substance research, (2) have a point of contact for industrial and governmental officials with hazardous waste research concerns, (3) develop a professional staff of faculty members who can conduct contract and grant research for industry and government, (4) maintain safe and proper environment for the conduct of hazardous and toxic substance research, (5) furnish well-equipped laboratories for hazardous substance research, (6) generate opportunities for research training of students in the area of hazardous substance research, and (7) enhance the climate for economic development in Kansas for the waste processing industry.

### Center for Transportation Research and Training

Eugene R. Russell, Sr., Director

The center conducts interdisciplinary research and training in the planning, design, and operation of rural and urban transportation systems.

The center carries out 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.

The center also hosts an annual transportation conference for state and local public employees in the transportation sector.

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.

### College of Engineering Research Council

Donald E. Rathbone, Governor  
Gale G. Simons, Director

The College of Engineering Research Council is a quasiprivate organization developed under the KSU Research Foundation. The

council serves mainly College of Engineering researchers.

It is an organization, essentially parallel to the Engineering Experiment Station, which handles proposals or projects that have an industrial involvement. Many of the proposals or projects are interdisciplinary, conducted either within the college or between the college and other colleges and departments at K-State.

Certain elasticities have been built into the organization to better handle industrial contracts. These tractable areas include flexibility in contract negotiations (patents, proprietary information, etc.), and simplified procurement procedures.

### Engineering Experiment Station

Gale G. Simons, Associate Dean for Research and Director

The College of Engineering is committed to the concept that good teaching and good research complement each other to the benefit of the student, the public, and the faculty member. The experiment station is the division of the college responsible for the administration of research.

The research faculty of the experiment station is composed of members of all departments of the college. Researchers from the Engineering Experiment Station work closely with those from the Agricultural Experiment Station and with others from within the university on projects of mutual concern.

The activities of the Engineering Experiment Station are funded by state appropriations and by grants and contracts from governmental agencies and private industries. The annual research budget is more than \$10 million.

### Engineering Extension Programs

Richard B. Hayter, Director

Engineering Extension Programs is a collection of services created to serve Kansans through the transfer of technology from the campus and laboratory to home and businesses.

Engineering Extension reaches out through its own short courses, conferences, seminars, and workshops to provide information to audiences ranging from the lay public to users of sophisticated technology, including engineering and manufacturing personnel.

Engineering Extension's educational and training programs focus on energy and the environment, helping energy consumers in residential, commercial, and industrial buildings to better manage their energy resources. Information emphasizes residential construction and retrofit for energy efficiency, maintenance techniques in commercial and institutional buildings, building environmental control systems, and system design for energy ef-

iciency. Engineering Extension targets these programs toward building designers, contractors, building operators, and owners.

Engineering Extension also coordinates off-campus graduate courses by the College of Engineering. These courses can be available to the general public or be packaged as educational activities delivered for, and supported by, a specific industry or organization. Many of these courses are delivered electronically to educational sites in selected areas of Kansas.

## Institute for Computational Research in Engineering and Science

J. Kenneth Shultis, Director

The Institute for Computational Research in Engineering and Science was established to promote computational research, to develop better research computing facilities, to provide administrative support for computer-oriented activities, and to foster cooperative efforts among members of K-State's research community.

The activities of ICRES are interdisciplinary in nature and span a wide range of research topics with emphasis on computer modeling and simulation. ICRES serves as a university-wide center for the exchange of computational techniques among researchers and for the development of computer facilities dedicated to research. The institute presently is serving as a focus to develop high-end computing capabilities to meet the needs of computational researchers in engineering and science.

Other objectives of the institute include preparation of research proposals for computational research; the encouragement of creative uses of computers; the dissemination of computing information through seminars, conferences and institute publications; and the development of software for engineering and scientific research.

## Institute for Environmental Research

M.H. Hosni, Director  
Elizabeth A. McCullough, Co-Director

The Institute for Environmental Research serves as a focal point for interdisciplinary research on thermal environmental engineering and the thermal interaction between people and their thermal environment.

The institute is administered by the College of Engineering and research is administered through the Engineering Experiment Station. It works in cooperation with academic departments from throughout the university. Faculty and students from these departments participate in the institute's research programs, use the facilities for their own research, and utilize the facilities for specialized graduate courses and seminars. Research funding is primarily

from contracts with private companies and government agencies.

Research facilities are available for controlling and measuring thermal environmental parameters over a range of conditions, for measuring thermal characteristics of clothing, and for measuring human physiological variables.

Major facilities include: environmental chambers ranging in size from 40 to 280 square feet and with operating temperatures ranging from -30 to 150 degrees F.; thermal manikins for measuring clothing insulation; hot plates for measuring the thermal resistance of fabric or insulation systems; and an infrared thermal imaging system for measuring human body, clothing, or building surface temperature profiles.

## Institute for Systems Design and Optimization

L. T. Fan, Director

The Institute for Systems Design and Optimization promotes interdisciplinary research, teaching, and communications in systems engineering.

The institute is administered through the College of Engineering and the Engineering Experiment Station and provides channels of communication between disciplines throughout the university in engineering systems design.

Specific objectives of the institute include interdisciplinary research; systems seminars and conferences; preparation of research proposals; and providing assistance in recruiting of graduate students, post-doctoral students, and faculty.

## Nuclear Reactor Facility

Richard E. Faw, Director

K-State 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 that is essentially nondestructive 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.

# General Engineering

Donald E. Rathbone, Dean  
Tom C. Roberts, Assistant Dean

## General engineering (DEN)

Entering freshmen who are undecided in their 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. Undecided students are encouraged to select a major by the beginning of their sophomore year.

Fall semester	
ENGL 100	Expository Writing I ..... 3
CHM 210	Chemistry I ..... 4
MATH 220	Analytic Geometry and Calculus I ..... 4
DEN 160	Engineering Concepts ..... 2
Humanities or social science electives	..... 3
KIN 101	Principles of Physical Fitness ..... 1
<b>17</b>	

Spring semester	
SPCH 105	Public Speaking 1A ..... 2
CHM 230	Chemistry II ..... 4
MATH 221	Analytic Geometry and Calculus II ..... 4
ECON 110	Principles of Macroeconomics ..... 3
Humanities or social science elective	..... 3
<b>16</b>	

Courses in personal and professional development, engineering honors, minority engineering, and other student development programs are included in general engineering.

Courses related to the B.S. degree in nuclear reactor technology are also included in general engineering to support outreach programs to the nuclear power industry.

## Nuclear reactor technology

This program provides the education necessary for careers associated with assisting engineers in the design, construction, inspection, maintenance, monitoring, and management of nuclear reactor power generation facilities. Primary employment positions are senior reactor operators and shift technical advisors. Other employment opportunities include similar responsibilities in medical and industrial facilities where radioactive materials are used.

### Area of specialization (62 hours)

Required courses (48 hours)	
CE 231	Statics A ..... 3
CE 331	Strength of Materials A ..... 3
CHM 230	Chemistry II ..... 4
ET 410	Properties of Engineering Materials .... 2
ET 436	Digital Logic Systems I ..... 4
ET 480	Materials of Nuclear Reactor Systems 2
ET 481	Nuclear Reactor Technology I ..... 3
ET 482	Nuclear Reactor Technology Analysis 3
ET 512	Mechanics of Fluids ..... 3
ET 514	Energy Conversion Technology ..... 3
ET 534	Automatic Control Technology ..... 3
ET 537	Electronic Measurements ..... 4
ET 583	Nuclear Reactor Technology II ..... 3
ET 584	Radiation Detection and Monitoring ... 3
ET 585	Nuclear Reactor Thermal Technology . 3
ET 586	Radiation Protection Technology ..... 2

Technical electives	..... 10
Management electives	..... 3
Free elective	..... 1

## General engineering courses

### Undergraduate credit

**DEN 120. Minority Engineering Enrichment Seminar.** (3) I. Introduction to the academic and intellectual demands of an engineering curriculum from a multicultural perspective. Develop group cohesiveness and an attitude of mutual support by engaging in collaborative learning. Help students acquire effective study methods, analyze/compare learning/teaching styles, prepare for and improve examination performance, promote optimum utilization of campus resources, develop leadership and communication skills and enhance self-esteem. Credit may not be applied towards an engineering degree.

**DEN 160. Engineering Concepts.** (2) I. An introduction to engineering and engineering design. Problems involving the basic concepts of engineering science are considered. Two class periods a week. Pr.: Two high school units of algebra, one high school unit of geometry, and one-half high school unit of trigonometry.

**DEN 200. Kansas State Engineer Journalism.** (1-2) I, II. Editorial and business staff work on the Kansas State Engineer. Pr.: Junior classification and consent of dean.

**DEN 201. Amateur Radio Theory I.** (1) I, II. Theory and practice of amateur ("ham") radio operation. Basics of radio electronics, antennas, FCC regulations, Morse code; successful completion of the course should ensure passing the FCC Novice and "no-code" technician examinations. Credit may not be applied toward an engineering degree. Two hours rec. a week for ten weeks. (Includes examinations).

**DEN 202. Amateur Radio Theory II.** (1) I, II. Theory and practice of amateur ("ham") radio operation. More basics of radio electronics, antennas, FCC regulations, Morse code; successful completion of the course should ensure passing the FCC General class examination. Credit may not be applied toward an engineering degree. One hour rec. and one hour Morse code lab a week. Pr.: DEN 201 or FCC Novice or "no-code" technician.

**DEN 220. Minority Engineering Colloquium.** (1) II. Continuation of DEN 120. Emphasis on career exploration and development, introduction to graduate school options, preparation and responsibility for advising process, tips on breaking the failure cycle, behavior modification strategies, and developing and utilizing leadership skills. Credit may not be applied towards an engineering degree.

**DEN 275. STARS Program: Introduction to Personal and Professional Development.** (1) I, II. Overview of major topics related to personal and professional development, including communication, leadership, teamwork, total quality management, and ethics. One hour lec. and one hour activity a week. Pr.: Sophomore standing in the College of Engineering.

**DEN 299. Honors Seminar in Engineering.** (1) I, II. Selected topics of general interest. May be taken twice for credit by engineering honor students starting in the second semester of the freshmen year.

**DEN300. Introduction to Total Quality Management.** (1) I, II. Overview of major topics related to Total Quality Management (TQM), including managerial and engineering aspects. One hour lec. a week. Pr.: MATH 100, sophomore standing. Cross-listed with MGMT 300.

**DEN 380. Principles of Solar Energy Conversion and Utilization.** (3) I. Solar radiation; solar collectors; engineering principles of solar house space heating, cooling, and water heating; conversion of solar energy into mechanical power and electricity; solar engines; application of solar energy in industrial processes; calculations of efficiency of solar energy conversion processes; cost analysis of various solar applications. Three hours rec. a week. Pr.: PHYS 113.

**DEN 399. Honors Colloquium in Engineering.** (1) II. Selected topics of general interest. Open to students in the engineering honors program for one semester.

**DEN 400. Career Management for Engineers.** (1) I, II. A seminar course which considers the basic factors in professional career management; career paths and strategies; important factors for success. One hour rec. a week. Pr.: Junior or senior standing in the College of Engineering.

**DEN 420. Introduction to Alternative Energy Sources.** (3) II. Introduction to solar, geothermal, wind, tidal, thermal sea gradients, breeder reactor, and fusion energy sources. Concepts, devices, potential, economics, and status of each energy source. Introduction to the all-electric economy. Three hours rec. a week. Open to all nonengineering and first- and second-year engineering students.

**DEN 425. Introduction to Energy and Environmental Technology.** (2) I, II. An introductory course for nonengineering students. An introduction to the technology employed in analyzing energy and pollution control processes. The course emphasizes energy problems, control of water and air pollution, food and land use problems, and material recycling concepts. Not open to engineering students. Two hours lec. a week.

**DEN 450. Impact of Technology on Society.** (3) I, II. A study of social, economic, and environmental problems as a function of technology. Study of effect 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. Sophomore standing or above.

**DEN 499. Honors Research in Engineering.** (1) I, II. Individual research problem selected with approval of faculty advisor. Open to seniors in the engineering honors program for two semesters. Written report is presented at end of second semester.

**DEN 550. Engineering Law.** (3) I, II. An introduction to concepts of law pertinent to engineering practice. These include contracts, torts, products liability, business associations, engineering licensing, real and personal property law, commercial law, and taxes. Three hours rec. a week. Pr.: Junior standing.

**DEN 582. Natural Resources/Environmental Sciences Project (NRES).** (3) I, II. A comprehensive project in NRES. Requires integration of information and understanding acquired in NRES secondary major courses. Students must prepare and present written and oral reports. Three hours rec. a week. Pr.: ENGL 415, SPCH 105. Pr. or conc.: 15 hours of approved courses in NRES secondary major. Cross listed with DAS 582 and GENAG 582.

**DEN 740. Applied Linear Analysis.** (3) I. The application of linear analysis to engineering problems, including derivations of equations, exact and approximate solutions of 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.

## Nuclear engineering technology courses

### Undergraduate credit

**ET 480. Materials of Nuclear Reactor Systems.** (2) On sufficient demand. The properties and behavior of fuel and nonfuel materials used in nuclear reactor systems are considered. Selected nuclear fuel cycle topics are covered. Two hours rec. a week. Pr.: ET 410.

**ET 481. Nuclear Reactor Technology I.** (3) On sufficient demand. Introduction to nuclear and neutron physics, including: interaction of neutrons, gamma rays, and beta and alpha particles with matter; production of neutrons and the neutron life cycle; basic neutron diffusion principles; and the nuclear fuel cycle. Three hours rec. a week. Pr.: PHYS 114, STAT 320.

**ET 482. Nuclear Reactor Technology Analysis.** (3) I. Applied numerical analysis emphasizing solutions of elementary differential equations with a very strong emphasis on applications in nuclear reactor technology. Three hours rec. a week. Pr.: MATH 211 or equiv.

### Undergraduate or graduate credit in minor field

**ET 583. Nuclear Reactor Technology II.** (3) On sufficient demand. Theory of diffusion and slowing down of neutrons with application to subcritical and critical reactors; introduction to the time behavior of reactor systems. Three hours rec. a week. Pr.: ET 481.

**ET 584. Radiation Detection and Monitoring.** (3) On sufficient demand. Principles of operation of detectors used in the measurement and monitoring of ionizing radiation. Three hours rec. a week. Pr.: ET 480.

**ET 585. Nuclear Reactor Thermal Technology.** (3) On sufficient demand. Introduction to conduction, convection, and radiation heat transfer as applied to reactor cores and systems. Consideration of nuclear reactor safety and power reactor systems. Three hours rec. a week. Pr.: ET 481.

**ET 586. Radiation Protection Technology.** (2) On sufficient demand. A study of radiation protection environmental effects of radiation and an introduction to nuclear reactor shielding. Two hours rec. a week. Pr.: ET 584.

## Architectural Engineering/Construction Science

Charles L. Burton, Head

Professors Bissey\* and Burton;\* Associate Professors Goddard, Hayter, Knostman, Roberts,\* and Waters; Assistant Professors Fritchen, Goodman, and Riblett; Instructors Bluhm, Imel, Moser, and Schlageck; Emeriti: Professors Dahl, Hodges, Lindley, Mingle, and Thorson; Associate Professor Blackman

### Architectural engineering

The architectural engineering program is planned for students who are particularly interested in the engineering aspects of building design. Architectural engineers must be sympathetic with the practical, functional, and aesthetic possibilities of contemporary materials, and with mechanical, electrical, plumbing, and structural systems. As important members of building design teams, they must be able to create designs that will answer the economic, safety, and aesthetic requirements of a project.

Included in the academic program are exercises in many of the courses beginning in the freshman year and continuing through the fifth year to develop skills in the engineering design process. The last course in this sequence is Senior Project, a culmination of all the previous design experiences from the first four and one-half years of the curriculum. Architectural engineers must have a working ability with total and system design concepts.

### Curriculum in architectural engineering (ARE)

Bachelor of science in architectural engineering  
162 hours required for graduation  
Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology

#### Freshman Fall semester

ENVD 205	Graphics I .....	2
ENGL 100	Expository Writing I .....	3
MATH 220	Analytic Geometry and Calculus I .....	4
CHM 210	Chemistry I .....	4
CNS 200	History of Building and Construction ...	3
ARE 020	Architectural Engineering Seminar .....	0

**Spring semester**

ENVD 206	Graphics II .....	2
CNS 320	Construction Materials .....	2
MATH 221	Analytic Geometry and Calculus II .....	4
CHM 230	Chemistry II .....	4
CNS 210	Introduction Construction Computer Programming .....	3
KIN 101	Principles of Physical Fitness .....	1
ARE 020	Architectural Engineering Seminar .....	0
		<b>16</b>

**Sophomore****Fall semester**

ART 190	Drawing I .....	2
CNS 321	Construction Techniques and Detailing .....	3
PHYS 213	Engineering Physics I .....	5
MATH 222	Analytic Geometry and Calculus III .....	4
ENGL 200	Expository Writing II* .....	3
<b>or</b>		
Humanities or social science elective .....		3
ARE 020	Architectural Engineering Seminar .....	0
		<b>17</b>

**Spring semester**

CNS 325	Construction Drawing .....	3
CE 333	Statics .....	3
PHYS 214	Engineering Physics II .....	5
MATH 240	Elementary Differential Equations .....	4
SPCH 105	Public Speaking I .....	2
ARE 020	Architectural Engineering Seminar .....	0
		<b>17</b>

**Junior****Fall semester**

ME 512	Dynamics .....	3
CE 533	Mechanics of Materials .....	3
CE 534	Mechanics Materials Lab .....	1
ECON 110	Principles of Macroeconomics .....	3
ME 513	Thermodynamics .....	3
ARE 532	Lighting Systems Design .....	2
ARE 020	Architectural Engineering Seminar .....	0
		<b>15</b>

**Spring semester**

ARE 537	Acoustic Systems .....	2
ART 100	Design I .....	2
CE 537	Introduction to Structural Analysis .....	4
ARE 534	Thermal Systems .....	3
CE 212	Elementary Surveying Engineering .....	3
GEOL 100	Introduction to Geology .....	3
ARE 020	Architectural Engineering Seminar .....	0
		<b>17</b>

**Senior****Fall semester**

ARE 411	Architectural Engineering Design .....	3
ENGL 415	Written Communication for Engineers ..	3
EECE 519	Electrical Circuits and Control .....	4
ARE 524	Theory of Structures II .....	3
Complementary elective .....		3
ARE 020	Architectural Engineering Seminar .....	0
		<b>16</b>

**Spring semester**

ARE 523	Timber Structure .....	2
ARE 536	Plumbing/Fire Protection System Design .....	3
ARE 528	Theory of Structures III .....	3
ARE 533	Building Electrical Systems .....	3
ME 571	Fluid Mechanics .....	3
Humanities or social science elective .....		3
ARE 020	Architectural Engineering Seminar .....	0
		<b>17</b>

**Fifth year****Fall semester**

ARE 590	Integrated Building System Design .....	3
CE 522	Soil Mechanics I .....	3
ARE 640	Building Mechanical Systems .....	3
Complementary elective .....		5
Elective .....		3
ARE 020	Architectural Engineering Seminar .....	0
		<b>17</b>

**Spring semester**

ARE 690	Senior Project .....	3
ARE 539	Architectural Engineering Management ..	3
Complementary elective .....		5
Humanities or social science elective .....		3
ARE 020	Architectural Engineering Seminar .....	0
		<b>14</b>

\*Expository Writing II is optional if prerequisites for Written Communications for Engineers (ENGL 415) are met from Expository Writing I.

Humanities and social science electives are to be selected from the approved catalog list. From the areas listed, at least two advanced level courses must be taken. See catalog requirements.

Complementary electives are to be selected from the approved departmental lists.

## Construction science and management

The construction science and management program prepares students to be professional constructors, managers of personnel resources, financial resources, materials, and machines. The curriculum is an engineering-based management program designed to produce technically competent managers of construction. Entering students should have a background in mathematics and physics.

The program prepares graduates to execute the designs created by engineers and architects. Graduates may enter fields of general, heavy and highway, utility, mechanical, or electrical construction. Their education provides the fundamental engineering and management skills necessary for success in any of the above areas.

Constructors work in many settings. For example, as a principal in a small construction firm, a constructor may engage in many of the activities in management, whereas a constructor in a large firm may concentrate exclusively on only one or two of the activities. Most students in the program intend to enter building, heavy/highway, or utility construction fields. Other roles, such as construction education, will normally require an advanced degree and/or professional experience.

Through construction education, students attain a level of construction knowledge that would otherwise require decades of practical experience to develop. With this level of knowledge, graduates typically move rapidly into upper management positions in construction organizations.

## Curriculum in construction science and management (CNS)

Bachelor of science in construction science and management

134 hours required for graduation

Accredited by the American Council for Construction Education

**Freshman****Fall semester**

ENVD 205	Graphics I .....	2
MATH 210	Technical Calculus I .....	3
CNS 200	History of Building and Construction ...	3
SPCH 105	Public Speaking IA .....	2

ENGL 100	Expository Writing I .....	3
CNS 320	Construction Materials .....	2
CNS 016	Construction Seminar .....	0
		<b>15</b>

**Spring semester**

ENVD 206	Graphics II .....	2
MATH 211	Technical Calculus II .....	3
PHYS 113	General Physics I .....	4
CE 212	Elementary Surveying Engineering .....	3
CNS 210	Introduction to Construction Computer Programming .....	3
KIN 101	Principles of Physical Fitness .....	1
CNS 016	Construction Seminar .....	0
		<b>16</b>

**Sophomore****Fall semester**

CNS 321	Construction Techniques and Detailing ..	3
CE 231	Statics A .....	3
CNS 330	Site Construction .....	3
ECON 110	Principles of Macroeconomics .....	3
GEOL 100	Introductory Geology .....	3
ENGL 200	Expository Writing II .....	3
<b>or</b>		
Humanities or social science elective .....		3
CNS 016	Construction Seminar .....	0
		<b>18</b>

**Spring semester**

CNS 325	Construction Drawings .....	3
CE 331	Strength of Materials .....	3
CE 332	Strength of Materials Lab .....	1
PHYS 114	General Physics II .....	4
ACCTG 231	Accounting for Business Operations ....	3
Humanities or social science electives .....		3
CNS 016	Construction Seminar .....	0
		<b>17</b>

**Junior****Fall semester**

CNS 522	Theory of Structures .....	3
CNS 536	Water Supply and Plumbing .....	3
CNS 535	Electrical Service and Installation .....	3
ARE 537	Acoustic Systems .....	2
Management elective .....		3
Humanities or social science elective .....		3
CNS 016	Construction Seminar .....	0
		<b>17</b>

**Spring semester**

CNS 523	Timber Construction .....	2
CNS 540	Construction Methods and Equipment ..	3
CNS 534	Heating and Air Conditioning .....	3
MANGT 390	Business Law I .....	3
ENGL 415	Written Communication for Engineers ..	3
Management elective .....		3
CNS 016	Construction Seminar .....	0
		<b>17</b>

**Senior****Fall semester**

CNS 524	Steel Construction .....	3
CNS 540	Construction Operations .....	3
CNS 641	Construction Estimating .....	3
CNS 642	Construction Management .....	3
Management or professional elective .....		3
Professional elective .....		2
CNS 016	Construction Seminar .....	0
		<b>17</b>

**Spring semester**

CNS 528	Concrete and Masonry Construction ....	3
CNS 645	Construction Schedule and Cost Construction .....	2
CE 322	Soil and Foundation Construction .....	3
Management or professional elective .....		3
Professional elective .....		3
Humanities or social science elective .....		3
CNS 016	Construction Seminar .....	0
		<b>17</b>

Expository Writing II is optional if prerequisites for Written Communications for Engineers (ENGL 415) are met from Expository Writing I.

Humanities and social science electives are to be selected from the approved catalog list. From the areas listed, at least two advanced level courses must be taken.

Management electives and professional electives are to be selected from approved departmental lists.

## Architectural engineering courses

**ARE 020. Architectural Engineering Seminar.** (0) I, II. Presentation of professional problems and practices by students, faculty, and professionals associated with the career of architectural engineering. One hour lec. a month.

### Undergraduate credit

**ARE 100. Architectural Engineering Orientation.** (2) II. Introduction to architectural engineering; emphasis on relationship of architectural engineering to the building industry. Two hours lec. a week.

**ARE 311. CAD in Engineering and Construction.** (2) I, II. On sufficient demand. Basics of CAD and the applications to the engineering and construction industry. Two hours lecture and six hours lab a week (7 week course). Pr.: CNS 210.

**ARE 411. Architectural Engineering Design.** (3) I, II. Principles and elements of design; synthesis of structural, mechanical, electrical, lighting, sanitary, and construction systems, considering interrelationship in performance and economics. Nine hours lab a week. Pr.: ART 100, 190, CNS 325.

**ARE 499. Honors Research in Architectural Engineering.** (Var.) I, II. Individual research problem selected with approval of faculty advisor. Open to students in the College of Engineering honors program. A report is presented orally and in writing during the last semester.

### Undergraduate and graduate credit in minor field

**ARE 523. Timber Structures.** (2) I, II. Analysis and design of timber structures using solid and laminated materials. Two hours rec. a week. Pr.: CE 537.

**ARE 524. Theory of Structures II.** (3) I. Analysis and design of metal structures; emphasis on buildings. Two hours rec. and three hours lab a week. Pr.: CE 537.

**ARE 528. Theory of Structures III.** (3) II. Design of reinforced concrete building frames; footings, columns and floor systems, attention being given to costs and economical design. Two hours rec. and three hours lab a week. Pr.: CE 537.

**ARE 532. Lighting Systems Design.** (2) I. Study of human needs in lighting, lighting sources, lighting systems design, and application. Two hours rec. a week. Pr.: PHYS 114 or 214.

**ARE 533. Building Electrical Systems.** (3) II. Study of basic design of building electrical systems including circuit design, power distribution and service equipment, communications systems, and special electrical systems. Three hours rec. a week. Pr.: EECE 519.

**ARE 534. Thermal Systems.** (3) I, II. Study of 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 engineering design. Three hours a week. Pr.: PHYS 214 and CNS 321.

**ARE 536. Plumbing/Fire Protection Systems Design.** (3) I, II. Sewage disposal systems, building plumbing and fire protection systems, space relationships, equipment requirements as related to architectural design, structural systems, construction materials, and techniques. Three hours rec. a week. Pr.: PHYS 213 and CNS 321.

**ARE 537. Acoustic Systems.** (2) I, II. Hearing and the ear, sound generation, acoustical correction, noise reduction, and sound transmission all as integral parts of architectural design. Two hours rec. a week. Pr.: PHYS 113 or 213.

**ARE 539. Architectural Engineering Management.** (3) I, II. General business and management procedures. Drawings, specifications, and conceptual estimating. Contracts, bonds, liability, arbitration, and insurance. Project financing. Three hours rec. a week. Pr.: ARE 590.

**ARE 590. Integrated Building System Design.** (3) I, II. Methods for integration and coordination of structural, mechanical, electrical and lighting systems in the building architectural design process. Two hours rec., three hours lab per week. Pr.: ARE 411.

**ARE 620. Problems in Architectural Engineering.** (Var.) 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 department head.

**ARE 640. Building Mechanical Systems.** (3) II. Study of heat gain using computers, pump laws, fan laws, various types of HVAC air systems, chilled water systems, heat pump systems, refrigeration, introduction to mechanical system controls. Two hours rec. and three hours lab a week. Pr.: ARE 534, or Pr. or Conc.: ME 571.

**ARE 690. Senior Project.** (3) I, II. Student working individually with laboratory support will prepare and present a project of appropriate scope and complexity with emphasis on structural, mechanical, acoustical, electrical and lighting requirements. Nine hours lab a week. Pr.: ARE 523, 524, 528, 532, 533, 534, 536, 537, 590, and 640.

### Undergraduate and graduate credit

**ARE 710. Building Energy Analysis.** (V) I. Study of building energy consumption and current modeling techniques to analyze overall energy usage including: auditing of existing buildings, economic evaluation and energy efficient system selection for new construction. Two or three rec. hours a week. Pr.: ARE 534.

**ARE 720. Topics in Architectural Engineering.** (V) I, II, S. A study of specific design problems in architectural engineering. Pr.: or conc.: ARE 590.

**ARE 724. Advanced Sanitation Systems.** (3) I. Water quality and treatment, pressure control, and hydraulics in domestic water and waste systems. Three hours rec. a week. Pr.: ARE 536 or CNS 536.

**ARE 731. Advanced Lighting Design.** (3) I. Design of all types of building lighting including exterior and site lighting. Calculations and layout utilizing zonal cavity, point by point, and computer-assisted lighting calculations methods. Three hours rec. a week. Pr.: ARE 635.

**ARE 734. Building Thermal Systems Design.** (3) II. Design and specifications of selected thermal and mechanical systems for structures. The course uses all the modern techniques of thermal/mechanical system design for buildings. Students are required to develop term research design projects. Two hours rec. and three hours lab a week. Pr.: ARE 640.

**ARE 735. Electrical Systems Design.** (3) II. Complete design and specifications of electrical systems for a selected structure. The course uses the National Electrical Code in conjunction with all the modern techniques of electrical systems design for buildings. Students are required to develop term research design projects. Two hours rec. and three hours lab a week. Pr.: ARE 533.

**ARE 740. Environmental Control Systems in Buildings.** (3) II. Electric, electronic, and pneumatic control systems to optimize energy usage and environmental comfort in buildings. Three hours rec. a week. Pr.: ARE 734 and 735.

**ARE 742. Communications and Energy Management Systems Design.** (3) II. Detailed design and analysis of special electrical systems for buildings including, but not limited to, energy management, fire alarm, and communication systems. Three hours rec. a week. Pr.: ARE 735.

**ARE 760. Masonry Structural Design.** (3) II. Introduction to masonry materials, specifications, testing and construction methods. The design of unreinforced and reinforced masonry structures according to applicable building codes. Three hours rec. a week. Pr.: ARE 528 or equivalent first course in reinforced concrete design.

**ARE 780. Theory of Structures IV.** (3) II. Continuation of Theory II and III, with special emphasis on the complete problem of the structure as a whole. Three hours a week. Pr.: CE 537 and ARE 523, 524, and 528.

## Construction science and management courses

### Undergraduate credit

**CNS 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. a month.

**CNS 200. History of Building and Construction.** (3) I, II. An introduction to the art and science of building. Historical review from ancient to contemporary including related construction methods, equipment, and systems. Three hours rec. a week.

**CNS 210. Introduction to Construction Computer Programming.** (3) I, II. Computer and disk operating systems, programming techniques, and spread sheets for construction applications. Pr.: MATH 150, 3 hours rec. per week.

**CNS 320. Construction Materials.** (2) I, II. Study and analysis of construction materials, their properties, selection, and use. Two hours rec. a week. Pr.: ENVD 205.

**CNS 321. Construction Techniques and Detailing.** (3) I, II. Study of construction methods and procedures in the assembly of building materials. Nine hours lab a week. Pr.: ENVD 206, CNS 320.

**CNS 325. Construction Drawings.** (3) I, II. Production of a set of construction drawings. Emphasis on construction procedures. Introduction to shop drawings. Nine hours lab a week. Pr.: CNS 321.

**CNS 330. Site Construction.** (3) I, II. Study of site construction problems and procedures, site survey and investigations, review of site plans, construction layouts, earthwork calculation, excavation/shoring methods, computer applications. Two hours rec. and three hours lab a week. Pr.: CE 212, CNS 210, ENVD 206.

**CNS 499. Honors Research in Construction Science.** (Var.) I, II. Individual research problem selected with approval of faculty advisor. Open to students in the College of Engineering honors program. A report is presented orally and in writing during the last semester.

### Undergraduate and graduate credit in minor field

**CNS 510. Computer Applications in Construction Science.** (V) I, II. On sufficient demand. Applications of specialized computer techniques to the solution of problems in construction science. By appointment. Pr.: CNS 210.

**CNS 522. Theory of Structures.** (3) I, II. The elastic analysis of determinate and indeterminate structures. Emphasis on equilibrium equations, shear and moment diagrams, and solving forces in trusses. Includes solutions of indeterminate structures by moment distribution and matrix stiffness method with microcomputer applications. Three hours rec. a week. Pr.: CE 331.

**CNS 523. Timber Construction.** (2) I, II. Principles of design, fabrication, and erection of timber structures including both solid and laminated materials. Two hours rec. a week. Pr.: CNS 522.

**CNS 524. Steel Construction.** (3) I, II. Principles of design, fabrication, and erection of structural steel in conformance with codes. Two hours lec. and three hours lab a week. Pr.: CNS 522.

**CNS 528. Concrete and Masonry Construction.** (3) I, II. Principles of design, fabrication, and erection of concrete and masonry structures. Two hours lec. and three hours lab a week. Pr.: CNS 522.

**CNS 534. Heating and Air Conditioning.** (3) I, II. Principles of designing, applying, installing, and estimating heating and air conditioning systems for buildings. Three hours rec. a week. Pr.: PHYS 113 and CNS 321.

**CNS 535. Electrical Service and Installation.** (3) I, II. Basic design and construction of building electrical, lighting, and distribution systems with emphasis on the National Electrical Code and installation. Three hours rec. a week. Pr.: PHYS 114 and CNS 321.

**CNS 536. Water Supply and Plumbing.** (3) I, II. Principles and practices of plumbing and fire protection systems in buildings including code requirements and estimating. Three hours rec. a week. Pr.: PHYS 113 and CNS 321.

**CNS 540. Construction Methods and Equipment.** (3) I, II. Operations, costs, productivity of construction equipment. Investments/life cycle costing of the equipment. Equipment selection criteria and analysis. Construction methods. Three hours rec. a week. Pr.: CNS 321, 330, and 522.

**CNS 544. Problems in Construction Science.** (Var.) I, II, S. A study of specific design problems under the direct supervision of a member of the construction science faculty. Pr.: Junior standing.

**CNS 545. Heavy Construction Methods.** (3) I. Principles of asphalt, asphalt and concrete paving operations, concrete batch plant operations, heavy construction equipment, and applications. Three hours recitation a week. Pr.: CNS 325 and 540.

**CNS 634. Building Systems Installation and Commissioning.** (3) I. Principles and methods for proper installation, commissioning and maintaining of efficient performance of mechanical, plumbing, fire protection, electrical, and lighting systems in buildings. Three hours rec. a week. Pr.: CNS 534, 535, and 536.

**CNS 640. Construction Operations.** (3) I, II. Shop drawing and submittal processes, field and office practices, change orders, construction safety standards and practice, pre-construction planning, expediting, short-interval planning. Two hours rec. and three hours lab a week. Pr.: CNS 325 and 540. Conc.: CNS 641.

**CNS 641. Construction Estimating.** (3) I, II. Understanding estimating procedures, quantity surveying, specification reviews, pricing of an estimate, market analysis, subcontractor and supplier solicitation, and risk management, following the CSI format. Nine hours lab a week. Pr.: CNS 325 and 540.

**CNS 642. Construction Management.** (3) I, II. An introduction to the business of construction; study of legal considerations, contract documents, bonds and insurance. Evaluation of the characteristics of the construction firm, organization structure, and financial performance. Three hours rec. a week. Pr.: CNS 540.

**CNS 644. Topics in Construction Management.** (V) I, II. On sufficient demand. Topical material of importance in the management of construction such as marketing, ethics, personnel management, etc. Pr. or conc.: CNS 642.

**CNS 645. Construction Scheduling and Cost Control.** (2) I, II. Construction cost reporting and control. Construction planning, both long-term and short-interval, construction scheduling, monitoring, and controlling. Computer applications. One hour rec. and two hours lab a week. Pr.: CNS 640, 641, and 642.

**CNS 738. Mechanical and Electrical Estimating.** (2) I, II. Techniques of mechanical and electrical building systems estimating. Procedure for evaluating relative costs of different systems. Development of computer-aided finite and conceptual estimating techniques. Two three-hour labs a week. Pr.: ARE 534 and 533 or CNS 534 and 535.

# Biological and Agricultural Engineering

Stanley J. Clark, Head

Professors Chung,\* Clark,\* Harner,\* Kuhlman,\* Murphy, Powell, Schrock,\* Slocombe,\* Spillman,\* and Steichen;\* Associate Professors Black and Rogers; Assistant Professors Barnes, Maghirang, Taylor, and Zhang;\* Adjunct Professor Steele;\* Adjunct Associate Professors Chang\* and Hagen;\* Adjunct Assistant Professors Martin and Wagner;\* Emeriti: Professors Fairbanks, Holmes, Jepsen, Larson, Manges,

and Wendling; Associate Professors Baugher, Schindler, Stevenson, and TenEyck.

Biological and agricultural engineering is the field that applies engineering science and technology, as well as biological sciences, to food and fiber production, processing, and distribution systems. Biological and agricultural engineers provide an essential link between the biological sciences and engineering, which uses physical science to solve practical problems. Engineering fundamentals are applied to achieve the goal of a safe and stable food supply while considering human and environmental factors. Three curriculum options are available.

## General option with area of specialization

Biological and agricultural engineers develop techniques and equipment for using land and water resources to produce and process an array of biological products, including food, fiber, energy, chemical feedstocks, and pharmaceuticals. The increasing demand for agricultural products must be met within the constraints of greater competition for reduced land, water, and energy resources.

Balancing the conflicting needs of society will require engineers trained to apply engineering science in the control and management of biological processes. The first two years of study in the general option concentrate on mathematics, physical sciences, and biological sciences. The third and fourth years contain additional engineering science courses as well as technical electives that allow the student to pursue his or her specific interests. These areas are power and machinery, grain handling and processing, soil and water, and structures and environment.

## Environmental option

Biological and agricultural engineers work at the interface between biology and engineering, they must be knowledgeable in both disciplines. Applications in the environmental option include water quality studies of lakes, rivers, and groundwater, soil and water conservation, irrigation and drainage, waste treatment, management of air quality inside buildings and outside, remediation of land damaged by construction, mining, and other uses.

The environmental option focuses on the management and use of natural resources. Non-point pollution issues have long been a component of agricultural engineering programs. Soil conservation programs began in the 1930s, long before the environmental movement began. Non-point sources are a major environmental problem yet to be solved. This option is distinct from but interfaces with the environmental option in civil engineering.

## Secondary major in natural resources and environmental sciences

Students enrolled in biological and agricultural engineering, regardless of option, may participate in the natural resources and environmental sciences secondary major. Courses used for the secondary major may also be used for completing regular graduation requirements. Details are found the Natural Resources and Environmental Sciences section of this catalog.

## Food engineering option

Students pursuing the food engineering option can fulfill the requirements for a B.S. in agricultural engineering by following the food engineering option outline. Inherent in this program is the basic background of agricultural engineering with emphasis in food processing, and packaging and handling.

## Agricultural technology management

Description and curriculum outline are listed in the College of Agriculture section of this catalog.

## Curriculum in biological and agricultural engineering (BAE)

Bachelor of science in biological and agricultural engineering  
135 hours required for graduation  
Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology

### General option

#### Freshman

##### Fall semester

BAE 200	Engineering Methods .....	1
ECON 110	Principles of Macroeconomics .....	3
ENGL 100	Expository Writing I .....	3
CHM 210	Chemistry I .....	4
MATH 220	Analytic Geometry and Calculus I .....	4
BAE 020	Engineering Assembly .....	0
		<b>15</b>

##### Spring semester

BIOL 198	Principles of Biology .....	4
SPCH 105	Public Speaking 1A .....	2
MATH 221	Analytic Geometry and Calculus II .....	4
CHM 230	Chemistry II .....	4
KIN 101	Principles of Physical Fitness .....	1
BAE 020	Engineering Assembly .....	0
		<b>15</b>

### Sophomore

#### Fall semester

MATH 222	Analytic Geometry and Calculus III .....	4
PHYS 213	Engineering Physics I .....	5
CHM 350	General Organic Chemistry .....	3
NE 385	Engineering Computational Techniques .....	2
ENGL 200	Expository Writing II* .....	3
<b>or</b>		
	Elective .....	3
BAE 020	Engineering Assembly .....	0
		<b>17</b>

#### Spring semester

BAE 500	Properties of Biological Materials .....	2
MATH 240	Elementary Differential Equations .....	4
PHYS 214	Engineering Physics II .....	5
ME 212	Engineering Graphics I .....	2

Biology Elective .....	3
BAE 020     Engineering Assembly .....	0
	<b>16</b>

**Junior****Fall semester**

BAE 510     Environmental Design of Agricultural Buildings .....	3
ME 513     Thermodynamics I .....	3
AGRON 305     Soils .....	4
CE 530     Statics and Dynamics .....	4
	Humanities or Social Science Elective .. 4
BAE 020     Engineering Assembly .....	0
	<b>18</b>

**Spring semester**

BAE 512     Functional Analysis of Agricultural Machinery .....	3
BAE 521     Energy in Biological Systems .....	3
ME 571     Fluid Mechanics .....	3
ENGL 415     Written Communications for Engineers* .....	3
	Mechanics of Materials .....
CE 533     .....	3
BAE 020     Engineering Assembly .....	0
Humanities or social science elective .....	3
	<b>18</b>

**Senior****Fall semester**

BAE 536     Agricultural Engineering Design I .....	3
BAE 575     Fundamentals of Agricultural Process Engineering .....	3
EECE 519     Electric Circuits and Controls .....	4
BAE 530     Natural Resources Engineering .....	3
Technical elective .....	2
Design technical elective .....	3
BAE 020     Engineering Assembly .....	0
	<b>18</b>

**Spring semester**

Humanities or social science elective .....	6
Technical elective .....	6
Design technical elective .....	3
Biology elective .....	3
BAE 020     Engineering Assembly .....	0
	<b>18</b>

\*Expository Writing II is optional if prerequisites for Written Communication for Engineers (ENGL 415) are met from Expository Writing I. Elective is restricted to only a technical elective.

Humanities and social science electives are to be selected from the approved list and need not be taken in the order listed in the curriculum (usually two courses must be 400 level or above).

Technical electives are to be chosen with the advice and approval of the faculty advisor and department head and to include two courses in biological and agricultural engineering.

**Environmental option****Freshman****Fall semester**

ENGL 100     Expository Writing I .....	3
CHM 210     Chemistry I .....	4
MATH 220     Analytic Geometry and Calculus I .....	4
SPCH 105     Public Speaking IA .....	2
BAE 200     Engineering Methods .....	1
BAE 020     Engineering Assembly .....	0
Humanities or social science elective .....	3
	<b>17</b>

**Spring semester**

MATH 221     Analytic Geometry and Calculus II .....	4
ECON 110     Principles of Macroeconomics .....	3
CHM 230     Chemistry II .....	4
ME 212     Engineering Graphics .....	2
BIOL 198     Principles of Biology .....	4
BAE 020     Engineering Assembly .....	0
	<b>17</b>

**Sophomore****Fall semester**

MATH 222     Analytic Geometry and Calculus III .....	4
PHYS 213     Engineering Physics I .....	5

ENGL 120     Expository Writing II .....	3
	or
Elective .....	3
KIN 101     Principles of Physical Fitness .....	1
AGRON 305     Soils .....	4
BAE 020     Engineering Assembly .....	0
	<b>17</b>

**Spring semester**

MATH 240     Elementary Differential Equations .....	4
PHYS 214     Engineering Physics II .....	5
BAE 500     Properties of Biological Materials .....	2
CE 530     Statics and Dynamics .....	4
NE 385     Engineering Computational Techniques .....	2
BAE 020     Engineering Assembly .....	0
	<b>17</b>

**Junior****Fall semester**

CE 563     Environmental Engineering Fundamentals .....	3
ME 513     Thermodynamics I .....	3
CHM 350     General Organic Chemistry .....	3
BAE 551     Hydrology .....	2
CE 553     Hydrologic Methods Laboratory .....	1
ENGL 200     Expository Writing II* .....	
	or
Elective .....	3
Technical electives .....	3
BAE 020     Engineering Assembly .....	0
	<b>18</b>

**Spring semester**

BIOL 455     General Microbiology .....	4
EECE 519     Electric Circuits and Control .....	4
BAE 521     Energy in Biological Systems .....	3
ME 571     Fluid Mechanics .....	3
Humanities or social science electives .....	3
BAE 020     Engineering Assembly .....	0
	<b>17</b>

**Senior****Fall semester**

BAE 690     Non-Point Pollution Engineering .....	3
BAE 575     Fundamentals of Agricultural Process Engineering .....	3
BAE 536     Agricultural Engineering Design I .....	3
ENGL 415     Written Communications for Engineers* .....	3
	Technical elective .....
	4
BAE 020     Engineering Assembly .....	0
	<b>16</b>

**Spring semester**

BAE 530     Natural Resources Engineering .....	3
BAE 651     Air Pollution Engineering .....	3
Humanities or social science electives .....	4
Technical elective .....	3
Design technical elective .....	3
BAE 020     Engineering Assembly .....	0
	<b>16</b>

\*Expository Writing II is optional if prerequisites for Written Communication for Engineers (ENGL 415) are met from Expository Writing I. Elective is restricted to only technical elective, humanities or social science elective, or ROTC.

Humanities and social science electives are to be selected from the approved list and need not be taken in the order listed in the curriculum (two courses must be 400 level or above).

Technical electives are to be chosen with the advice and approval of the faculty advisor and department head.

**Food engineering option****Freshman****Fall semester**

ENGL 100     Expository Writing I .....	3
CHM 210     Chemistry I .....	4
MATH 220     Analytic Geometry and Calculus I .....	4
BAE 200     Engineering Methods .....	1
SPCH 105     Public Speaking IA .....	2
Humanities or social science electives .....	3

BAE 020     Engineering Assembly .....	0
	<b>17</b>

**Spring semester**

CHM 230     Chemistry II4	
MATH 221     Analytic Geometry and Calculus II .....	4
ECON 110     Principles of Macroeconomics .....	3
KIN 101     Principles of Physical Fitness .....	1
NE 385     Engineering Computational Techniques .....	2
Technical elective .....	2
BAE 020     Engineering Assembly .....	0
	<b>16</b>

**Sophomore****Fall semester**

MATH 222     Analytic Geometry and Calculus III .....	4
PHYS 213     Engineering Physics I .....	5
BIOL 198     Principles of Biology .....	4
CHM 350     General Organic Chemistry .....	3
BAE 020     Engineering Assembly .....	0
	<b>16</b>

**Spring semester**

MATH 240     Elementary Differential Equations .....	4
PHYS 214     Engineering Physics II .....	5
CE 530     Statics and Dynamics .....	4
CHE 314     Introduction to Process Analysis .....	3
BAE 020     Engineering Assembly .....	0
	<b>16</b>

**Junior****Fall semester**

CHE 520     Chemical Engineering Thermodynamics I .....	2
BIOL 455     General Microbiology .....	4
CHM 585     Physical Chemistry I .....	3
BIOCH 521     General Biochemistry .....	3
BAE 575     Fundamentals of Agricultural Process Engineering .....	3
ENGL 200     Expository Writing II* .....	3
	or
Elective .....	3
BAE 020     Engineering Assembly .....	0
	<b>18</b>

**Spring semester**

CHE 521     Chemical Engineering Thermodynamics II .....	3
ME 571     Fluid Mechanics .....	3
BAE 512     Functional Analysis of Agricultural Machinery .....	3
	Properties of Biological Materials .....
BAE 500     .....	2
BAE 625     Thermal Processing Operations in Food Engineering .....	2
ASI 411     Introduction to Food Chemistry .....	3
BAE 630     Food Process Engineering Lab .....	1
BAE 020     Engineering Assembly .....	0
	<b>17</b>

**Senior****Fall semester**

EECE 510     Circuit Theory I .....	3
ENGL 415     Written Communication for Engineers* .....	3
	Chemical Reaction Engineering .....
CHE 550     .....	3
BAE 510     Environmental Design of Agricultural Buildings .....	3
BAE 536     Agricultural Engineering Design I .....	3
Humanities or social science electives .....	3
BAE 020     Engineering Assembly .....	0
	<b>18</b>

**Spring semester**

BAE 521     Energy in Biological Systems .....	3
BAE 635     Food Plant Design .....	3
CHE 626     Bioseparation .....	2
Design technical elective .....	2
Humanities or social science electives .....	7
BAE 020     Engineering Assembly .....	0
	<b>17</b>

\*Expository Writing II is optional if prerequisites for Written Communication for Engineers (ENGL 415) are met from Expository Writing I. Elective is restricted to technical elective, humanities or social science elective, or ROTC.

Humanities and social science electives are to be selected from the approved list and need not be taken in the order listed in the curriculum (usually two courses must be 400 level or above).

Technical electives are to be chosen with the advice and approval of the faculty advisor and department head. The engineering science requirements will be satisfied by the required courses in this curriculum.

## Biological and agricultural engineering courses

**BAE 020. Engineering Assembly.** (0) I, II. Presentation of professional problems and practices by students, faculty, and professionals associated with the career of biological and agricultural engineering. One hour lec. a month.

**BAE 200. Engineering Methods.** (1) I. Engineering approach to problem solving, computer use in biological and agricultural engineering, solving and plotting calculus problems on the computer, differential leveling, and topographic mapping. Three hours lab a week. Pr. or conc.: MATH 220.

**BAE 499. Honors Research in Biological and Agricultural Engineering.** (Var.) I, II. Individual research problem selected with approval of faculty advisor. Open to students in the College of Engineering honors program. A report is presented orally and in writing during the last semester.

## Undergraduate and graduate credit in minor field

**BAE 500. Properties of Biological Materials.** (2) II. Characterization of biological material properties that affect the design and analysis of material handling equipment and processes. Physical, electrical, thermal, mechanical, aerodynamic, hygroscopic, and rheological properties of grain and other agricultural products will be examined. One hour rec. and three hours lab a week. Pr.: PHYS 213.

**BAE 510. Environmental Design of Agricultural Buildings.** (3) I. Theory and application of psychometrics, air dilution, and heat and mass transfer; study of animal's interaction with its environment; computer-aided design and analysis of environmental control systems for plants and animals. Two hours rec. and three hours lab a week. Pr.: BAE 320 or IE 372. Pr. or conc.: ME 513.

**BAE 512. Functional Analysis of Agricultural Machinery.** (3) II. Kinematics, power transmission, and basic hydraulics as applied to tillage, planting, and harvesting machinery. Two hours rec. and three hours lab a week. Pr.: ME 512.

**BAE 521. Energy in Biological Systems.** (3) II. Energy and material balances, process analysis and efficiency. Combustion, steam generation, fuel properties, and exhaust emissions. Net energy analysis and environmental consequences of biological production and processing systems. Analysis and design of systems for the production of biomass fuels. Three hours rec. a week. Pr. or conc.: ME 513.

**BAE 530. Natural Resources Engineering.** (3) II. Principles and measures for controlling storm water runoff and soil erosion; design of water handling structures for land drainage, flood protection, and irrigation; agricultural surveying. Two hours rec. and three hours lab a week. Pr.: BAE 551, AGRON 305; Pr. or conc.: ME 571.

**BAE 536. Agricultural Engineering Design I.** (3) I. Analysis and design of equipment and systems for the production and processing of food and fiber. Introduction to structural and process analysis using finite element techniques and engineering economics. Concepts of mechanical design, system design, human factors, and reliability in design are applied in a project-oriented laboratory. Two hours rec. and three hours lab a week. Pr.: ME 512 or CE 530.

**BAE 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.: PHYS 113 or 213. Same as CE 551.

**BAE 566. Design of Agricultural Structures.** (3) II. Application of statics and strength of materials to the design and analysis of light-frame structures of wood, steel, and concrete; estimation of wind, snow, grain, and soil loads; stress analysis of beams, columns, frames, trusses,

and foundations; computer-aided drafting and introduction to finite element analysis. Three hours rec. a week. Pr.: CE 533.

**BAE 575. Fundamentals of Agricultural Process Engineering.** (3) I. Application of basic science and engineering fundamentals for the analysis and design of agricultural processes. Two hours rec. and three hours lab a week. Pr. or conc.: CHE 314 or ME 571.

## Undergraduate and graduate credit

**BAE 620. Problems in Agricultural Engineering.** (Var.) 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.

**BAE 625. Thermal Processing Operations in Food Engineering.** (2) II, in odd years. Analysis of thermal processing operations such as drying, evaporation, canning, freezing, and freeze drying. Two hours rec. a week. Pr.: CHE 531 or BAE 575.

**BAE 630. Food Process Engineering Laboratory.** (1) II, in odd years. Laboratory studies of food processing unit operations and applications with emphasis on heat and mass transfer operations. Three hours lab a week. Pr.: BAE 575 or CHE 531. Pr. or conc.: BAE 625.

**BAE 635. Food Plant Design.** (3) II. Synthesis and design of different food processing plants such as cereal, dairy, fruit, and vegetable. Two hours rec. and three hours lab a week. Pr. or conc.: BAE 625.

**BAE 636. Agricultural Engineering Design II.** (Var.) II. Fabrication, evaluation, and refinement of a prototype machine or device designed in BAE 536. Pr.: BAE 536.

**BAE 640. Design of Control Systems for Agricultural Machines and Process.** (3) I, in odd years. Fundamentals of control engineering with primary emphasis on automatic controls for agricultural machinery and processes. Control system analysis and design. Computer-based applications. Two hours or rec. and three hours lab a week. Pr.: EECE 510 or 519 and MATH 240.

**BAE 651. Air Pollution Engineering.** (3) II. Air pollution legislation, standards, measurement, and terminology. Design and economics of particulate pollution control systems including cyclones, fabric filters, wet scrubbers, and electrostatic precipitators. Abatement of gas and vapor pollution using VOC incineration, gas adsorption, and gas absorption. Meteorology and atmospheric dispersion modeling. Three hours recitation. Pr.: ME 513, 571.

**BAE 690. Non-Point Pollution Engineering.** (3) I. Management of diffuse sources of pollution generally resulting from storm water and runoff. Use of models and Geographic Information Systems (GIS) to evaluate the extent and magnitude of non-point pollution, legislation and programs affecting non-point pollution, and design of treatment and management systems. Non-point pollutants addressed include: nutrients, pesticides, sediment, and hazardous wastes. Three lec. a week. Pr.: BAE 551 or CE 551.

**BAE 700. Agricultural Process Engineering.** (3) II. Theory, equipment, and design techniques in processing agricultural products. Two hours rec. and three hours lab a week. Pr.: BAE 575.

**BAE 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.: BAE 551 and AGRON 305. Pr. or conc.: ME 571.

**BAE 710. Advanced Farm Power and Machinery.** (3) I, in even years. Analytical study of design, construction, and operating characteristics of tractors and selected farm machines. Two hours rec. and three hours lab a week. Pr.: BAE 536.

**BAE 780. Measurement Systems.** (3) II. Theory and application of measurement systems with emphasis on environments and processes related to soils, plants, and animals. Two hours rec. and three hours lab a week. Pr.: EECE 510 or 519.

# Chemical Engineering

L. T. Fan,\* Head

Professors Akins,\* Erickson,\* Fan,\* Glasgow,\* Kyle,\* Matthews,\* and Walawender;\* Associate Professors Edgar\* and Schlup;\* Adjunct Assistant Professor Huang;\* Emeriti: Professors Bates and Honstead.

Chemical engineers contribute to society through the useful application of knowledge and understanding of chemistry, physics, and mathematics. Chemical engineers can expect to participate in many decisions crucial to the preservation and improvement of society, especially in energy and food production, resource management, and the specification and design of pollution control processes.

The objective of the chemical engineering program is to prepare qualified students for a professional career in chemical engineering. The curriculum is best suited to highly motivated students with superior abilities in chemistry, physics and mathematics. The first two years are devoted to a study of the pure sciences and essential communication skills. The last two years of the program contain a carefully structured sequence of courses that blend engineering sciences and design. Qualified graduates of the program desiring to do advanced study at other universities should be able to compete well.

## Dual degree program

The Department of Chemical Engineering 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 Pittsburg State University in which students spend the first three years at PSU and the last two at K-State. Other dual degree programs are also available.

## Areas of concentration

If a student desires to emphasize a particular area such as biochemical, food, computer and systems, energy, materials, or environmental engineering, there are three possibilities: areas of emphasis, minors, and secondary majors.

For an area of emphasis the student selects appropriate technical electives. Lists of recommended technical electives for some of the common choices for emphasis are available in the department office.

A student may also acquire a minor in an area of concentration or complete requirements for admission to medical or law school. Interested students should consult the Pre-Professional

Programs section of this catalog. A student may complete requirements for a secondary major in an area such as natural resources and environmental sciences. Other opportunities are described in the Secondary Majors section of this catalog.

Selection of technical electives and choices for areas of concentration should be made in consultation with the academic advisor.

## Curriculum in chemical engineering (CHE)

Bachelor of science in chemical engineering  
134 hours required for graduation

Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology

### Freshman

#### Fall semester

ENGL 100	Expository Writing I*	3
CHM 210	Chemistry I	4
MATH 220	Analytic Geometry and Calculus I	4
ECON 110	Principles of Macroeconomics I	3
SPCH 105	Public Speaking IA	2
KIN 101	Principles of Physical Fitness	1
CHE 015	Engineering Assembly	0
		<b>17</b>

#### Spring semester

CHM 230	Chemistry II	4
CHM 271	Chemical Analysis	4
MATH 221	Analytic Geometry and Calculus II	4
Elective		6
CHE 015	Engineering Assembly	0
		<b>18</b>

### Sophomore

#### Fall semester

MATH 222	Analytic Geometry and Calculus III	4
PHYS 213	Engineering Physics I	5
CHM 531	Organic Chemistry I	3
CHE 316	Chemical Engineering Computational Techniques I	1
Elective		3
CHE 015	Engineering Assembly	0
		<b>16</b>

#### Spring semester

MATH 240	Elementary Differential Equations	4
PHYS 214	Engineering Physics II	5
CHM 550	Organic Chemistry II	3
CHE 320	Introduction to Process Analysis	3
CHM 532	Organic Chemistry Lab	2
CHE 015	Engineering Assembly	0
		<b>17</b>

### Junior

#### Fall semester

CHM 585	Physical Chemistry I	3
CHM 586	Physical Chemistry I Lab	2
CHE 520	Chemical Engineering Thermodynamics I	2
CHE 530	Transport Phenomena I	3
Elective		6
CHE 015	Engineering Assembly	0
		<b>16</b>

#### Spring semester

CHM 595	Physical Chemistry II	3
ENGL 415	Written Communication for Engineers*	3
CHE 522	Chemical Engineering Lab I	2
CHE 521	Chemical Engineering Thermodynamics II	3
CHE 531	Transport Phenomena II	3
Elective		3
CHE 015	Engineering Assembly	0
		<b>17</b>

### Senior

#### Fall semester

CHE 516	Chemical Engineering Computational Techniques II	1
CHE 532	Chemical Engineering Lab II	2
CHE 560	Separational Process Design	3
CHE 550	Chemical Reaction Engineering	3
CHE 570	Chemical Engineering Systems Design I	2
Elective		6
CHE 015	Engineering Assembly	0
		<b>17</b>

#### Spring semester

CHE 542	Chemical Engineering Lab III	3
CHE 561	Chemical Process Dynamics and Control	3
CHE 571	Chemical Engineering Systems Design II	4
Elective		6
CHE 015	Engineering Assembly	0
		<b>16</b>

\*The prerequisite for ENGL 415 is satisfied with an A or B in ENGL 100. Otherwise students must take ENGL 200, which may be substituted for 3 credit hours of technical electives.

Thirty hours of electives are required and they are to be selected in consultation with the student's advisor. Fifteen of these hours are to be selected from the approved list of humanities and social sciences (two courses must be 400 level or above). Nine hours must satisfy the engineering science requirements, and the remaining six hours are selected to enhance the student's professional development. All electives must have the approval of the department head and technical electives must meet the engineering science requirements.

## Chemical engineering courses

**CHE 015. Engineering Assembly.** (0) I, II.

### Undergraduate credit

**CHE 316. Chemical Engineering Computational Techniques I.** (1) I, II, S. Introduction to the application of digital computers to chemical engineering problems. Three hours lab a week. Pr. or conc.: MATH 221.

**CHE 320. Introduction to Process Analysis.** (3) I, II, S. An introduction to the basic concepts of chemical engineering. Three hours rec. a week. Pr. or conc.: MATH 240 and CHE 316.

**CHE 350. Engineering Materials.** (2) I, II. Structures of metals, ceramics, glasses, polymers, semiconductors, and composites. Mechanical, electrical, and magnetic properties. Multiphase equilibrium and modification of properties through changes in microstructure. Two hours rec. a week. Pr.: CHM 230. Pr. or conc.: PHYS 213.

**CHE 352. Engineering Materials I.** (3) I, II. Structure of metals, ceramics, glasses, polymers, semiconductors, and composites. Mechanical, electrical, and magnetic properties. Multiphase equilibrium and modification of properties through change in microstructure. Two hours rec. a week and three hours lab a week. Pr.: CHM 230. Pr. or conc.: PHYS 213.

**CHE 356. Corrosion.** (1) I, II. An introductory survey of corrosion mechanisms and prevention. Emphasis is on the corrosion of metals. One hour rec. a week. Pr.: CHE 350 or 352.

**CHE 499. Honors Research in Chemical Engineering.** (Var.) I, II. Individual research problem selected with approval of faculty advisor. Open to students in the College of Engineering honors program. A report is presented orally and in writing during the last semester.

### Undergraduate and graduate credit in minor field

**CHE 516. Chemical Engineering Computational Techniques II.** (1) I. Application of digital computers to chemical engineering problems. Three hours of lab a week. Pr.: CHE 316 or conc.: CHE 550 and 560.

**CHE 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.: CHE 320. Pr. or conc.: CHM 585.

**CHE 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.: CHE 520.

**CHE 522. Chemical Engineering Laboratory I.** (2) II. Laboratory experiments on momentum and heat transfer. Five hours lab a week. Pr.: CHE 520 and 530.

**CHE 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.: CHE 320 and MATH 240.

**CHE 531. Transport Phenomena II.** (3) II. Continuation of Transport Phenomena I with special emphasis on mass transfer. Three hours rec. a week. Pr.: CHE 530.

**CHE 532. Chemical Engineering Laboratory II.** (2) I. Laboratory experiments on heat and mass transfer. Five hours lab a week. Pr.: CHE 521 and 531.

**CHE 542. Chemical Engineering Laboratory III.** (3) II. Laboratory experiments on classical unit operations, e.g., distillation, absorption, extraction, and on chemical kinetics and process dynamics. Eight hours lab a week. Pr.: CHE 516, 550, and 560. Pr. or conc.: CHE 561.

**CHE 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.: CHE 521 and 531. Conc.: CHE 516.

**CHE 560. Separational Process Design.** (3) I. Development of the basic theory and design of separational processes such as distillation, gas absorption, liquid extraction, adsorption, and ion exchange. Three hours rec. a week. Pr.: CHE 521 and 531. Conc.: CHE 516.

**CHE 561. Chemical Process Dynamics and Control.** (3) II. A study of the unsteady state behavior and control of chemical processes. Three hours rec. a week. Pr.: CHE 550.

**CHE 570. Chemical Engineering Systems Design I.** (2) I. Basic concepts of process economics with application to the design of chemical processes. Two hours rec. a week. Pr. or conc.: CHE 550 and 560.

**CHE 571. Chemical Engineering Systems Design II.** (4) II. Basic concepts of process optimization with application to the synthesis and design of chemical processing systems. Emphasis will be on the solution of comprehensive systems design problems. Two hours rec. and six hours lab a week. Pr.: CHE 516, 550, 560, and 570. Pr. or conc.: CHE 561.

**CHE 580. Problems in Chemical Engineering or Materials Science.** (Var.) I, II, S. An introduction to chemical engineering research. Pr.: Approval of department head.

### Undergraduate and graduate credit

**CHE 626. Bioseparations.** (2) II, in even years. Study of separations important in food and biochemical engineering such as leaching, extraction, expression, absorption, ion exchange, filtration, centrifugation, membrane separation, and chromatographic separations. Two hours rec. a week. Pr.: CHE 531 or AGE 575.

**CHE 648. Processing of Composite Materials.** (3) I, II. Principles of composite materials, including ceramic, metal, and polymer matrix composites; properties and processing of fibers; role of interfaces in composites; basic concepts in mechanics, failure, and testing of composite materials. Three hours lec. a week. Pr.: CHE 350 or 352.

**CHE 650. Hazardous Waste Engineering Seminar.** (1) I, II, S. Topics in hazardous materials management and control, waste reduction and minimization, hazardous substance tracking, and hazardous waste engineering. One hour rec. a week. Pr.: CHM 230.

**CHE 653. Ceramic Materials.** (3) I, II. Structure and bonding in glasses and ceramics; phase equilibria and transformation kinetics; defects and microstructure within ceramic materials; mechanical, thermal, optical, electrical, and magnetic properties of ceramics and glasses. Three hours rec. a week. Pr.: CHE 350 or 352.

**CHE 661. Processing of Materials for Solid State Devices.** (3) I, II. Structure, properties, and processing of materials for solid state devices. Crystal growth, epitaxy,

oxidation, diffusion, lithography, and etching as applied to device fabrication. Three hours rec. a week. Pr.: CHE 350 or 352.

**CHE 664. Electrochemical Engineering.** (3) I, II. Thermodynamics, electrode kinetics, and transport phenomena of electrochemical systems. Three hours rec. a week. Pr.: CHE 521 and 531.

**CHE 681. Engineering Materials II.** (3) I, II, S. The structure and bonding in crystalline and amorphous materials; crystallography; thermodynamic stability in materials; equilibrium diagrams and the phase rule; rate theory and kinetics of solid-state transformations; mechanical behavior of engineering materials; dislocations; failure mechanisms. Three hours lec. a week. Pr.: CHE 350 or 352.

**CHE 682. Surface Phenomena.** (2) I, II, S. Principles and applications of interfacial phenomena, including capillarity, colloids, porosity, adsorption, and catalysis. Two hours rec. a week. Pr.: CHE 520.

**CHE 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.: CHE 550.

**CHE 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.: CHE 530.

**CHE 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.: CHE 530.

**CHE 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.: CHE 55

## Civil Engineering

Stuart E. Swartz, Head

Professors Cooper,\* Hu,\* Koelliker,\* Mathews,\* Russell,\* Snell,\* and Swartz,\* Associate Professors Banks\* and Stokes,\* Assistant Professors Govindaraju,\* Hossain,\* Melhem,\* Najjar,\* and Reddi,\* Emeriti: Professors McCormick, Smith, and Williams.

Civil engineering is the engineering of constructed facilities and systems. Because civil engineering is broad in scope, many civil engineers develop specialties within the broad field. The civil engineering department offers three options within the B.S. in civil engineering degree.

### Program goals

The objective of the civil engineering program is to prepare graduates for professional careers in civil engineering. A major goal is to provide civil engineering students with the best possible education toward that end within the guidelines provided by the Accreditation Board for Engineering and Technology (ABET) General Criteria and the ABET Program Criteria for Civil Engineering. Within this framework, further goals are to instill in the students a sensitivity to the social and humanistic implications of technology,

and to motivate them to make worthwhile contributions to the profession and to society.

The civil engineering curriculum provides: (1) an understanding of basic sciences, mathematics and communications skills; (2) an understanding of the basic principles associated with each of the following civil engineering areas included within our program: environmental engineering, geotechnical engineering, structural engineering, transportation engineering, and water resources engineering; (3) an introduction to the methodologies of current design practice in these areas; (4) design experiences in the application of these methodologies while at the same time emphasizing the generality of the basic principles which supercede specific design approaches; (5) a sequence of courses in the humanities and social sciences to provide breadth and depth; and (6) an understanding of the ethical, social, and economic factors in professional engineering practice.

### General option

The general option allows the student to pursue a B.S. in civil engineering degree in a broader general program or, if a specific career objective has been identified, to concentrate on one or more areas within the general option. The following areas of concentration are available:

**Water resources**—design and construction of reservoirs, canal systems, and dams for flood control, irrigation, power, and water supply.

**Geotechnical**—foundations for structures, earth embankments, retaining walls and bulkheads, and pavements for highways and airports.

**Environmental**—protection of public health and environmental quality through planning and designing facilities for water treatment and distribution; wastewater, solid and hazardous wastes collection, treatment, and disposal; and air pollution control.

**Transportation**—planning, design, and construction of highways, railways, airports, and urban mass transit systems.

**Structures**—design and construction of a variety of buildings and bridges, as well as the structural framing of aircraft, ships, and space vehicles.

Students choosing the general option can fulfill the requirements for a B.S. in civil engineering by following the course curriculum as well as the following selection of courses:

CE 411 Route Location and Design .....	4
Option elective .....	12–15
C.E. electives .....	12

CE electives must be chosen from those listed below, and must include at least one course in four of the five areas:

<b>Environmental</b>	
CE 565	Water and Wastewater Engineering
<b>Geotechnical</b>	
CE 528	Foundation Engineering

### Structural

CE 542	Structural Engineering in Steel
CE 544	Structural Engineering in Concrete

### Transportation

CE 572	Highway Engineering and Management
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### Water resources

CE 552	Hydraulic Engineering
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## Construction engineering option

This option allows students to obtain a B.S. in civil engineering while preparing more specifically for employment in the construction industry.

Students choosing the construction engineering option can fulfill the requirements for a B.S. in civil engineering by following the course curriculum listed for civil engineering as well as the following selection of courses:

ACTG 231	Accounting for Business Operations .....	3
ACTG 241	Accounting for Investing and Financing .....	3
DEN 550	Engineering Law .....	3
CE 411	Route Location and Design .....	4
CE 528	Foundation Engineering .....	3
CE 542	Structural Engineering in Steel .....	3
CE 544	Structural Engineering in Concrete .....	3
CE 641	Civil Engineering Materials .....	3
CE 680	Economics of Design and Construction .....	3
Option elective .....		0–3

## Environmental option

This option allows students to obtain a B.S. in civil engineering while preparing more specifically for career opportunities with firms and governmental agencies actively engaged in environmental engineering practice.

Students choosing the environmental option can fulfill the requirements for a B.S. in civil engineering by following the course curriculum listed for civil engineering as well as the following selection of courses:

BIOL 198	Principles of Biology .....	4
CHM 531	Organic Chemistry I .....	3
CHE 352	Engineering Materials I .....	3
CE 528	Foundation Engineering .....	3
CE 544	Structural Engineering in Concrete .....	3
CE 552	Hydraulic Engineering .....	3
CE 565	Water and Wastewater Engineering .....	3
Option elective .....		6–9

## Curriculum in civil engineering (CE)

Bachelor of science in civil engineering  
134 hours required for graduation  
Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology

### Freshman

#### Fall semester

MATH 220	Analytic Geometry and Calculus I .....	4
CHM 210	Chemistry I .....	4
ENGL 100	Expository Writing I* .....	3
ECON 110	Principles of Macroeconomics I .....	3
ME 212	Engineering Graphics I .....	2
KIN 101	Principles of Physical Fitness .....	1

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#### Spring semester

MATH 221	Analytic Geometry and Calculus II .....	4
CHM 230	Chemistry II .....	4
Option elective*** .....		3
NE 385	Engineering Computational Techniques .....	2
GEOL 100	Introductory Geology .....	3
CE 015	Engineering Assembly .....	0

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**Sophomore****Fall semester**

MATH 222	Analytic Geometry and Calculus III .....	4
PHYS 213	Engineering Physics I .....	5
ENGL 200	Expository Writing II* or	
Option elective***	.....	3
SPCH 105	Public Speaking IA .....	2
CE 212	Elementary Surveying Engineering .....	3
CE 015	Engineering Assembly .....	0
		<b>17</b>

**Spring semester**

MATH 240	Elementary Differential Equations .....	4
PHYS 214	Engineering Physics II .....	5
STAT 490	Statistics for Engineering .....	1
CE 333	Statics .....	3
Option elective***	.....	3
CE 380	Computer Applications in Civil Engineering .....	1
CE 015	Engineering Assembly .....	0
		<b>17</b>

**Junior****Fall semester**

ME 512	Dynamics .....	3
ME 513	Thermodynamics I .....	3
CE 551	Hydrology .....	2
CE 553	Hydrologic Methods Lab .....	1
CE 533	Mechanics of Materials .....	3
CE 534	Mechanics of Materials Lab .....	1
Option elective***	.....	4
CE 015	Engineering Assembly .....	0
		<b>17</b>

**Spring semester**

CE 537	Introduction to Structural Analysis .....	4
ME 571	Fluid Mechanics .....	3
CE 522	Soil Mechanics I .....	3
CE 563	Environmental Engineering Fundamentals .....	3
ENGL 415	Written Communication for Engineers* .....	3
CE 015	Engineering Assembly .....	0
		<b>16</b>

**Senior****Fall semester**

CE 015	Engineering Assembly .....	0
Option elective***	.....	6
Civil engineering electives****	.....	6
Humanities or social science electives**	.....	5
		<b>17</b>

**Spring semester**

CE 015	Engineering Assembly .....	0
CE 585	Civil Engineering Project .....	3
Civil engineering elective****	.....	3
Humanities or social science electives**	.....	8
Option elective***	.....	3
		<b>17</b>

\*Expository Writing II is optional if prerequisites for Written Communication for Engineers (ENGL 415) are met from Expository Writing I.

\*\*Humanities and social science electives are to be selected from the approved list and need not be taken in the order listed in the curriculum (two courses must be 400 level or above).

\*\*\*Option electives are to be selected in consultation with the student's faculty advisor to satisfy the requirements of the option the student has chosen. One course from either the engineering materials or circuits, fields, and electronics engineering science group is required in the general option.

\*\*\*\*Civil engineering electives are to be selected from the list approved by the department to satisfy option requirements.

**Civil engineering courses**

**CE 015. Engineering Assembly.** (0) I, II.

**Undergraduate credit****CE 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.

**CE 231. Statics A.** (3) I, II. 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 and MATH 220 or conc.: MATH 211.

**CE 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.

**CE 331. Strength of Materials A.** (3) I, II. Behavior of materials subjected to tension, compression, shear, and bending; design of beams and columns. Three hours rec. a week. Pr.: CE 231.

**CE 332. Strength of Materials A Laboratory.** (1) I, II. Tests to determine the physical properties of various structural materials. Analysis and interpretation of test data. Three hours lab a week. Pr.: ENGL 120 or 100 with grade of A or B, and one course in graphics. Pr. or conc.: CE 331.

**CE 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.: MATH 221 and PHYS 213.

**CE 380. Computer Applications in Civil Engineering.** (1) I, II. Application of computers to problems in civil engineering, including programming. Use of software packages for report preparation, graphics generation, spreadsheet analysis, and data management. One hour rec. and two hours lab a week. Pr.: MATH 221 and NE 385. Conc.: STAT 490.

**CE 411. Route Location and Design.** (4) I, II. Transportation systems; highway location and the geometric design of streets and highways considering the driver-vehicle-roadway system characteristics; curves and earthwork; surveying pertaining to the alignment of highways and railways. Two hours rec. and six hours lab a week. Pr.: CE 212, MATH 221, and PHYS 213.

**CE 499. Honors Research in Civil Engineering.** (Var.) I, II. Individual research problem selected with approval of faculty advisor. Open to students in the College of Engineering honors program. A report is presented orally and in writing during the last semester.

**Undergraduate and graduate credit in minor field**

**CE 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.: CE 533.

**CE 528. Foundation Engineering.** (3) I. Prediction of soil variation; soil investigations; stress distribution and bearing capacity; dewatering analysis and procedures; retaining structures and lateral earth pressures; shallow foundations, pile foundations; underpinning and grouting. Two hours rec. and three hours lab a week. Pr.: CE 522. Pr. or conc.: CE 544.

**CE 530. Statics and Dynamics.** (4) I, II. A shortened combined course in (1) statics, including a study of force systems, free-body diagrams, and problems in equilibrium, friction, centroids, and moments of inertia; and (2) dynamics, including a study of the kinematics and kinetics of particles and rigid bodies using the methods of force-mass acceleration, work-energy, and impulse-momentum. Four hours rec. a week. Pr.: MATH 222 and PHYS 213.

**CE 533. Mechanics of Materials.** (3) I, II. 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.: CE 333 or 530. Pr. or conc.: MATH 222.

**CE 534. Mechanics of Materials Laboratory.** (1) I, II. 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.: CE 533.

**CE 537. Introduction to Structural Analysis.** (4) I, II. Elastic analysis of determinate and indeterminate beams, frames, and trusses; construction of shear and moment diagrams and influence lines; calculation of deflections using conjugate beam and virtual work; solution of indeterminate structures by consistent deformation, slope-deflection, moment distribution, and matrix stiffness method; with microcomputer applications. Four hours rec. a week. Pr.: CE 533. Pr. or conc.: CE 380.

**CE 542. Structural Engineering in Steel.** (3) II. 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.: CE 537.

**CE 544. Structural Engineering in Concrete.** (3) I. 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.: CE 537.

**CE 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.: PHYS 113 or 213. Cross-listed with AE 551.

**CE 552. Hydraulic Engineering.** (3) II. Applications of the principles of fluid mechanics to control and use of water; reservoir, dam, and spillway design; enclosed conduit and open-channel design; hydraulic machinery and hydro-power development; principles of fluid measurement; laboratory-flow and velocity metering, hydraulic models, pipe losses, open-channel flow. Two hours rec. and three hours lab a week. Pr.: ME 571. Pr. or conc.: CE 551.

**CE 553. Hydrologic Methods Laboratory.** (1) I, II. Application of hydrologic methods in design; precipitation data analysis; evapotranspiration; streamgauging; 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.: CE 551 and NE 385.

**CE 563. Environmental Engineering Fundamentals.** (3) I, II. Basic physical, chemical, and biological concepts and their applications to the protection of the environment with emphasis on techniques used in water and wastewater treatment. Two hours rec. and three hours lab a week. Pr.: CHM 230 and MATH 222.

**CE 565. Water and Wastewater Engineering.** (3) 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.: CE 563, PHYS 214, and ME 571.

**CE 570. Transportation Planning.** (3) Intersession. Fundamentals of transportation planning. Historical development and current status of techniques used in travel demand forecasting; trip generation, trip distribution, mode choice, and traffic assignment. Current microcomputer models and applications. Pr.: CE 380 or equivalent and junior standing.

**CE 572. Highway Engineering and Management.** (3) I. Applications of the principles of highway planning, design, and capacity analysis techniques to analyze, design, and maintain street and highway systems. Assessment of the impact of activity center development or redevelopment on the surrounding surface transportation system. Two hours rec. and three hours lab a week. Pr.: CE 411 and 522.

**CE 580. AI Applications in Civil Engineering.** (2) Intercession. A review of the available techniques in artificial intelligence and a survey of applications in the different areas of civil engineering (structures, transportation/materials, geotechnical, hydraulics/water resources, and environmental engineering). Knowledge representation, inference mechanisms, system development and evaluation, object-oriented programming. Use of expert system shells, neural networks, and fuzzy logic. Hands-on applications on microcomputers in the MS-Windows environment. Three hours recitation for 10 days. Afternoon lab hours additional in computer laboratory. Pr.: CE 380.

**CE 585. Civil Engineering Project.** (1-3) I, II. A comprehensive civil engineering project. Requires integration of skills acquired in civil engineering elective courses. Students must prepare and present written and oral design reports. One hour rec. and two three-hour labs a week. Pr.: ENGL 415 and 6 hours of CE electives. Pr. or conc.: Six additional credit hours of CE electives.

### Undergraduate and graduate credit

**CE 641. Civil Engineering Materials I.** (3) I. Properties and behavior of structural metals, timber, portland cement concrete, and bituminous concrete; standard specifications and methods of test; inspection and control; long-term protection and durability. Two hours rec. and three hours lab a week. Pr.: CE 534 and ENGL 415. Pr. or conc.: either CE 528 or 542 or 544.

**CE 680. Economics of Design and Construction.** (3) II. 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 nonengineering majors.

**CE 686. 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.

**CE 718. Engineering Photo Interpretation.** (3) II. 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.

**CE 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.: CE 522.

**CE 725. Seepage in Permeable Materials.** (3) I. In alternate years. Analysis of seepage; groundwater movement in slopes, embankments, dams, and earth-supporting structures; construction of flow nets; dewatering systems; filter and drain design. Three hours rec. a week. Pr.: CE 522 and CE 552.

**CE 728. Advanced Geotechnical Design.** (3) II. Advanced studies of soil investigations; design of retaining structures and reinforced earth walls, sheet piles, anchored bulkheads, underground conduits and tunnels; analysis and repair of failed structures. Two hours rec. and three hours lab a week. Pr.: CE 528.

**CE 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.: CE 537.

**CE 741. Civil Engineering Materials II.** (3) II. Advanced study of civil engineering materials including concrete, steel, and bituminous concrete. Two hours rec. and three hours lab a week. Pr.: CE 641 and CE 350.

**CE 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.: CE 542.

**CE 743. Advanced Reinforced Concrete Theory.** (3) II. Advanced theories and methods of design and analysis of reinforced concrete structures. Three hours rec. a week. Pr.: CE 544.

**CE 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.: CE 552.

**CE 752. Advanced Hydrology.** (3) I. Review of 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.: CE 551.

**CE 762. Water Treatment Processes.** (3) I. Physical and chemical process principles and their application to water treatment plant design. Three hours rec. a week. Pr.: CE 565.

**CE 766. Wastewater Engineering: Biological Processes.** (3) II. Biological process principles and their application to the design of wastewater treatment plants. Three hours rec. a week. Pr.: CE 565.

**CE 771. Urban Transportation Analysis.** (3) II. 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.: CE 572 or consent of instructor.

**CE 774. Pavement Design.** (3) I. On sufficient demand. Methods of evaluating the load-carrying capacity of soil subgrade, subbase, 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.: CE 522.

**CE 775. Traffic Engineering I.** (3) II. Traffic operations of roads, streets, and highways; traffic engineering studies; use of signs, signals, and pavement markings as traffic control devices; highway and intersection capacity, design, and operation of traffic signals; current microcomputer models and applications. Two hours rec. and three hours lab a week. Pr.: CE 572.

**CE 776. Pavement Performance and Management Systems.** (3) I, in alternate years. Pavement management systems including pavement condition and structural evaluation, analysis, and optimization. Economic analysis and rehabilitation planning including computer applications. Three hours rec. a week. Pr.: CE 572.

**CE 790. Problems in Civil Engineering.** (Var.) I, II, S. Pr.: Approval of instructor.

## Computing and Information Sciences

Virgil E. Wallentine, Head

Professors Hankley,\* Schmidt,\* Unger,\* and Wallentine;\* Associate Professors Bleyberg,\* Calhoun,\* Gustafson,\* Howell,\* Mizuno,\* Stoughton,\* and VanSwaay;\* Assistant Professor Chomicki,\* Miller, Ravindran,\* and Singh;\* Instructor Campbell.

The creation and use of the best possible hardware and software is, broadly speaking, the field of computer science.

Two curricula, computer science and information systems, are offered by the Department of Computing and Information Sciences. Many other fields require a minor emphasis in computer science, and students working toward a dual degree (one in computer science and one in some other field) are common.

The department maintains laboratories with extensive mini- and microcomputers. Large computer facilities are provided by Computing and Network Services. Some students choose to own or share microcomputers because of the convenience and learning efficiency of personal interactive computing.

### Computer science curriculum

Accredited by the Computer Science Accreditation Commission of the Computing Sciences Accreditation Board, a specialized accrediting body recognized by the Council on Postsecondary Accreditation and the U.S. Department of Education.

The computer science curriculum emphasizes a broad foundation of computer organization, software, and mathematics, together with electives that focus on some aspect or application of computers. The computer science curriculum is recommended for students planning graduate studies in computing.

Technical electives consist of a set of computer science courses that permit students to concentrate on an area of technical expertise. The most common technical areas are: software engineering, which involves management and development of large software systems; operating systems, which consists of the supervisory software that controls the operation of a computer; theoretical computer science; computer systems architecture, which involves design of centralized and distributed computer systems; programming languages and their compilers; data systems; and knowledge engineering (artificial intelligence).

The Department of Computing and Information Sciences joined the College of Engineering on January 1, 1993. The department will continue using the College of Arts and Sciences general requirements that were in effect on that date until revised requirements are determined.

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 and the following:

MATH 220	Analytic Geometry and Calculus I .....	4
MATH 221	Analytic Geometry and Calculus II .....	4
MATH 510	Discrete Mathematics .....	3
MATH 551	Applied Matrix Theory .....	3
STAT 410	Probabilistic Systems Modeling .....	3
EECE 241	Introduction to Computer Engineering ..	3
CIS 200	Fundamentals of Computer Programming .....	3
CIS 203	Fundamentals of Computer Programming Laboratory .....	1
CIS 300	Algorithms and Data Structures .....	3
CIS 301	Logical Foundations of Computing .....	3
CIS 350	Computer Architecture and Organization .....	3
CIS 500	Analysis of Algorithms and Data Structures .....	3
CIS 520	Operating Systems I .....	3
CIS 540	Software Engineering Project I .....	3
CIS 541	Software Engineering Project II .....	3
CIS 560	Introduction to Data Management Systems .....	3
CIS 570	Theoretical Foundations of Computing..	3
CIS 605	Programming Languages .....	3

With B.A. degree:	
Technical electives (with advisor's approval) .....	6
With B.S. degree:	
ENGL 516      Written Communication for the Sciences .....	3
MATH 655      Elementary Numerical Analysis .....	3
CIS 580          Numerical Computing .....	3
CIS/	
PHILO 492      Computers and Society .....	3
Technical electives (with advisor's approval) .....	9
Natural science electives for the CS degree must meet the Computing Sciences Accreditation guidelines.	
Required courses may not be taken under the A/Pass/F option.	

### Suggested course schedule for computer science

#### Freshman year

<b>Fall semester</b>	
ENGL 100      Expository Writing I .....	3
SPCH 105      Public Speaking IA .....	2
or	
SPCH 106      Public Speaking I .....	3
MATH 220      Analytic Geometry and Calculus I .....	4
CIS 200          Fundamentals of Computer Programming .....	3
CIS 203          Fundamentals of Computer Programming Laboratory .....	1
KIN 101          Concepts in Physical Education .....	1
<b>14-15</b>	

#### Spring semester

Humanities elective (first of four) .....	2-3
CIS 300          Algorithms and Data Structures .....	3
CIS 301          Logical Foundations of Programming ...	3
MATH 221      Analytic Geometry and Calculus II .....	4
Social science elective (first of four) .....	3
<b>15-16</b>	

#### Sophomore year

<b>Fall semester</b>	
ENGL 200      Expository Writing II .....	3
EECE 241      Introduction to Computer Engineering ..	3
CIS 500          Analysis of Algorithms and Data Structures .....	3
Natural science elective with laboratory (first of four) ....	4
Social science elective (second of four) .....	3
<b>16</b>	

#### Spring semester

CIS 350          Computer Architecture and Organization .....	3
CIS 605          Programming Languages .....	3
MATH 510      Discrete Mathematics .....	3
MATH 551      Applied Matrix Theory .....	3
Natural science elective with laboratory (second of four) .....	4
<b>16</b>	

#### Junior year

<b>Fall semester</b>	
CIS 520          Operating Systems I .....	3
CIS 570          Theoretical Foundations of Computing .	3
MATH 655      Elementary Numerical Analysis .....	3
or	
CIS 580          Numerical Computing .....	3
Humanities elective (second of four) .....	3
Natural science elective with laboratory (third of four) ....	3
<b>15</b>	

#### Spring semester

CIS 560          Introduction to Data Management .....	3
STAT 410      Probabilistic Systems Modeling .....	3
Technical elective .....	3
Social science elective (third of four) .....	3
Free elective .....	3
<b>15</b>	

#### Senior year

<b>Fall semester</b>	
CIS 540          Software Engineering Project I .....	3
Technical elective .....	3
Natural science elective (fourth of four) .....	3
ENGL 516      Written Communications for the Sciences .....	3
Humanities elective (third of four) .....	3
<b>15</b>	

#### Spring semester

CIS 541          Software Engineering Project II .....	3
CIS/	
PHILO 492      Computers and Society .....	3
Humanities elective (fourth of four) .....	3
Social science elective (fourth of four) .....	3
Technical elective .....	3
<b>15</b>	

### Information systems curriculum

The information systems curriculum emphasizes the use of computers to solve problems arising in the operations of business and commerce. The curriculum closely follows programs designed by the Association for Computing Machinery and the Data Processing Management Association.

Five specializations are available, each designed to develop additional skills supportive of needs of the industry. These specializations are database manager (designs, uses, maintains, and manages database systems), management information systems specialist (defines organization requirements, acts as a management-technical communication channel, evaluates information systems, manages analyst/programmers), application programmer (designs detail logic, codes, verifies, documents programs and systems), and communications analyst (designs and implements distributed information systems, specifies and designs interface to the communication system.)

A person seeking a bachelor of science or bachelor of arts degree in information systems must fulfill the general requirements of the College of Arts and Sciences and the following:

ENGL 516      Written Communication for the Sciences .....	3
MATH 205      General Calculus and Linear Algebra .	3
MATH 312      Finite Applications of Mathematics ....	3
STAT 320      Elements of Statistics .....	3
EECE 241      Introduction to Computer Engineering	3
CIS 200          Fundamentals of Computer Programming .....	2
CIS 203          Fundamentals of Computer Programming Laboratory .....	1
CIS 300          Algorithms and Data Structures .....	3
CIS 350          Computer Architecture and Organization .....	3
CIS 362          Introduction to Business Programming .....	3
CIS 462          Information Systems in Organizations .	3
CIS 500          Analysis of Algorithms and Data Structures .....	3
CIS 520          Operating Systems I .....	3
CIS 525          Telecommunications and Data Communications Systems .....	3
CIS 540          Software Engineering Project I .....	3
CIS 541          Software Engineering Project II .....	3
CIS 560          Introduction to Data Management Systems .....	3
CIS 605          Programming Languages .....	3

Technical electives (with advisor's approval):

B.A. Degree .....	6
B.S. Degree .....	12

Required courses may not be taken under the A/Pass/F option.

### Suggested course schedule for information systems

#### Freshman year

<b>Fall semester</b>	
ENGL 100      Expository Writing I .....	3
SPCH 105      Public Speaking IA .....	2
or	
SPCH 106      Public Speaking I .....	3
MATH 205      General Calculus and Linear Algebra ...	3
CIS 200          Fundamentals of Computer Programming .....	3
CIS 203          Fundamentals of Computer Programming Laboratory .....	1
Humanities elective (first of four) .....	3
<b>15-16</b>	

#### Spring semester

EECE 241      Introduction to Computer Engineering ..	3
CIS 300          Algorithms and Data Structures .....	3
KIN 101          Concepts in Physical Education .....	1
Humanities elective (second of four) .....	3
Social science elective (first of four) .....	3
MATH 312      Finite Applications of Mathematics .....	3
<b>16</b>	

#### Sophomore year

<b>Fall semester</b>	
ENGL 200      Expository Writing II .....	3
CIS 500          Analysis of Algorithms and Data Structures .....	3
Free elective .....	3
Social science elective (second of four) .....	3
Natural science elective with laboratory (first of four) ....	4
<b>16</b>	

#### Spring semester

CIS 350          Computer Architecture and Organization .....	3
CIS 605          Programming Languages .....	3
Natural science elective with laboratory (second of four) .....	4
Technical elective .....	3
STAT 320      Elements of Statistics .....	3
<b>16</b>	

#### Junior year

<b>Fall semester</b>	
CIS 520          Operating Systems I .....	3
Technical elective .....	3
Natural science elective (third of four) .....	3
Free elective .....	3
CIS 362          Introduction to Business Programming .	3
<b>15</b>	

#### Spring semester

CIS 560          Introduction to Data Management Systems .....	3
Humanities elective (third of four) .....	3
Technical elective .....	3
Free elective .....	3
CIS 462          Information Systems in Organizations ..	3
<b>15</b>	

#### Senior year

<b>Fall semester</b>	
CIS 525          Telecommunications and Data Communications Systems .....	3
CIS 540          Software Engineering Project I .....	3
Social science elective (third of four) .....	3
Natural science elective fourth of four) .....	3
Technical elective .....	3
<b>15</b>	

#### Spring semester

CIS 541          Software Engineering Project II .....	3
Humanities elective (fourth of four) .....	3
Social science elective (fourth of four) .....	3

ENGL 516	Written Communications for the Sciences .....	3
Free elective .....		3
		<b>15</b>

A free elective is any 100- or higher-level course, excluding courses listed as a prerequisite to a required course.

## Minor in computer science

CIS 200, CIS 203, CIS 300, CIS 500 plus any two additional 500- or 600- level courses in CIS for a total of 16 hours.

## Computer science courses

### Undergraduate credit

**CIS 110. Introduction to Personal Computing.** (3) I, II, S. Introduction to the use of computers and application software including word processing, spread sheets, graphics, database management, communications, and problem solving issues of ethical use of computers. Pr.: MATH 100.

**CIS 112. Advanced Personal Computing.** (3) Advanced features of application software for personal computers, including batch files, configuration and maintenance of hardware and software, macros for application software, and sharing of data and programs. Individualized problems. Two hours lec. and four hours lab a week. Pr.: B or better in CIS 110 or permission of instructor.

**CIS 115. Personal Computer Applications.** (3) Introduction to the personal computer environment and operating system; study of various software packages. This course is taught only during intersession; requires a total of thirty eight clock hours for completion. Cannot be taken for Arts and Sciences quantitative requirement. Credit will not be given for both CIS 110 and 115.

**CIS 190. Undergraduate Seminar in Computing and Information Sciences.** (1) Topics of special interest in computing and information sciences.

**CIS 200. Fundamentals of Computer Programming.** (3) I, II, S. Abstraction and problem solving, concept of algorithm and algorithm efficiency, control structures, procedures, arrays and array processing; introduction to a procedural language, and use of that language in selected applications. Pr.: MATH 100; conc. in CIS 203 is required.

**CIS 203. Fundamentals of Computer Programming Laboratory.** (1) I, II, S. Programming instruction and assistance in the procedural language taught in CIS 200. Conc. enrollment in CIS 200 is required.

**CIS 204. FORTRAN Language Laboratory.** (1) I, II. Fundamentals of programming in FORTRAN; applications. Three hours lab a week. Pr.: CIS 200 and 203.

**CIS 206. BASIC Language Laboratory.** (1) I, II. Fundamentals of programming in BASIC; applications. Three hours lab a week. Pr.: CIS 200 and 203.

**CIS 208. C Language Laboratory.** (1) I, II. Fundamentals of programming in C; applications. Three hours lab a week. Pr.: CIS 200 and 203.

**CIS 300. Algorithms and Data Structures.** (3) I, II, S. Structured and modular design and implementation; arrays, records, sets, pointers, files, strings; defined types, stacks, queues; searching, hashing, sorting; recursion; procedure specifications, exceptions, testing, debugging. Pr.: CIS 200 and 203.

**CIS 301. Logical Foundations of Programming.** (3) II. Foundations of logic; definitions and proofs by induction; program specifics as logical formulae; invariants; programming as theorem proving. Pr.: CIS 200 and 203.

**CIS 306. Operating Systems Laboratory.** (3) Advanced programming laboratory for experience in O/S 360/370, job control language, utilities, and access methods. Pr.: CIS 350 and 407.

**CIS 350. Computer Architecture and Organization.** (3) I, II. Introduction to computer architecture as the interface between hardware and software. Register-transfer CPU, memory bus, and input/output structures. Assembler language as the programmer's interface to the bare machine and to the extended machine (including system services). Instruction sequencing, addressing mechanisms, procedure

calls, and simple input/output operations. Pr.: EECE 241 and CIS 300.

**CIS 362. Introduction to Business Programming.** (3) I. An introduction to basic business programming techniques including file manipulation operations and sorting. The COBOL language will be used as an implementation tool. Pr.: CIS 200 and 203.

**CIS 397. Honors Seminar in Computer Science.** (1-3).

**CIS 407. Assembler Language Programming.** (3) Programming in assembler language under mainframe environment such as IBM, CMS, and VM. Introduction to system services such as file operations and channel programming. Pr.: EECE 241 and CIS 350.

**CIS 462. Information Systems in Organizations.** (3) II. Role of information systems in organizations, representation of systems structures, decision processes, system evaluation, information system applications including file structures, and using a high level language in a system study. Pr.: CIS 362.

**CIS 490. Special Topics in Computer Science.** (2-4) Current topics in computer science. Pr.: Prerequisite varies with the announced topic.

**CIS 492. Computers and Society.** (1-3) A study of the impact of computers and associated technologies on society, including such topics as ethics of computer use, computer fraud, protection of privacy; legal, moral, and public policy-making responsibility of computer professionals. Pr.: Junior standing and conc. enrollment in PHILO 492; CIS 520.

**CIS 499. Honors Research/Thesis.** (2-4) Individual research problem selected with approval of faculty advisor. Open to students in the College of Engineering honors program and to seniors in the college of Arts and Sciences honors program. A report/thesis is presented orally and in writing during the last semester.

### Undergraduate and graduate credit in minor field

**CIS 500. Analysis of Algorithms and Data Structure.** (3) I, II. Analysis of data structures and computer algorithms for trees, lists, graphs, sets. Measures of performance and complexity of algorithms and structures. Pr.: CIS 300.

**CIS 520. Operating Systems I.** (3) I. Basic operating systems concepts and services: interrupt processing, process, concurrency, deadlock, resource scheduling and system structure; resource management: real and virtual storage, input/output systems, disk scheduling and file systems; design and construction of concurrent programs. Pr.: CIS 350 or EECE 631; and CIS 500.

**CIS 521. Real-Time Programming Laboratory.** (3) I. Project-oriented introduction to asynchronous processes and related system software; device drivers, event-driven operations, hierarchical and time-sliced process scheduling, spooling operations, interjob and intermachine communications. Project will be built on a single-use environment. Pr.: CIS 520.

**CIS 525. Telecommunications and Data Communications Systems.** (3) Basic concepts including OSI 7 layer model, data transmission methods, medium access, link control, connections management; network applications including electronic mail, file transfer, distributed computing, window systems; network management including OSI and Internet management frameworks. Pr.: CIS 300.

**CIS 540. Software Engineering Project I.** (3) I. Current practices of software development, requirements, design, prototyping, measures, and evaluation. Specification, design, and prototyping of a software system. Pr.: CIS 500.

**CIS 541. Software Engineering Project II.** (3) II. Final implementation, integration, and testing of a software system. Introduction to configuration management, project management, and software maintenance. Pr.: CIS 540 (which must be taken in the preceding semester).

**CIS 560. Introduction to Data Management Systems.** (3) II. Representation of information as data, storage and manipulation of large amounts of data, logical data models, data storage techniques, data retrieval, integrity, and security. Pr.: CIS 500.

**CIS 570. Theoretical Foundations of Computing.** (3) I. specifications and correctness of algorithms, formal languages and automata, introduction to computability, computational complexity of algorithms. Pr.: MATH 510, CIS 300, and CIS 301.

**CIS 580. Numerical Computing.** (3) I. 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.: CIS 300 and MATH 221 and 551.

**CIS 591. Computer Science Applications.** (3) I, II, S. Programming, program libraries, and design of algorithms. for students with minimal background in computer science. Not for credit by CIS majors. Pr.: Graduate standing in student's own area and knowledge of at least one procedural programming language.

### Undergraduate and graduate credit

**CIS 600. Microcomputer Software.** (3) I. Contemporary software packages for microcomputers, including graphics, word processing, spreadsheets, desktop publishing. Events, resources, and the graphical user interface. Student programming project. Pr.: CIS 300.

**CIS 604. Set Theory and Logic for CS.** (3) Informal and axiomatic set theory, propositional and predicate logic, proof techniques. Pr.: Graduate standing.

**CIS 605. Programming Languages.** (3) History, processors, programming environments; types, scopes and extent, abstraction mechanisms, exceptions and concurrency; functional and object-oriented languages; formal syntax and semantics; structure of compilers for block-structured languages. Pr.: CIS 300.

**CIS 606. Translator Design I.** (3) Compilers and interpreters, including description of languages, finite state scanners, LL (1) parsing, symbol tables, syntaxdirected semantics, simple code generation. Constructing a simple PASCAL compiler. Pr.: CIS 500, 605.

**CIS 620. Operating System Practices.** (3) Structure and functions of modern operating systems. Emphasis on reading and modifying the source code of a working operating system. This includes memory management, input/output, process management, file systems, and network interconnection software construction. Pr.: CIS 520.

**CIS 625. Parallel Programming.** (3) Basic concepts of concurrent and distributed programming; parallel computing architectures; real-time programming; parallel simulation; fault-tolerant programming; partitioning, mapping, and granularity of parallel programming such as communication systems; grid, N-body stimulation, and matrix problems; and embedded systems control. Pr.: Pr.: CIS 500 and 520.

**CIS 630. AI Programming Techniques.** (3) I. Techniques of logic and/or functional programming used in areas of artificial intelligence. Pr.: CIS 605.

**CIS 635. Introduction to Computer-Based Knowledge Systems.** (3) I. Introduction to the applications of artificial intelligence concepts to solving knowledge-dependent tasks. Review of knowledge-representation ideas. Survey of expert system design. Introduction to existing knowledge-based tools available on personal computers. Development of an intelligent system. Pr.: CIS 300.

**CIS 636. Introduction to Computer Graphics.** (3) I, II. Devices and software for graphics display and user interaction, development of software for direct graphic manipulation applications. Pr.: CIS 300.

**CIS 690. Implementation Projects.** (3) I, II, S. The department will suggest various design or implementation projects for individuals or groups in areas such as translators, interpreters, microprogramming, minicomputer operating systems, graphics, numerical software, etc. Pr.: Junior standing.

**CIS 697. Seminar in Computer Science.** (1-3) Pr.: Junior standing.

**CIS 705. Programming Language Design.** (3) Fundamental design principles: abstraction, parameterization, qualification. Lambda-calculus as a metalanguage for design and analysis. The role of data typing, predicate calculus-base typing. Intuitionistic Type Theory. Pr.: CIS 605.

**CIS 707. Fundamentals of Programming Semantics.** (3) Fundamentals of algebraic specification techniques for specifications, initial algebra semantics, the equational calculus, term rewriting, corrections and extension of specifications. Pr.: CIS 500, 605.

**CIS 720. Advanced Operating Systems.** (3) Process synchronization and communication, distributed programming primitives, transactions and concurrency control, distributed scheduling, distributed storage, deadlock, security. Pr.: CIS 520.

**CIS 721. Real Time Systems.** (3) The design of hard real-time embedded systems, including language and operating system support, scheduling, schedulability analysis, fault-tolerance, and design tools. Pr.: CIS 520.

**CIS 725. Advanced Computer Networks.** (3) Network algorithms; routing and congestion control; protocol engineering; protocol decomposition, specification and verification, synthesis; protocols for high speed networks; parallel implementations, light-weight protocols. Pr.: CIS 520 and 525.

**CIS 730. Principles of Artificial Intelligence.** (3) Introduction to the fundamental concepts and techniques of AI: problem solving, search and planning, knowledge representation and qualitative reasoning, expert systems, natural language processing and cognitive modeling, computer vision, and machine learning. Pr.: CIS 630.

**CIS 736. Computer Graphics.** (3) Topics in computer representation and display of images and graphic interaction. Pr.: CIS 636 or EECE 636.

**CIS 740. Software Engineering.** (3) Software life cycle, requirements, specifications, design, validation, measures, and maintenance. Pr.: CIS 540.

**CIS 746. Software Measurement.** (3) Measurement theory; development, validation and use of software measures; software measures in the software lifecycle, including cost estimation, design measures, software complexity and software reliability. Pr.: CIS 540.

**CIS 750. Advanced Computer Architecture Experiments.** (3) Characteristics of various computers including those with execution support of multiprocessing, multiprogramming, microprogrammable, high-level language, stack processing, and communication architectures. Two hours lec. and three hours lab a week. Pr.: CIS 350 or 407.

**CIS 761. Data Base Management Systems.** (3) Data models and languages, hierarchical, network, relational systems; implementation and operational requirements; programming projects using data base management systems. Pr.: CIS 560, 604.

**CIS 762. Office Automation.** (3) Characteristics of information work; modeling systems for characterizing aspects of office environment; form-based systems; office automation and description languages; ergonomics; local area networks and tools used in the automation of offices. Pr.: CIS 525, 560.

**CIS 770. Formal Language Theory.** (3) Regular languages, finite automata, context-free languages, pushdown automata, context-sensitive languages, linear bounded automata, recursively enumerable languages, Turing machines. Pr.: CIS 570.

**CIS 771. Programming Science.** (3) Use of formal logic for specification and verification of programs; abstractions and assertions for data structures, procedures, packages, loops, and tasks. Pr.: CIS 604, 605.

**CIS 775. Analysis of Algorithms.** (3) Study and application of techniques and procedures used in the analysis of algorithms including the worst and average cases of both time and space. Study of the P and NP classes. Pr.: CIS 500, 604 and MATH 220.

**CIS 798. Topics in Computer Science.** (Var.) I, II, S. Pr.: Prerequisite varies with the announced topic.

## Electrical and Computer Engineering

David L. Soldan, Head

Professors Carpenter,\* Dillman,\* S. Dyer,\* Fowler,\* Gallagher,\* Hummels,\* Lenhert,\* Lucas,\* Rathbone,\* and Soldan;\* Associate Professors Chandra,\* Dawes, DeVault, Devore,\* R. Dyer,\* Harms,\* Morcos,\* Pahwa,\* and Rys;\* Assistant Professors Day,\* Fox,\* Gordon,\* and Hudson;\* Instructor Wakabayashi; Emeriti: Professors Cottom, Dollar, Haft, Hunt, Johnson, Kirmser, Koepsel, and Ward.

Electrical and computer engineers are involved in the design of electrically oriented systems for a range of applications in modern society. These systems or circuits range from miniature microprocessors through energy conversion systems to giant communication networks and super computers. Electrical or computer engineers are involved in every phase of the transmission, conversion, and processing of energy and information for useful purposes both in industry and in our homes.

Opportunities exist for baccalaureate degree holders to continue education at advanced degree levels or to enter such fields as medicine, law, or business administration.

The electrical and computer engineering curricula provide course work in the basic sciences, mathematics, and communications skills. They also provide an understanding of the ethical, social, safety, and economic factors required for professional engineering practice. A sequence of courses in the humanities and social sciences provides depth and breadth to the student's education.

The electrical engineering curriculum establishes a theoretical basis in circuits, electronics, electromagnetics, energy conversion, and controls. It develops advanced problem solving skills in the student's area of specialization and includes a strong laboratory experience stressing system design and implementation.

The computer engineering curriculum establishes a theoretical basis for computer components in circuits, electronics, electromagnetics, digital systems, and microprocessors and for software in programming languages, algorithms, data structures, and operating systems. It develops advanced problem solving skills in an environment where hardware and software tradeoffs are necessary. A strong laboratory experience stressing digital and microprocessor system design and implementation is included.

Through the four years, students are individually advised and counseled by the faculty. At

various times during the year, engineers from industry are invited to speak to students on topics of current interest to the profession.

### Curriculum in electrical engineering (EE)

Bachelor of science in electrical engineering

135 hours required for graduation

Accredited by the Engineering Accreditation Commission of the Accreditation Board of Engineering and Technology

#### Freshman

##### Fall semester

ENGL 100	Expository Writing I*	3
SPCH 105	Public Speaking IA	2
ECON 110	Principles of Macroeconomics	3
CHM 210	Chemistry I	4
MATH 220	Analytic Geometry and Calculus I	4
		<b>16</b>

##### Spring semester

KIN 101	Principles of Physical Fitness	1
CIS 200	Fundamentals of Computer Programming	3
CIS 203	Fundamentals of Computer Programming Laboratory	1
MATH 221	Analytic Geometry and Calculus II	4
CHM 230	Chemistry II	4
Humanities or social science electives		3
		<b>16</b>

#### Sophomore

##### Fall semester

EECE 241	Introduction to Computer Engineering	3
PHYS 213	Engineering Physics I	5
MATH 222	Analytic Geometry and Calculus III	4
CHE 350	Engineering Materials	2
Humanities or social science electives		3
		<b>17</b>

##### Spring semester

EECE 510	Circuit Theory I	3
PHYS 214	Engineering Physics II	5
MATH 240	Elementary Differential Equations	4
CIS 208	C Language Laboratory	1
Humanities or social science electives		3
		<b>16</b>

#### Junior

##### Fall semester

EECE 501	Electrical Engineering Laboratory I	2
EECE 511	Circuit Theory II	3
EECE 525	Electronics I	3
STAT 510	Introduction to Probabilities and Statistics	3
CE 530	Statics and Dynamics	4
Humanities or social science electives		3
		<b>18</b>

##### Spring semester

EECE 502	Electrical Engineering Lab II	2
EECE 512	Linear Systems	3
EECE 526	Electronics II	3
EECE 557	Electromagnetic Theory I	4
EECE 581	Energy Conversion I	3
ENGL 415	Written Communication for Engineers*	3
		<b>18</b>

#### Senior

##### Fall semester

EECE 530	Control Systems Design	3
ME 513	Thermodynamics I	3
Option electives		6
Complementary electives		6
		<b>18</b>

##### Spring semester

EECE 590	Seminar	1
Option electives		3
Complementary electives		9
Humanities or social science electives		3
		<b>16</b>

\*The prerequisite for ENGL 415 is satisfied with an A or B in ENGL 100. Otherwise students must take ENGL 200, which, if necessary, may be substituted for 3 credit hours of complementary electives.

Humanities and social science electives are to be selected from the approved list and need not be taken in the order listed in the curriculum. (Two courses must be 400 level or above.)

Nine semester hours of option electives must be selected from electrical and computer engineering courses upon consultation with the student's faculty advisor.

Fifteen semester hours of complementary electives must be selected from an approved list of complementary electives upon consultation with the student's faculty advisor. The complementary electives may include a maximum of 6 semester hours from electrical and computer engineering courses (10 hours for honors students.)

In fulfillment of the 24 semester hours of option and complementary electives, at least one course must be selected from the approved list of senior-level design/laboratory courses.

## Electrical engineering options

### General

In the general option a set of specializations is possible. Students are expected to select a set of interrelated courses that fulfills an engineering design experience and allows for concentration in one area. Examples of such areas are communication systems, digital systems, electronics and instrumentation, solid-state electronics, control systems and robotics, signal processing, and power systems.

### Bioengineering

Students pursuing the option of bioengineering can fulfill the requirements for a B.S. in electrical engineering by following the outlined core curriculum listed for electrical engineering. Students pursuing a pre-medicine program should contact the College of Arts and Sciences dean's office for additional information. A listing of courses that support the life science component of the bioengineering option follows:

CHM 531	Organic Chemistry I .....	3
CHM 532	Organic Chemistry Lab .....	2
CHM 550	Organic Chemistry II .....	3
BIOCH 521	General Biochemistry .....	3
BIOL 198	Principles of Biology .....	4
BIOL 240	Structure and Function of the Human Body .....	6
BIOL 505	Comparative Anatomy of Vertebrates ...	4
BIOL 526	Human Physiology .....	3
AP 530	Anatomy and Physiology .....	4

The selected courses from the above list will be used as complementary electives in the electrical engineering curriculum. As a minimum, students should select a physiology course and, if possible, additional electives in the chemistry area.

## Computer engineering (CMPEN)

Bachelor of science in computer engineering  
135 hours required for graduation  
Accredited by Engineering Accreditation Commission of  
the Accreditation Board of Engineering and Technology.

### Freshman

#### Fall semester

ENGL 100	Expository Writing* .....	3
KIN 101	Principles of Physical Fitness .....	1

CHM 210	Chemistry I .....	4
MATH 220	Analytic Geometry and Calculus I .....	4
CIS 200	Fundamentals of Computer Programming .....	3
CIS 203	Fundamentals of Computer Programming Laboratory .....	1
		16

#### Spring semester

SPCH 105	Public Speaking IA .....	2
ECON 110	Principles for Macroeconomics .....	3
MATH 221	Analytic Geometry and Calculus II .....	4
EECE 241	Introduction to Computer Engineering .....	3
CIS 208	C Language Laboratory .....	1
Humanities or social science elective	.....	3
		16

### Sophomore

#### Fall semester

PHYS 213	Engineering Physics I .....	5
MATH 222	Analytic Geometry and Calculus III ....	4
CIS 300	Algorithms and Data Structures .....	3
EECE 444	Computer Engineering Lab 1 .....	1
Humanities or social science elective	.....	3
		16

#### Spring semester

PHYS 214	Engineering Physics II .....	5
MATH 240	Elementary Differential Equations .....	4
MATH 510	Discrete Mathematics .....	3
EECE 510	Circuit Theory I .....	3
Humanities or social science elective	.....	3
		18

### Junior

#### Fall semester

CIS 500	Analysis of Algorithmic and Data Structures .....	3
EECE 511	Circuit Theory II .....	3
EECE 525	Electronics I .....	3
STAT 510	Introductory Probability and Statistics I .....	3
EECE 641	Design of Digital Systems I .....	3
EECE 501	Electrical Engineering Lab I .....	2
		17

#### Spring semester

EECE 512	Linear Systems .....	3
EECE 557	Electromagnetic Theory I .....	4
EECE 636	Introduction to Computer Graphics .....	3
EECE 649	Computer Design I .....	3
EECE 544	Computer Engineering Lab II .....	2
Humanities or social science elective	.....	3
		18

### Senior

#### Fall semester

CE 530	Statics and Dynamics .....	4
EECE 645	Digital Electronics .....	3
ENGL 415	Written Communication for Engineers* .....	3
EECE 631	Microcomputer Systems Design .....	3
Humanities or social science elective	.....	3
		16

#### Spring semester

EECE 530	Control Systems Design .....	3
EECE 590	Seminar .....	1
CIS 520	Operating Systems I .....	3
Complementary electives	.....	11
		18

\*The prerequisite for ENGL 415 is satisfied with an A or B in ENGL 100. Otherwise students must take ENGL 200, which, if necessary, may be substituted for 3 credit hours of complementary electives.

Humanities and social science electives are to be selected from the approved list and need not be taken in the order listed in the curriculum. (Two courses must be 400 or above.)

Complementary electives must include an approved engineering science course in either engineering materials, thermodynamics, or flow and rate processes.

## Electrical and computer engineering courses

### Undergraduate credit

**EECE 241. Introduction to Computer Engineering.** (3) I, II, S. 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. or conc.: CIS 200.

**EECE 444. Computer Engineering Laboratory I.** (1) I, II. Laboratory experience in design, construction, and debugging of simple digital systems and subsystems. Three hours lab a week. Pr.: EECE 241.

**EECE 499. Honors Research in Electrical and Computer Engineering.** (Var.) I, II. Individual research problem selected with approval of faculty advisor. Open to students in the College of Engineering honors program. A report is presented orally and in writing during the last semester.

### Undergraduate and graduate credit in minor field

**EECE 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.: EECE 241 and 510. Pr. or conc.: EECE 511 and 525.

**EECE 502. Electrical Engineering Laboratory II.** (2) I, II. Continuation of Electrical Engineering Laboratory I. Three hours lab a week. Pr.: EECE 501, 511, and 525. Pr. or conc.: EECE 526.

**EECE 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.: CIS 200, MATH 222, and PHYS 213.

**EECE 511. Circuit Theory II.** (3) I, II, S. Analysis of electric circuits using differential equations, state equations, transform techniques and linear algebra. Three hours rec. a week. Pr.: PHYS 214, MATH 240, and EECE 510.

**EECE 512. Linear Systems.** (3) I, II. An introduction to linear system fundamental concepts and analytical methods. Analytical concepts presented are signal representation and classification, statistical parameters, convolution, Fourier analysis signal sampling, and discrete transforms. Three hours rec. a week. Pr.: EECE 511, STAT 510, and CIS 208.

**EECE 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. Not open to EECE students. Pr.: PHYS 214.

**EECE 525. Electronics I.** (3) I, II. Fundamentals of electronic components, devices, and circuits. Three hours rec. a week. Pr.: EECE 510 or 519 or ET 530.

**EECE 526. Electronics II.** (3) I, II. Continuation of Electronics I. Three hours rec. a week. Pr.: EECE 511 and 525.

**EECE 530. Control Systems Design.** (3) I, II. Modeling, analysis, and design of control systems. Three hours rec. a week. Pr.: EECE 512.

**EECE 544. Computer Engineering Laboratory II.** (2) I, II. Practical aspects of digital systems design, including the design and operation of small computer systems. Three hours lab a week. Pr.: EECE 444 and 501. Pr. or conc.: EECE 557 and 649.

**EECE 557. Electromagnetic Theory I.** (4) I, II. Vector analysis, electrostatics, magnetostatics, Faraday's Law, Maxwell's Equations, transmission lines, and applications. Four hours rec. a week. Pr.: PHYS 214 and EECE 510.

**EECE 571. Introduction to Biomedical Engineering.** (1) I. Introduction to quantitative analysis techniques as applied to the study of physiological systems and their associated biological signals. One hour rec. a week. Pr.: MATH 222.

**EECE 581. Energy Conversion I.** (3) I, II. Energy conversion principles and their application to electric energy converters operating in the static and the dynamic mode. Three hours rec. a week. Pr.: EECE 510. Pr. or conc.: EECE 557.

**EECE 589. Circuits and Machines Lab.** (2) I, II. Practical aspects of electrical circuits, transformers, and electrical motors and generators. One hour lec. and two hours lab a week. Not open to EECE students. Pr.: EECE 519.

**EECE 590. Seminar.** (1) I, II. Preparation and oral presentation of a written technical report. One hour rec. a week. Pr.: ENGL 415.

### Undergraduate and graduate credit

**EECE 603. Advanced Electrical Engineering Laboratory.** (2) On sufficient demand. 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.: EECE 502.

**EECE 624. Power Electronics.** (3) I. Theory and application of semiconductor devices to the control and conversion of electric power, control of DC and AC machines, design of electronic power circuits such as inverters, controlled rectifiers, and choppers using diodes, diacs, thyristors, triacs, and power transistors. Three hours rec. a week. Pr.: EECE 581 and 512. Pr. or conc.: EECE 526.

**EECE 625. Integrated Circuits Engineering.** (3) II. An introduction to integrated circuit fabrication processes including oxidation, diffusion, masking, etching, process monitoring and device characterization. Design of bipolar and MOS circuits through laboratory experiments and computer simulations. Two hours rec. and three hours lab a week. Pr.: EECE 525 and CHE 350.

**EECE 627. Communication Electronics.** (3) I. An introduction to analog communication systems. Includes amplitude modulation (AM) and frequency modulation (FM) by analog signals and the determination of signal-to-noise ratio in AM and FM systems. Design of simple oscillators, modulators, mixers, and detectors. Three hours rec. a week. Pr. or conc.: EECE 512.

**EECE 628. Electronic Instrumentation.** (3) I, II. Applications of electronics in the design of analog and digital systems for the measurement of physical variables and in the transduction of these variables into a useful form for both recording and control. Two hours rec. and three hours lab a week. Pr.: EECE 502 and 526.

**EECE 631. Microcomputer Systems Design.** (3) I, II. Engineering application of microcomputers to instrumentation, control, and communications. Two hours rec. and three hours lab a week. Pr.: EECE 241, 525 or equiv., and CIS 200.

**EECE 632. Engineering Applications of Microcomputer Systems.** (3) On sufficient demand. Elements of digital building blocks and number systems. Computer systems organization, memories, microcomputer fundamentals. Applications of microcomputer systems. Not available for students with credit for EECE 241. Two hours rec. and three hours lab a week. Pr.: PHYS 214; high-level programming language.

**EECE 636. Introduction to Computer Graphics.** (3) I, II. An introduction to the hardware and software aspects of graphics generation. Programming assignments will provide practical experience in implementing and using standard graphics primitives and user interfaces. Three hours rec. a week. Pr.: CIS 208 and 300.

**EECE 641. Design of Digital Systems I.** (3) I, II. Design of combinational and sequential circuits, computer subsystems, and peripheral interfaces. Emphasis is placed on non-ideal digital device phenomena, electromagnetic interference, radio frequency interference, shielding, and timing. Three hours rec. a week. Pr.: EECE 444 and 510, CIS 200.

**EECE 642. Design of Digital Systems II.** (3) On sufficient demand. 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 rec. a week. Pr.: EECE 645 and 641.

**EECE 645. Digital Electronics.** (3) I, II. The characteristics and performance of the major contemporary digital logic families. Three hours rec. a week. Pr.: EECE 525, 557, and 641.

**EECE 647. Digital Filtering.** (3) I. Difference equation characterization of digital filters, transient and steady-state

analysis of digital filters using the Z-transform, spectral analysis of digital signals, design and implementation of digital filters. Three hours rec. a week. Pr.: EECE 512.

**EECE 649. Computer Design I.** (3) I, II. Basic concepts of computer design. Arithmetic and logic unit design for fixed and floating point operations. Hardwired and micro-programmed control design with emphasis placed on instruction sets and addressing modes. Memory system design including virtual memory organization, caches, and associative memories. I/O design methods, interrupt mechanisms, DMA and I/O processors are covered. Three hours rec. a week. Pr.: EECE 641.

**EECE 659. Wave Guides, Antennas, and Propagation.** (3) I, in even years. Applications of Maxwell's equations to boundary value problems, guided transmission, cavities, radiation, and propagation. Three hours rec. a week. Pr.: EECE 557.

**EECE 661. Digital Communication Systems.** (3) 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.: EECE 512.

**EECE 662. Design of Communication Circuits.** (3) I, II. The design and performance testing of common communication circuits. Topics include tuned amplifiers, impedance matching, oscillators, filters, transmission lines, and phase locked loops. Two hours rec. and three hours lab a week. Pr.: EECE 526 and 502.

**EECE 663. Digital Error Control Coding.** (3) II, in odd years. An introduction to the subject of error-correcting and error-detecting codes, both block and convolutional. Emphasis is placed on practical means of encoding and decoding the most commonly used codes such as Hamming, BCH, and Reed-Solomon codes. Three hours rec. a week. Pr.: EECE 241, STAT 510, and CIS 208.

**EECE 670. Engineering Applications of Machine Intelligence.** (3) II. Study of machine intelligence and fuzzy logic concepts and applications in engineering problem domains. As a term project, develop a fuzzy expert system for a specific problem domain that runs on a personal computer and develop the supporting documentation. Pr.: CIS 200 or NE 385, and PHYS 214. Three hours rec. a week.

**EECE 681. Wind Engineering.** (3) On sufficient demand. Wind characteristics, turbine performance, synchronous and asynchronous electrical loads, siting, economics, and wind farm design. Three hours rec. a week. Pr.: ME 512 or CE 530; and EECE 525 or 519.

**EECE 682. Energy Conversion II.** (3) On sufficient demand. Continuation of EECE 581. Three hours rec. a week. Pr.: EECE 581.

**EECE 683. Power Devices.** (3) II. The design of systems for the control and measurement of large voltages and currents, using power MOSFETs, other solid state switches, resonant transformers, Hall effect sensors, optoisolators, and fiber optics. Two hours rec. and three hours lab a week. Pr.: EECE 501, 525, and 581.

**EECE 685. Modeling, Computer Simulation, and Design of Electric Power Systems.** (3) I. A comprehensive study of modeling of the electric power system components and computer simulation of interconnected power systems in steady state. Vector-matrix descriptions are emphasized. Three hours rec. a week. Pr.: EECE 581.

**EECE 686. Fault Analysis and Protection of Electric Power Systems.** (3) II. Analysis of symmetrical and unsymmetrical faults on power systems using symmetrical components technique. Study of protective relaying for protection of power systems against faults. Vector-matrix descriptions and computer solutions are emphasized. Three hours rec. a week. Pr.: EECE 581.

**EECE 690. Problems in Electrical and Computer Engineering.** (Var.) I, II, S.

**EECE 694. Optoelectronics.** (3) I. Applied geometric and physical optics, optical radiation, and the interaction of light and matter. The theory and application of photodetectors, lasers, and other photoemitters. Introduction to fiber optical waveguides, sensors, and systems. Three hours rec. a week. Pr.: EECE 525, 557, and CHE 350.

**EECE 696. VLSI Circuit Design.** (3) I. Study of silicon NMOS and CMOS technologies in contemporary very large scale integrated circuits. The complete design of the circuit and lithographic masks on the Computer Aided Design (CAD) station. Two hours rec. and three hours lab a week. Pr.: EECE 241 and 525.

**EECE 728. Mixed Signal Measurements.** (3) II. Signal classification, noise and uncertainty, TRMS conversion, quantization and ADCs, repetitive sampling and signal recovery techniques, vector voltmeters, basic network analyzers. Three hours rec. a week. Pr.: EECE 512 or graduate standing.

**EECE 730. Control Systems Analysis and Design.** (3) On sufficient demand. Use 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. Three hours rec. a week. Pr.: EECE 530 or ME 640. Same as ME 730.

**EECE 731. Advanced Microcomputer System Design.** (3) II. Design and engineering applications of 16 and 32 bit microprocessors. Utilization of peripheral and co-processor chips. Two hours rec. and three hours lab a week. Pr.: EECE 631.

**EECE 736. Discrete-Time and Computer-Control Systems.** (3) II. Analysis and design of discrete-time, sampled-data, and computer-control systems using discrete-state equations and Z-transforms. Three hours rec. a week. Pr.: EECE 526, 530, and 581.

**EECE 742. Data Communications.** (3) I. The design and testing of popular local area networks for computers. Topics include topologies, media, signalling and modulation, testing, system design and installation. Emphasis on physical and data link layers of the Open System Interface (OSI) model. Three hours rec. a week. Pr.: EECE 512 or CIS 500.

**EECE 746. Fault Diagnosis in Digital Systems.** (3) II, in odd years. Hazards, fault detection in combinational circuits, and sequential machines using path sensitizing and fault-matrix methods, state table analysis, etc.; system reliability through logical redundancy. Three hours rec. a week. Pr. or conc.: EECE 641 or 631.

**EECE 747. Digital Signal Processing Laboratory.** (3) II. Digitization of analog signals; demonstration of aliasing problems; spectral analysis of digital signals using Fourier and other signal representation techniques; digital filtering problems; applications related to biomedical and speech data. Two hours lec. and three hours lab a week. Pr.: EECE 512. Pr. or conc.: EECE 647.

**EECE 749. Computer Design II.** (3) I. Study of alternate computer hardware structures. Investigation of engineering tradeoffs in implementation of alternative instruction sets and computing structures. Emphasis will be placed on a quantitative approach to cost/performance evaluations including simulation of hardware structures. Three hours rec. a week. Pr.: EECE 649.

**EECE 758. Electromagnetic Theory II.** (3) I, in odd years. Continuation of EECE 557. Three hours rec. a week. Pr.: EECE 557.

**EECE 771. Control Theory Applied to Bioengineering.** (3) II. 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.: EECE 530 or ME 640, and a basic physiology course.

**EECE 772. Theory and Techniques of Bioinstrumentation.** (3) I. Theoretical aspects of biological signals, electrodes, transducers, and processing equipment with emphasis on the acquisition and recording of the responses to electrical potentials, pressure, and flow measurements. Three hours rec. a week. Pr.: EECE 771 or consent of instructor.

**EECE 773. Bioinstrumentation Laboratory.** (1) I. Practical experience with and evaluations of laboratory and clinical techniques related to electrodes, transducers, and monitoring equipment. Emphasis is on instrumentation for the respiratory, cardiovascular, and nervous systems. Three hours lab a week. Pr.: Conc. enrollment in EECE 772 and AP 773.

**EECE 791. Matrix Methods Applied to Electrical Engineering.** (3) On sufficient demand. Applications of matrices and linear vector spaces to electrical systems. Three hours rec. a week. Pr.: EECE 512.

## Industrial and Manufacturing Systems Engineering

Bradley A. Kramer,\* Head

Professors Azadivar,\* Harnett,\* Hwang,\* Konz,\* E.S. Lee,\* and Tillman,\* Associate Professors Ben-Arieh,\* Kramer\* and Wilson; Assistant Professors Chang,\* Lavelle,\* Y.S. Lee,\* Ordoobadi, Rys,\* and Wu,\* Emeritus: Professor D. Grosh; Associate Professor L. Grosh, Hansen, and Willems; Adjunct Professors Amos and Galitzer.\*

### Degrees

The department of industrial engineering offers two accredited degree programs: industrial engineering and manufacturing systems engineering.

#### Industrial engineering

Industrial engineers design, analyze, and improve integrated systems of people, equipment, and material to produce goods and services. They are concerned with the effective utilization of all organizational resources to maximize system productivity. The industrial engineer is equipped to influence product designs, develop efficient production systems, and to integrate these activities with the financial, marketing, and other functions of an organization. The goal of the industrial engineering curricula is to integrate mathematics, the basic sciences, the engineering sciences, and engineering design projects into a meaningful educational experience so that our graduates have the ability to apply this knowledge to the identification and solution of practical engineering problems. Our graduates are equally prepared to begin exciting careers in engineering or to continue their education in graduate programs of engineering, business, or law.

The curriculum provides an education in each of the basic functional areas of industrial engineering: engineering management, ergonomics, manufacturing systems engineering, and operations research. Students are individually advised and counseled by the faculty to choose electives to broaden their education and to emphasize subjects of interest.

Courses are available in computer simulation, operations research, industrial management, ergonomics, safety, manufacturing information systems, quality engineering, project evaluation, automated factory concepts, product and process engineering, computer control of manufacturing equipment, robotics, and the design and analysis of manufacturing systems.

The curriculum is augmented by an industrial engineering assembly held once each month in which engineers from industry are invited to speak about topics of current interest to the profession.

#### Manufacturing systems engineering

The manufacturing systems engineering program is of particular interest to students interested in a career in designing, analyzing, and improving modern manufacturing systems. This program provides a basic background in modern manufacturing engineering, manufacturing systems engineering, and industrial engineering principles.

Graduates of this program will have a strong background in the use of computers in integrating all phases of a manufacturing enterprise. Manufacturing subjects covered in the curriculum include: computer aided manufacturing, engineering materials, ergonomics, facilities layout and design, industrial simulation, manufacturing processes, manufacturing information systems, product and process engineering, and statistical quality control. The program culminates with a team project to design and implement a working manufacturing system to mass produce a product.

### Industrial engineering (IE)

Bachelor of science in industrial engineering  
135 hours required for graduation  
Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology

#### Freshman

Fall semester	
MATH 220	Analytic Geometry and Calculus I ..... 4
CHM 210	Chemistry I ..... 4
ENGL 100	Expository Writing I* ..... 3
ECON 110	Principles of Macroeconomics ..... 3
Humanities or social science elective	..... 2
IMSE 015	Engineering Assembly ..... 0
<b>16</b>	

#### Spring semester

MATH 221	Analytic Geometry and Calculus II ..... 4
CHM 230	Chemistry II ..... 4
NE 385	Engineering Computational Techniques ..... 2
ME 212	Engineering Graphics I ..... 2
KIN 101	Principles of Physical Fitness ..... 1
Humanities or social science elective	..... 3
IMSE 015	Engineering Assembly ..... 0
<b>16</b>	

#### Sophomore

Fall semester	
MATH 222	Analytic Geometry and Calculus III ..... 4
PHYS 213	Engineering Physics I ..... 5
ACCTG 231	Accounting for Business Operations ..... 3
IMSE 373	Computer Applications in IE ..... 2
Literature elective	..... 3
IMSE 015	Engineering Assembly ..... 0
<b>17</b>	

#### Spring semester

MATH 240	Elementary Differential Equations ..... 4
PHYS 214	Engineering Physics II ..... 5
IMSE 242	Introduction to Manufacturing Engineering ..... 3
CHE 352	Engineering Materials I ..... 3
Restricted elective	..... 3
IMSE 015	Engineering Assembly ..... 0
<b>17</b>	

#### Junior

##### Fall semester

STAT 510	Introduction to Probability and Statistics I ..... 3
IMSE 530	Industrial Project Evaluation ..... 3
IMSE 560	Introduction to Operations Research I ... 3
IMSE 623	Industrial Ergonomics ..... 3
EECE 519	Electric Circuits and Controls ..... 4
SPCH 105	Public Speaking IA ..... 2
IMSE 015	Engineering Assembly ..... 0
<b>18</b>	

##### Spring semester

STAT 511	Introduction to Probability and Statistics II ..... 3
IMSE 660	Introduction to Operations Research II . 3
IMSE elective	..... 3
CE 530	Statics and Dynamics ..... 4
ENGL 415	Written Communication for Engineers* ..... 3
IMSE 015	Engineering Assembly ..... 0
IMSE 050	Industrial Plant Studies ..... 0
<b>16</b>	

#### Senior

##### Fall semester

IMSE 541	Statistical Quality Control ..... 3
IMSE 591	Senior Design Project I** ..... 2
IMSE 633	Production Planning and Inventory Control ..... 3
IMSE 643	Industrial Simulation ..... 3
IMSE elective	..... 3
Humanities or social science elective	..... 3
IMSE 015	Engineering Assembly ..... 0
<b>17</b>	

##### Spring semester

IMSE 501	Industrial Management ..... 3
IMSE 555	Industrial Facility Layout Design ..... 3
IMSE 592	Senior Design Project II ..... 2
IMSE electives	..... 6
Humanities or social science elective	..... 3
IMSE 015	Engineering Assembly ..... 0
<b>17</b>	

\*The prerequisite for ENGL 415 is satisfied with an A or B in ENGL 100. Otherwise students must take ENGL 200, which, if necessary, may be substituted for 3 hours of restricted elective.

\*\*IMSE 580 may be substituted for IMSE 591 and IMSE 592. Students should sign up in the IMSE department office at the beginning of the fall semester if they intend to take IMSE 580 in the following spring semester.

Humanities and social science electives are to be selected from the catalog list, need not be taken at the time shown in the curriculum, and must include two courses at or above the 400 level.

Literature elective must be selected from ENGL 262, 272, 320, 330, 340, or 390.

Restricted elective must be selected from engineering, mathematics or computer science, economics, statistics, ROTC, and business administration courses, or ENGL 200, if necessary.

An IMSE elective is any course in industrial engineering below the 800 level.

### Manufacturing systems engineering (MSE)

Bachelor of science in manufacturing systems engineering.  
135 hours required for graduation  
Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology

#### Freshman

##### Fall semester

MATH 220	Analytic Geometry and Calculus I ..... 4
CHM 210	Chemistry I ..... 4
ENGL 100	Expository Writing I* ..... 3
ECON 110	Principles of Macroeconomics ..... 3
Humanities or social science elective	..... 3
IMSE 015	Engineering Assembly ..... 0
<b>17</b>	

**Spring semester**

MATH 221	Analytic Geometry and Calculus II .....	4
CHM 230	Chemistry II .....	4
NE 385	Engineering Computational Techniques .....	2
ME 212	Engineering Graphics I .....	2
KIN 101	Principles of Physical Fitness .....	1
Humanities or social science elective	.....	3
IMSE 015	Engineering Assembly .....	0
		<b>16</b>

**Sophomore****Fall semester**

MATH 222	Analytic Geometry and Calculus III .....	4
PHYS 213	Engineering Physics I .....	5
SPCH 105	Public Speaking IA .....	2
IMSE 373	Computer Applications in IE .....	2
Literature elective	.....	3
IMSE 015	Engineering Assembly .....	0
		<b>16</b>

**Spring semester**

MATH 240	Elementary Differential Equations .....	4
PHYS 214	Engineering Physics II .....	5
IMSE 242	Introduction to Manufacturing Engineering .....	3
CHE 352	Engineering Materials I .....	3
Restricted elective	.....	3
IMSE 015	Engineering Assembly .....	0
		<b>18</b>

**Junior****Fall semester**

STAT 510	Introduction to Probability and Statistics I .....	3
IMSE 530	Industrial Project Evaluation .....	3
IMSE 623	Industrial Ergonomics .....	3
EECE 519	Electric Circuits and Controls .....	4
CE 530	Statics and Dynamics .....	4
IMSE 015	Engineering Assembly .....	0
		<b>17</b>

**Spring semester**

STAT 511	Introduction to Probability and Statistics II .....	3
IMSE 560	Introduction to Operations Research I ...	3
IMSE 563	Manufacturing Processes Engineering ..	4
ENGL 415	Written Communication for Engineers* .....	3
IMSE elective	.....	3
Humanities or social science elective	.....	2
IMSE 015	Engineering Assembly .....	0
IMSE 050	Industrial Plant Studies .....	0
		<b>18</b>

**Senior****Fall semester**

IMSE 541	Statistical Quality Control .....	3
IMSE 564	Product and Process Engineering .....	3
IMSE 662	Computer Aided Manufacturing .....	3
IMSE 633	Production Planning and Inventory Control .....	3
IMSE 643	Industrial Simulation .....	3
IMSE elective	.....	2
IMSE 015	Engineering Assembly .....	0
		<b>17</b>

**Spring semester**

IMSE 555	Industrial Facility Layout Design .....	3
IMSE 580	Manufacturing Systems Design and Analysis .....	4
IMSE 685	Manufacturing Information Systems .....	3
IMSE elective	.....	3
Humanities or social science elective	.....	3
IMSE 015	Engineering Assembly .....	0
		<b>16</b>

\*The prerequisite for ENGL 415 is satisfied with an A or B in ENGL 100. Otherwise students must take ENGL 120, which, if necessary, may be substituted for 3 hours of restricted elective.

Humanities and social science electives are to be selected from the catalog list, need not be taken at the time shown in the curriculum, and must include two courses at or above the 400 level.

Literature elective must be selected from ENGL 262, 272, 320, 330, 340, or 390.

Restricted elective must be selected from engineering, mathematics or computer science, economics, statistics, ROTC, and business administration courses, or ENGL 120, if necessary.

An IMSE elective is any course in industrial engineering below the 800 level.

**Industrial engineering courses**

**IMSE 015. Engineering Assembly.** (0) I, II. Assemblies are held once a month for practicing industrial engineers to make presentations to the students. Students are given an opportunity to interact with the visitors. The purpose is to provide an opportunity to learn about various companies and their products and operations. Required every semester.

**IMSE 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.

**Undergraduate credit**

**IMSE 201. Introduction to Industrial Engineering.** (3) I. Introduction to the major functions of industrial engineers with emphasis on the analysis, design, and control of production systems. Two hours lec. and two hours lab a week. Pr.: NE 385.

**IMSE 241. Production Processes.** (3) I, II. A survey of basic manufacturing processes used in modern industry. Topics include measurement, metal machining, welding, casting, hot and cold press forming processes, heat treatment, powdered metals, plastics, and an introduction to automation. Hands-on experience in measurement, machining, welding, and casting. Two hours rec. and four hours lab a week. Not for industrial engineering majors. Pr.: ME 212.

**IMSE 242. Introduction to Manufacturing Engineering.** (3) I, II. A survey of basic manufacturing processes, including: measurement, casting, metal machining, welding, hot and cold press forming processes, heat treatment, powdered metals and plastic molding; and including hands-on experience. An introduction to design of manufacturing processes. Two hours rec. and four hours lab a week. Pr.: ME 212.

**IMSE 373. Computer Applications in Industrial Engineering.** (2) I, II. Use of operating systems, applications of software in engineering economy, mathematical programming, statistical analysis, and management reporting systems. One hour lec. and three hours lab a week. Pr.: NE 385 or a previous course in computers.

**IMSE 499. Honors Research in Industrial Engineering.** (Var.) I, II. Individual research problem selected with approval of faculty advisor. Open to students in the College of Engineering honors program. A report is presented orally and in writing during the last semester.

**Undergraduate and graduate credit in minor field**

**IMSE 501. Introduction to 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.

**IMSE 530. Industrial Project Evaluation.** (3) I, 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 rec. a week. Pr.: MATH 222 and IMSE 373.

**IMSE 541. Statistical Quality Control.** (3) I, II. Normal, binomial, and frequency distributions. Seven process improvement tools. Control charts on means and variances for variables and attributes. Design of experiments for process and product design. Acceptance sampling plans. Two hours rec. and two hours lab. a week. Pr.: IMSE 373. Pr.: or conc.: STAT 511.

**IMSE 555. Industrial Facilities Layout and Design.** (3) I, II. Design of industrial facilities with emphasis on manu-

facturing engineering and material handling. Two hours rec. and two hours lab a week. Pr.: IMSE 623.

**IMSE 560. Introduction to Operations Research I.** (3) I, II. A study of the methods of operations research including model formulation and optimization. Topics include: assignment/transportation problems, linear programming, network flows. Three hours lec. a week. Pr.: IMSE 373 and MATH 222.

**IMSE 563. Manufacturing Processes Engineering.** (4) II. A study of the effects of operating variables on manufacturing processes such as machining, metal forming, casting, welding, plastics, etc. Emphases are on manufacturing process theory, process variables measurement, and the technical inferences of collected data. Strength of materials, manufacturing processes and the engineering design of experiments for process variables measurements are used to develop efficient manufacturing processes. Pr.: IMSE 241 or IMSE 242, CHE 352, CE 530 or Statics equivalent.

**IMSE 564. Product and Process Engineering.** (3) I. A study of the interrelationships between product design and production process selection. Emphasis is on the development of economic production systems for discrete products in a competitive manufacturing environment. Concepts of design for manufacture and assembly, tool engineering, and manufacturing systems design are included. Two hours lec. three hours lab per week. Pr.: IMSE 563. Pr. or conc.: IMSE 530.

**IMSE 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.

**IMSE 580. Manufacturing Systems Design and Analysis.** (4) II. Comprehensive design and analysis of a manufacturing system; integration of the undergraduate industrial engineering and manufacturing engineering option courses. Two hours rec. and four hours lab a week. Pr.: IMSE 530, IMSE 623, IMSE 633. Pr. or conc.: IMSE 541.

**IMSE 591. Senior Design Project I.** (2) I, II. Students organize themselves in teams, not exceeding five students in each team. The teams select a general subject, formulate a specific design project, and gather data and resources needed to support the project. Two hours rec. a week. Pr.: IMSE 530, 623.

**IMSE 592. Senior Design Project II.** (2) I, II. Continuation of IMSE 591 in which student teams complete engineering design projects formulated and approved in IMSE 591. Two hours rec. a week. Pr. or conc.: IMSE 591.

**Undergraduate and graduate credit**

**IMSE 601. Introduction to Systems Management.** (3) 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. Taught at Fort Leavenworth only. Three hours rec. a week. Pr.: MATH 222 and consent of instructor.

**IMSE 602. Topics in Industrial Engineering.** (Var.) I, II, S. Lectures on recent topics in industrial engineering.

**IMSE 604. Independent Study of Industrial Engineering.** (Var.) I, II, S. This course involves independent study at the introductory graduate level.

**IMSE 605. Advanced Industrial Management.** (3) I. Managing groups of employees in engineering settings; theory of organization design; designing engineering and technological organizations; professionalism and ethical considerations in engineering. Three hours lec. a week. Pr.: IMSE 501.

**IMSE 610. Occupational Safety Engineering.** (3) II. An overview of factors affecting safety in organizations, emphasizing analysis techniques and design strategies. Topics include occupational safety, accidents, fire protection, industrial hygiene, hazardous waste, toxicology, radiation safety, product liability, and federal standards. A project involving a hazard analysis and the design of solutions for a field location is required. Three hours lec. a week. Pr.: IMSE 242.

**IMSE 612. Hazardous Materials Management.** (2) I. All aspects from generation to final disposal will be studied, including: identifying hazardous materials, chemical safety, storing and shipping chemicals, and treatment and disposal of hazardous wastes. Two hours lec. a week. Pr.: CHM 230.

**IMSE 623. Industrial Ergonomics.** (3) I, II. Process analysis and charting; principles of motion economy and ergonomics; work stations and environments; micromotion analysis and an introduction to standard data systems. Two hours rec. and three hours lab a week. Pr.: IMSE 242.

**IMSE 625. Work Environments.** (3) II. Basic structure and performance of the human, viewed as a component in information processing and control systems. Effect of visual, auditory, toxic, and thermal environments. Two hours rec. and two hours lab a week. Pr.: IMSE 242.

**IMSE 633. Production Planning and Inventory Control.** (3) I, II. Principles, techniques, and applications of production planning and inventory control. Design of control systems. Three hours rec. Pr.: IMSE 242. Pr. or conc.: IMSE 560.

**IMSE 641. Statistical Process in Manufacturing.** (3) II. An introduction to the modern practice of Statistical Process Control in manufacturing. The course surveys the use of advanced techniques related to SPC such as expert systems in SPC implementations and the role of SPC in a Computer INtegrated Manufacturing (CIM) environment. Three hours lec. a week. Pr.: STAT 511, knowledge of Lotus 123/Quattro or SAS.

**IMSE 643. Industrial Simulation.** (3) I, II. Computer simulation modeling of industrial systems emphasizing the design, verification and validation of the models and the use of the model as a systems design tool. Three hours rec. Pr.: IMSE 560. Pr. or conc.: STAT 511.

**IMSE 651. Standard Data Systems.** (3) II. Taught off campus at Fort Leavenworth only. Microscopic and macroscopic standard data systems; commercial versions; company-developed plans; programmed standard data systems. Three hours rec. a week. Pr.: NE 385.

**IMSE 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. Taught at Fort Leavenworth only. Three hours rec. a week. Pr.: consent of instructor.

**IMSE 660. Introduction to Operations Research II.** (3) I, II. Continuation of IMSE 560. Topics include decision theory, Markov processes, queueing theory, nonlinear programming, dynamic programming. Three hours lec. a week. Pr.: IMSE 560, STAT 510.

**IMSE 662. Computer Aided Manufacturing.** (3) I. Concepts in CAM, integrated control of machine tools and transport devices with production control. Concepts of CAM and automated assembly in small lot production environment. Two hours lec. and three hours lab a week. Pr.: IMSE 242 and IMSE 373 or equiv.

**IMSE 671. Topics in Automated Factory Concepts.** (3) I. Introduction to concepts of automation, automatic transfer lines, and CAD/CAM. Emphasis on robots and their role in automated factories. Concepts of group technology, computer-aided process planning, automated material-handling equipment for automated factories. Three hours lec. a week. Pr.: IMSE 633 and 662.

**IMSE 672. Robotic Applications.** (3) II. History, development of the work environment for robots, their application, and implementation. Concepts of control and sensory feedback in robots are covered. Three hours lec a week. Pr.: IMSE 242 and NE 385.

**IMSE 685. Principles of Manufacturing Information Systems.** (3) II. Introduction to the theory and concepts of information for manufacturing. Design of manufacturing systems such as MRP, SFRS, CAD/CAM, etc. Concerns of integration and man-machine interface in manufacturing systems. Three hours lec. a week. Pr.: IMSE 633.

**IMSE 751. Applied Decision Theory.** (3) II, in alternate years. Bayes' theorem, Bayesian estimators, utility, loss function and risk, minimax strategies, elementary game theory. Three hours rec. a week. Pr.: STAT 511 or equiv.

## Mechanical Engineering

Byron W. Jones, \* Head

Professors Appl,\* Cogley,\* Fenton,\* Gowdy,\* Huang,\* Jones,\* Thompson,\* and Walker,\* Associate Professors Beek,\* Krishnaswami,\* Swenson,\* and White,\* Assistant Professors Chapman,\* Eekels, Gordcr, and Hosni,\* Emeriti: Professors Azer, Ball, Crank, Duncan, Gorton,\* Kipp, Lindholm, Messenheimer, Nesmith, Pauli, Rohles, Turnquist, and Wood.

Mechanical engineering is a broad profession that traditionally comprises three primary sub-fields: energy, mechanisms and machinery, and controls. The work done by mechanical engineers includes the design, construction, and use of systems for the conversion of energy available from natural sources (water, fossil fuels, nuclear fuels, solar radiation) to other forms of useful energy (for transportation, heat, light, power); design and production of machines to lighten the burden of servile human work and to do work otherwise beyond human capability; processing of materials into useful products; and creative planning, development, and operation of systems using energy, machines, and resources; and manufacturing.

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 humanities and social science electives are found throughout the curriculum. The laboratory and application courses provide opportunity for development of student creativity, use of design methodology, and other aspects of engineering design.

The entire curriculum serves as preparation for the senior design laboratory, where a team of three to five students is assigned to work on a realistic engineering problem supplied by an industrial sponsor. This brief internship gives new mechanical engineering graduates the experience and confidence to move quickly into productive and satisfying careers.

Because of the broad and fundamental nature of the curriculum, mechanical engineering provides an excellent background for careers in such fields as law, medicine, social services, urban design, and business management.

### Individual programs

The electives in the curriculum provide the opportunity for students to develop skills of individual interest. Students with clear career objectives may be permitted to substitute appropriate courses for some of the required courses. For example, students interested in the aerospace industry can choose elective

courses in propulsion, aerodynamics, aircraft stability and control, and composite materials. A special interest in automobiles may prompt students to choose elective courses in internal combustion engines, machine vibrations, composite materials, and thermodynamic analysis. The combinations are extensive.

### Curriculum in mechanical engineering (ME)

Bachelor of science in mechanical engineering  
135 hours required for graduation  
Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology

#### Freshman

##### Fall semester

CHM 210	Chemistry I .....	4
ENGL 100	Expository Writing I* .....	3
MATH 220	Analytic Geometry and Calculus I .....	4
SPCH 105	Public Speaking IA .....	2
Humanities or social science elective	.....	3
ME 015	Mechanical Engineering Seminar .....	0
		<b>16</b>

##### Spring semester

CHM 230	Chemistry II .....	4
Humanities or social science elective	.....	3
MATH 221	Analytic Geometry and Calculus II .....	4
ME 212	Engineering Graphics .....	2
ECON 110	Principles of Macroeconomics .....	3
ME 015	Mechanical Engineering Seminar .....	0
		<b>16</b>

#### Sophomore

##### Fall semester

MATH 222	Analytic Geometry and Calculus III .....	4
PHYS 213	Engineering Physics I .....	5
IMSE 241	Production Processes .....	3
NE 385	Computational Techniques .....	2
CHE 352	Engineering Materials I .....	3
ME 015	Mechanical Engineering Seminar .....	0
		<b>17</b>

##### Spring semester

MATH 240	Elementary Differential Equations .....	4
PHYS 214	Engineering Physics II .....	5
ME 300	Introduction to ME Design .....	3
CE 333	Statics .....	3
ME 400	Computer Applications in Mechanical Engineering .....	2
ME 015	Mechanical Engineering Seminar .....	0
		<b>17</b>

#### Junior

##### Fall semester

CE 533	Mechanics of Materials .....	3
EECE 519	Electric Circuits and Control .....	4
ME 512	Dynamics .....	3
ME 513	Thermodynamics I .....	3
ENGL 415	Written Communication for Engineers* .....	3
KIN 101	Principles of Physical Fitness .....	1
ME 015	Mechanical Engineering Seminar .....	0
		<b>17</b>

##### Spring semester

EECE 589	Circuits and Machines Lab .....	2
ME 523	Thermodynamics II .....	3
ME 533	Machine Design I .....	3
ME 535	Mechanical Engineering Lab I .....	3
ME 571	Fluid Mechanics .....	3
Humanities or social science elective	.....	3
ME 015	Mechanical Engineering Seminar .....	0
		<b>17</b>

#### Senior

##### Fall semester

ME 573	Heat Transfer .....	3
ME 583	Mechanical Engineering Lab II .....	2
ME 560	Engineering Economics .....	3
Technical electives	.....	6

Humanities or social science elective .....	3
ME 015 Mechanical Engineering Seminar .....	0
	<b>17</b>
<b>Spring semester</b>	
ME 563 Machine Design II .....	3
ME 575 Mechanical Engineering Design Lab ....	3
Technical electives .....	9
Humanities or social science elective .....	3
ME 015 Mechanical Engineering Seminar .....	0
	<b>18</b>

\*Expository Writing II is optional if prerequisites for Written Communication for Engineers (ENGL 415) are met from Expository Writing I.

Humanities and social science electives are to be selected from the approved list and need not be taken in the order listed in the curriculum. (Two courses must be 400 level or above.)

Of the 15 semester hours of technical electives shown above, one course must be chosen from approved course lists in each of the following areas: machine design/solid mechanics; thermal sciences; and automatic controls. Electives must be selected to ensure that a minimum of 16 design credits and 16 (including ECON 110) humanities and social science credits are included in the program of study. All electives are to be chosen with the advice and approval of the faculty advisor and department head.

## Mechanical engineering courses

**ME 015. Mechanical Engineering Seminar.** (0) I, II. A monthly assembly of all undergraduates enrolled in the mechanical engineering curriculum for the purpose of exchanging information regarding academic, technical, social, ethical, and professional matters between students, faculty, and practicing professionals. One hour of lec. a month.

### Undergraduate credit

**ME 212. Engineering Graphics.** (2) I, II. Technical sketching, study of basic principles of projective geometry, multiview drawings, pictorials, reading and interpreting drawings, introduction to CAD, sectioning, dimensioning. Three hours lab and one hour rec. a week. Pr.: Plane geometry.

**ME 220. Graphics A.** (2) I. Technical sketching, pictorials, projection systems and the creation, reading and interpreting of multiview drawings, computer graphics. For non-engineering majors. Three hours lab and one hour rec. a week. Pr.: Plane Geometry.

**ME 300. Introduction to ME Design.** (3) I, II. Introduction to the design process, dimensioning and tolerancing, fasteners, welds, gears, belts, chains, bearings, springs; detail and assembly drawings; interdisciplinary nature of design; design methodology; interdisciplinary design projects. Five hours lab and one hour rec. a week. Pr.: ME 212, PHYS 213 and IE 241.

**ME 390. Topics in Mechanical Engineering.** (Var.) I, II, S. Topics selected in consultation with instructor. Intended for interdisciplinary studies or innovative studies in mechanical engineering. Pr.: Consent of instructor.

**ME 400. Computer Applications in Mechanical Engineering.** (2) I, II. The development and application of computer techniques to the problems of design and analysis in mechanical engineering, including computer programming. Two hours rec. a week. Pr.: MATH 221 and NE 385.

**ME 499. Honors Research in Mechanical Engineering.** (Var.) I, II. Individual research problem selected with approval of faculty advisor. Open to students in the College of Engineering honors program. A report is presented orally and in writing during the last semester.

### Undergraduate and graduate credit in minor field

**ME 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.: CE 333 and MATH 222.

**ME 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.

**ME 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.: ME 513.

**ME 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.: ME 512.

**ME 535. Mechanical Engineering Laboratory I.** (3) I, II. Theory and application of mechanical engineering measurements, instrumentation, and computer-based data acquisition. One hour rec. and six hours lab a week. Pr.: ME 400, 513, and EECE 519.

**ME 560. Engineering Economics.** (3) I, II. Economic analysis of problems as applied in engineering. Three hours rec. a week. Pr.: ECON 110, junior standing in engineering.

**ME 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.: CE 533 and ME 533.

**ME 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.: ME 512. Pr. or conc.: ME 513.

**ME 573. Heat Transfer.** (3) I, II. Fundamentals of conduction, convection, and radiation; principles of heat exchanger design and dimensional analysis. Three hours rec. a week. Pr.: ME 571, MATH 240.

**ME 575. Mechanical Engineering Design Laboratory.** (3) 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.: ME 573 and 563.

**ME 583. Mechanical Engineering Laboratory II.** (2) I, II. Planning and executing experimental studies on mechanical and thermal systems; analysis of experimental results; oral and written reports. Six hours lab a week. Pr.: ME 535 and 571. Pr. or conc.: ME 573.

### Undergraduate and graduate credit

**ME 620. Internal Combustion Engines.** (3) I. Analysis of cycles, design, and performance characteristics. Three hours rec. a week. Pr.: ME 523.

**ME 622. Environmental Engineering I.** (3) II. Psychrometry; heating-cooling system design; refrigeration basics. Three hours rec. a week. Pr. or conc.: ME 573.

**ME 628. Aerodynamics.** (3) I. A general introduction to aerodynamics including the analysis of lift, drag, thrust, and aircraft performance for subsonic aircraft. Three hours rec. a week. Pr.: ME 571 and MATH 240.

**ME 631. Aircraft and Missile Propulsion.** (3) II. Mechanics and thermodynamics of aircraft and missile propulsion systems; combustion; air-breathing jet engines; rockets; applied compressible flow; propellants; performance and design of propulsion systems. Three hours rec. a week. Pr.: ME 523, 571, and MATH 240.

**ME 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.: ME 513.

**ME 635. Dynamics of Flight—Stability and Control.** (3) II. Stability and control of aircraft and missiles. Development of the general equations of unsteady motion for six-degree-of-freedom machines. Stability derivatives solution and analysis of the linearized problem. Longitudinal and lateral normal modes. Pr.: ME 512. Pr. or conc.: ME 628 or consent of instructor.

**ME 640. Automatic Controls.** (3) I. Analysis of the dynamic behavior of mechanical, thermal, fluid, and electrical elements using basic physical laws. Transient and fre-

quency response characteristics, stability and sensitivity analysis. Design of automatic control systems. Three hours rec. a week. Pr.: ME 535.

**ME 650. Introduction to Computer-Aided Design.** (3) I. Scope of computer-aided design, computer-aided design workstations, interactive programming, numerical methods and computer graphics in computer-aided design, applications to design problems, introduction to finite elements, and optimal design. Pr.: ME 400 and senior standing in engineering.

**ME 651. Introduction to Composites.** (3) II. The analysis and behavior of a laminate. Design, fabrication, and testing of elements made of various composite materials. Two hours rec. and three hours lab a week. Pr.: CE 533 and senior standing in engineering.

**ME 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.: ME 512 and MATH 240.

**ME 699. Problems in Mechanical Engineering.** (Var.) I, II, S. Pr.: Approval of department head.

**ME 716. Intermediate Dynamics.** (3) II. General vector principles of the dynamics of particles and rigid bodies; applications to orbital calculations, gyro dynamics, and rocket performance; introduction to the energy methods of advanced dynamics. Three hours rec. a week. Pr.: ME 512 and MATH 240.

**ME 720. Intermediate Fluid Mechanics.** (3) I. A continuation of ME 571 in the study of general topics in fluid mechanics including viscous flow, compressible flow, turbulence, and boundary layer theory. Numerous applications utilizing computational fluid dynamics. Three hours rec. a week. Pr.: ME 571, MATH 240.

**ME 721. Thermal Systems Design.** (3) I. Thermal systems design including economics, simulation, and optimization. Includes heating, ventilating, and air conditioning (HVAC) design and control. Pr.: ME 573.

**ME 722. Environmental Engineering II.** (3) I, in even years. Characteristics of air conditioning compressors, condensers, evaporators; system characteristics; air conditioning system controls; refrigeration systems; acoustics. Three hours rec. a week. Pr.: ME 622.

**ME 730. Control Systems Analysis and Design.** (3) II. Use 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.: EECE 530 or ME 640. Same as EECE 730.

**ME 732. Robotic System Analysis.** (3) I, in even years. Modeling and static position and dynamic motion of a serial link manipulator. Forward and inverse kinematics, differential motion, path description and generation, dynamic and static forces, dynamic formulations, and feedback control of joint actuators. Project work includes robot computer software development and lab exercises. Pr.: ME 512. Pr. or conc.: ME 640.

**ME 735. Geometric Modeling.** (3) II, in even years. Geometric aspects of computer graphics. Two- and three-dimensional homogeneous transformations; hidden line and surface removal; space curves and surfaces, including Bezier and B-spline methods; solid modeling; applications and current topics. Same as CIS 735. Pr.: ME 650 or CIS 636 or EECE 636.

**ME 736. Applied Elasticity.** (3) I. 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.: CE 533.

**ME 738. Experimental Stress Analysis.** (3) II, in odd years. Experimental methods of investigating stress distributions. Photoelastic models, photoelastic coatings, brittle coatings, and resistance strain gauges applied to static and dynamic problems. Two hours rec. and three hours lab a week. Pr. or conc.: CE 533.

**ME 756. Machine Vibrations II.** (3) I, in even years. 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.: ME 656.

**ME 757. Kinematics.** (3) I, in odd years. Geometry of constrained motion applied to point paths, specific input-output relations, function generators, kinematic synthesis. Three hours rec. a week. Pr.: ME 533.

**ME 760. Engineering Analysis I.** (3) I. Methods of analysis employed in the solution of problems selected from various branches of engineering. Emphasis is on discrete systems. Three hours rec. a week. Pr.: MATH 240 and senior standing.

**ME 762. Finite Elements.** (3) I. The modeling of lumped parameter systems. Element formulation, assembly, and solution are covered in detail. Standard element families, solution methods, energy techniques, display of results using computer graphics, and applications in heat transfer, fluid, and structural mechanics. The student will develop a complete finite element program. Pr.: ME 400. Pr. or conc.: ME 573 or graduate standing.

**ME 773. Intermediate Heat Transfer.** (3) II. Conduction, convection, and radiation, mass transfer, phase change, heat exchangers, introductory numerical methods. Three hours rec. a week. Pr.: ME 573.

**ME 775. Optimal Mechanical Design.** (3) II, in odd years. The philosophy of optimal design; unconstrained minimization for single variable and multivariable cases; linear and quadratic programming; constrained nonlinear optimization; applications to design of structures, mechanisms, dynamic systems, components, control systems, etc. Pr.: ME 400, MATH 240, and senior standing in engineering.

## Nuclear Engineering

N. Dean Eckhoff,\* Head

Professors Donnert,\* Eckhoff,\* Faw,\* Merklin,\* Shultis,\* and Simons,\* Assistant Professors Hightower.

The curriculum leading to the B.S. in nuclear engineering prepares students for professional positions in industry, government, private practice, and postgraduate studies. These fundamentals are emphasized throughout the curriculum beginning with the two nuclear engineering courses in the freshmen year and culminating with the nuclear engineering courses in the senior year. Through technical electives, students may organize a program suited to their particular needs and interests. Students may elect a program leading to specialized engineering practice or to postgraduate study in engineering, science, medicine, business, or law.

### Curriculum in nuclear engineering (NE)

Bachelor of science in nuclear engineering  
132 hours required for graduation  
Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology

#### Freshman

Fall semester	
NE 110	Nuclear Engineering Concepts ..... 2
ENGL 100	Expository Writing I ..... 3
CHM 210	Chemistry I ..... 4
MATH 220	Analytic Geometry and Calculus I ..... 4
KIN 101	Principles of Physical Fitness ..... 1
ECON 110	Principles of Macroeconomics ..... 3
<b>17</b>	

#### Spring semester

NE 385	Engineering Computational Techniques ..... 2
CHM 230	Chemistry II ..... 4

MATH 221	Analytic Geometry and Calculus II ..... 4
SPCH 105	Public Speaking IA ..... 2
Humanities or social science elective ..... 3	
<b>15</b>	

#### Sophomore

Fall semester	
CHE 350	Engineering Materials ..... 2
PHYS 213	Engineering Physics I ..... 5
MATH 222	Analytic Geometry and Calculus III ..... 4
NE 415	Introduction to Engineering Analysis .... 3
Humanities or social science elective ..... 3	
<b>17</b>	

#### Spring semester

PHYS 214	Engineering Physics II ..... 5
NE 500	Applied Engineering Analysis ..... 3
CE 530	Statics and Dynamics ..... 4
Humanities or social science elective ..... 5	
<b>17</b>	

#### Junior

Fall semester	
NE 515	Nuclear Engineering Materials ..... 3
EECE 519	Electric Circuits and Control ..... 4
ME 513	Thermodynamics I ..... 3
NE 505	Elements of Nuclear Engineering ..... 3
Technical elective ..... 3	
<b>16</b>	

#### Spring semester

NE 512	Principles of Radiation Detection ..... 3
NE 520	Neutron and Particle Interactions I ..... 2
ME 571	Fluid Mechanics ..... 3
NE 602	Radiation Protection Engineering I ..... 3
Technical elective ..... 3	
Humanities or social science elective ..... 2	
<b>16</b>	

#### Senior

Fall semester	
ENGL 415	Written Communication for Engineers* 3
NE 630	Applied Reactor Theory ..... 3
NE 646	Reactor Operations Laboratory I ..... 2
NE 693	Radiation Shielding Design ..... 3
ME 573	Heat Transfer ..... 3
Technical electives ..... 3	
<b>17</b>	

#### Spring semester

NE 648	Reactor Operations Laboratory II ..... 2
NE 694	Nuclear Reactor Thermal Design ..... 3
NE 696	Nuclear Systems Design ..... 3
NE 697	Nuclear Engineering Design ..... 2
Technical electives ..... 7	
<b>17</b>	

\*Expository Writing II is optional if prerequisites for Written Communication for Engineers (ENGL 415) are met from Expository Writing I. Expository Writing II may be substituted for 3 hours of technical electives.

Humanities and social science electives are to be selected from the approved list and need not be taken in the order listed in the curriculum. (Two courses must be 400 level or above.)

A technical elective program of study is chosen in consultation with the student's advisor and presented for approval to the department faculty.

### Nuclear engineering courses

#### Undergraduate credit

**NE 110. Nuclear Engineering Concepts.** (2) I. A survey of nuclear engineering that acquaints students with the technical and professional activities and responsibilities of nuclear engineers. Two hours lec. a week.

**NE 385. Engineering Computational Techniques.** (2) I, II. Application of digital computer methods to the solution of engineering problems. Two hours lec. a week. Pr.: MATH 220.

**NE 415. Introduction to Engineering Analysis.** (3) I. Introduction to analytical, statistical, and numerical analysis, including computer programming, as applied to engineering. Three hours rec. a week. Pr.: MATH 211 or 221.

**NE 499. Honors Research in Nuclear Engineering.** (Var.) I, II. Individual research problem selected with approval of faculty advisor. Open to students in the College of Engineering honors program. A report is presented orally and in writing during the last semester.

### Undergraduate and graduate credit in minor field

**NE 500. Applied Engineering Analysis.** (3) II. Methods and applications of analytical, statistical, and numerical analysis in engineering, including computer programming. Three hours rec. a week. Pr.: NE 415.

**NE 501. Introduction to Nuclear Engineering.** (3) I, II. An overview course to acquaint non-nuclear engineers with introductory aspects of nuclear engineering. Three hours rec. a week. Pr.: Junior standing in engineering or physical sciences.

**NE 505. Elements of Nuclear Engineering.** (3) I. Introduction to radioactive decay, neutron reactions and interactions, radiation interaction with matter, and reactor physics. Three hours lec. a week. Pr.: MATH 221 and PHYS 213.

**NE 512. Principles of Radiation Detection.** (3) II. Operating principles and general properties of devices used in the detection and characterization of ionizing radiation. Two hours rec. and three hours lab a week. Pr.: NE 505.

**NE 515. Nuclear Engineering Materials.** (3) I. An investigation of the nuclear properties, metallurgy, the processing of nuclear materials, and the behavior of fuels and components in a radiation environment. Three hours lec. a week. Pr.: NE 505 and CHE 352.

**NE 520. Neutron and Particle Interactions I.** (2) II. Neutron interactions and associated cross sections of importance to nuclear reactor theory; fission and its application to reactor design; energetics of multiple neutron scattering and neutron thermalization. Two hours rec. a week. Pr.: NE 505.

#### Undergraduate and graduate credit

**NE 602. Radiation Protection Engineering I.** (3) II. Basic principles and concepts of radiation protection. Analysis of radioactive-decay systematics, dose and risk concepts, description of natural and other sources of ionizing radiation, basic procedures of external and internal dose evaluation, waste storage and disposal. Three hours lec. a week. Pr.: NE 500 and 505. Pr. or conc.: NE 512.

**NE 620. Problems in Nuclear Engineering.** (Var.) I, II, S. Specific studies in current and advanced problems in various phases of nuclear engineering. Pr.: Consult head of department.

**NE 630. Applied Reactor Theory.** (3) I. Theory of diffusion and slowing down of neutrons with application to critical and subcritical nuclear reactors. Measurement of various reactor physics parameters. Three hours rec. a week. Pr.: NE 520.

**NE 635. Plasma Physics.** (3) I. Fundamental properties of plasmas; motion of ions and electrons in electromagnetic fields; plasmas as magneto-hydrodynamic fluids; plasma waves; diffusion phenomena in plasmas; electric resistivity of plasmas; equilibrium and plasma stability; kinetic theory of plasmas. Three hours rec. a week. Same as PHYS 635. Pr.: PHYS 532 or EECE 557, and PHYS 621.

**NE 646. Reactor Operations Laboratory I.** (2) I. Licensing, nuclear safety, and reactor operations. Measurement of nuclear-reactor neutronic, thermal hydraulic, and health physics protection parameters. One hour lec. and three hours lab a week. Pr.: NE 512 and 602. Pr. or conc.: ME 573, NE 630.

**NE 648. Reactor Operations Laboratory II.** (2) II. Licensing, nuclear safety, and reactor operations. Measurement of nuclear-reactor neutronics, thermal hydraulic, and health physics parameters. One hour lec. and three hours lab per week. Continuation of NE 646. Pr.: ME 573, NE 630 and 646. Pr. or conc.: NE 694, 696.

**NE 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.: NE 500 and 520.

**NE 693. Radiation Shielding Design.** (3) I. Sources of radiation, kernel concepts, and application of diffusion and ray theory to shielding calculations and design, with applications principally in stationary nuclear reactor shielding. Three hours rec. a week. Pr.: NE 602. Pr. or conc.: NE 630.

**NE 694. Nuclear Reactor Thermal Design.** (3) II. Application of thermal-hydraulic principles to the design and analysis of nuclear power plants, with special emphasis on safety systems. Three hours rec. a week. Pr.: NE 630 and ME 573.

**NE 696. Nuclear Systems Design.** (3) II. Application of the principles of nuclear reactor kinetics and simulation, linear stability of reactor systems, and noise analysis to nuclear reactor systems. Three hours rec. a week. Pr.: NE 630.

**NE 697. Nuclear Engineering Design.** (2) II. Individually prepared report on the solution of a design problem. Regulations and economics of nuclear power facilities. Two hours rec. a week. Pr.: NE 630, 693.

**NE 750. Direct Energy Conversion.** (3) II. Principles and analysis of direct conversion phenomena, with special emphasis on direct conversion of nuclear energy including thermoelectric, thermoionic, photovoltaic, magneto-hydrodynamic, and electrochemical processes. Three hours rec. a week. Pr.: NE 647.

**NE 761. Radiation Measurement Systems.** (3) I. Principles of systems used to measure radiation. Applications to radiation monitoring, dosimetry, and spectroscopy. Three hours rec. a week. Pr.: NE 512.

**NE 762. Nuclear Instrumentation.** (3) II. Design and analysis of nuclear instrumentation. Application to nuclear reactor control, radiation dosimetry, and nuclear spectroscopy. Three hours rec. a week. Pr.: EE 510 or 519, and NE 512.

**NE 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. a week. Pr.: NE 520.

**NE 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.: NE 520 or CHM 595.

**NE 799. Special Topics in Nuclear Engineering.** (Var.) On sufficient demand. Topical material of importance in nuclear engineering, such as controlled thermonuclear reactions, numerical analysis, Monte Carlo methods in radiation transport, effects of nuclear explosions, etc. Pr.: Consent of head of department.

# Human Ecology

Barbara S. Stowe, Dean  
Virginia M. Moxley, Associate Dean for  
Academic Affairs  
Jean Sego, Assistant Dean for Academic  
Programs and Records  
Karen Pence, Assistant Dean for Advising and  
New Student Programs

119 Justin Hall  
532-5500  
FAX: 913-532-5504

The College of Human Ecology provides the context for the study of people, their near environments, and especially the interaction between the two. Emphasis is placed on the design and management of environments and services that enhance human productivity and well-being.

Professional programs are offered through General Human Ecology and the four departments: Clothing, Textiles and Interior Design; Foods and Nutrition; Hotel, Restaurant, Institution Management and Dietetics; and Human Development and Family Studies.

The bachelor of science degree is offered in each area of specialization and in general human ecology.

The College of Human Ecology offers activities and experiences that enhance professional development. These include field study (see department descriptions), participation in professional organizations and activities, and career planning.

## Degree programs

All undergraduate programs of study lead to a bachelor of science degree. The programs are listed in the table and described on the following pages.

Entering freshmen who are undecided about specific programs may be admitted to the major in general human ecology (HEGN). Entering transfer students who are undecided and nondegree seeking students should seek admission in human ecology, undeclared (HEUN). Special advisors help students explore available alternatives before they choose specific programs.

## General Requirements

### Bachelor of science degree

Each degree offered by the College of Human Ecology includes a minimum of 37 hours in general education; professional and support-

ing courses in a specific option, including a minimum of 33 hours from departments within the college; and unrestricted electives as needed to total 125–130 hours.

The curricula for all programs consist of the following: general education, including courses from communications, the humanities, social, biological, and physical sciences, quantitative studies, and kinesiology; an area of specialization in a specific field of human ecology; supporting courses; at least 6 hours from two areas in the College of Human Ecology outside the professional area, as defined by the degree program; and unrestricted electives from any academic area.

Acceptance of courses to meet general education requirements varies among the colleges at the university. A listing of categories of applicable courses is available from the College of Human Ecology Dean's Office.

Basic curriculum requirements are listed below. See specific program descriptions for details.

General education courses (37 hours minimum)		
<i>Communications (8–9)</i>		
ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 105	Public Speaking IA .....	2
<b>or</b>		
SPCH 106	Public Speaking I .....	3
<i>Social science (9)</i>		
ECON 110	Principles of Macroeconomics .....	3
Two of the following:		
HDFS 110	Introduction to Human Development ....	3
PSYCH 110	General Psychology .....	3
SOCIO 211	Introduction to Sociology .....	3
<i>Humanities (6)</i>		
Electives*	.....	6
<i>Sciences (7)</i>		
Biological and physical sciences electives*	.....	7
(One course must be taken from each area; one course must include a laboratory)		
<i>Quantitative studies (6)</i>		
MATH 100	College Algebra .....	3
<b>or</b>		
A college-level calculus course .....		
Any 3-hour introductory statistics course .....		
<b>or</b>		
Any 3-hour computing literacy course .....		
KIN 101	Principles of Physical Fitness .....	1
<b>Human ecology courses</b> .....		
At least 6 hours representing two different areas in the College of Human Ecology, outside the professional area as defined by the degree program.**		

**Professional and supporting courses (37–82 hours)**  
(See specific option/program.)

**Unrestricted electives (0–28 hours)**  
(See specific option/program.)

**Total hours for graduation** ..... 125–130

\*A listing of categories of courses applicable toward the general education requirements for human ecology programs is available from the college dean's office.

\*\*This does not apply to B.S. in human ecology or B.S. in human ecology and mass communications, since the professional areas contain courses from at least three departments.

### Grade requirement

Grades of C or higher are required in all courses labeled as foundation, professional, and supporting courses in a College of Human Ecology degree program.

### Transfer programs

Careful planning enables students to transfer courses from another college or university that will apply toward specific degree requirements at K-State. Students who plan to transfer should contact the College of Human Ecology Dean's Office to verify the transferability of courses and plan their transfer programs as soon as possible.

Two-plus-two articulated programs are available for selected programs at some Kansas community colleges.

The courses listed below may be transferred to the College of Human Ecology, although not all courses are required for every program. A list of required courses for each program is available from the college dean's office.

Courses required in all human ecology programs:	Credit* hours*
Expository writing or English composition .....	6
Public speaking .....	2–3
General psychology and/or sociology .....	3
Macroeconomics .....	3
College algebra or college-level calculus (see specific program) .....	3
Introductory statistics and/or computing literacy .....	3
<b>Transferable courses; some may apply as electives if not required for specific program:</b>	
American government or political science .....	3
Sociology and/or psychology .....	3–6
Microeconomics .....	3
Civilization or world history .....	3
Approved literature or modern language .....	6
Design I .....	2
Drawing I .....	2
General chemistry or Chemistry I and II (see specific program) .....	4–8
Organic chemistry .....	5
Biology (with lab) .....	4
Human growth and development (life span)** .....	3
Nutrition*** .....	3
Family relations**** .....	3
Child development***** .....	3
Textiles***** .....	2
Textiles Lab***** .....	1

\*Credit hours given above apply to courses at K-State. Some transfer courses have more or fewer hours; substitutions or adjustments usually can be made for the difference in credit hours. A maximum of one-half of the hours required for the degree may be applied from a two-year college; i.e., in degree programs requiring 125–130 hours, 62–65 hours may be applied from a two-year college. See list of required courses for major area of interest.

\*\*Students planning for degrees in clothing and textiles, interior design, foods and nutrition, dietetics, or hotel and restaurant management should take HDFS 110 after transferring to K-State.

\*\*\*Students planning for degrees in foods and nutrition, or dietetics, or certification in home economics education should take FN 400 Human Nutrition after transferring to K-State.

\*\*\*\*Must be offered through a human ecology/home economics department to apply for certification in home economics education.

Programs	Degrees	Departments/areas
Apparel and textile marketing	Bachelor of science in clothing and textiles	Clothing, textiles and interior design
Apparel design	Bachelor of science in clothing and textiles	Clothing, textiles and interior design
Community health and nutrition	Bachelor of science in foods and nutrition	Foods and nutrition
Dietetics Coordinated program in dietetics General dietetics	Bachelor of science in dietetics	Hotel, restaurant, institution management and dietetics
Early childhood education	Bachelor of science in human development and family studies	Human development and family studies
Human development and family studies  Family and consumer economics (with family financial planning emphasis) Family life and community services Life span human development Human development and family studies and social work*	Bachelor of science in human development and family studies	Human development and family studies
Food science	Bachelor of science in foods and nutrition	Foods and nutrition
General human ecology	Bachelor of science in human ecology	General human ecology
Home economics education teacher certification	Bachelor of science in human ecology	General human ecology
Hotel and restaurant management	Bachelor of science in hotel and restaurant management	Hotel, restaurant, institution management and dietetics
Human ecology and mass communications	Bachelor of science in human ecology and mass communications	General human ecology
Interior design	Bachelor of science in interior design	Clothing, textiles, and interior design
Nutrition and exercise sciences*	Bachelor of science in foods and nutrition	Foods and nutrition
Nutritional sciences (pre-medical, pre-dental, and medically related fields)	Bachelor of science in foods and nutrition	Foods and nutrition
Textiles	Bachelor of science in clothing and textiles	Clothing, textiles and interior design

\*The dual degree is awarded through the College of Arts and Sciences.

## Program Options

### Honors programs

Students with outstanding academic records are invited to participate in the human ecology honors program. High school students are selected according to their scores on the American College Test. Transfer and upper-class students with a 3.5 cumulative grade point average also are eligible. Advisors help honor students plan individual programs of study, which include honors courses, seminars, and independent study.

In the junior or senior year, students complete honors projects on topics of their choice. They develop these projects with human ecology faculty advisors and with the approval of the human ecology honors coordinator. This independent study may involve extensive reading

in a selected area, field study, experience with a research project, or participation in an academic activity that will significantly increase the student's knowledge in an area of interest.

### Dual degree programs

#### Kansas State University

Students interested in combining two degree programs must satisfy all requirements for both degrees. Students may earn dual degrees within the College of Human Ecology, or they may combine their degree in human ecology with a degree from a different college. The dean's office may be contacted for more information.

The College of Human Ecology participates in the intercollegiate programs in American ethnic studies, international studies, Latin American studies, women's studies, and gerontology, described in the Secondary Majors section of this catalog.

#### Manhattan Christian College

The College of Human Ecology cooperates with Manhattan Christian College to provide dual degrees. Students may supplement their Christian service or other programs with a College of Human Ecology professional program. Those interested in dual degrees should contact the College of Human Ecology Dean's Office and Manhattan Christian College, Office of the Vice President for Academic Affairs. Joint advising is arranged for dual degree students. With careful planning during the first semester, most students can complete two degrees in five years, including study during the summers.

### Placement

The College of Human Ecology cooperates with Career and Employment Services to help students locate internships, co-op education, part-time work, and professional employment opportunities in their chosen fields.

## Field study and cooperative education opportunities

Each department in the college offers field study experience for interested and qualified students. Students earn university credit while gaining pre-professional experience. University faculty and professionals in the field guide and supervise these experiences. The length of time devoted to a field study experience varies from one or two weeks to a complete semester. Some field experience programs provide students with financial compensation.

## Organizations and activities

Students participate in a wide range of professional activities sponsored by local and national organizations. Most subject areas within the college have a student organization to enhance the personal and professional development of members. Student associations funded by the Human Ecology College Council are:

American Society of Interior Designers,  
Student Chapter  
Apparel and Textile Marketing Association  
Apparel Design Collective  
Foods and Nutrition Professional Association  
Human Ecology Association  
Human Development and Family Studies  
Association  
KSU Hospitality Management Society  
KSU Student Chapter of the American  
Association of Textile Chemists and  
Colorists  
KSU Student Chapter of the Professional  
Convention Management Association  
Student Dietetic Association

Undergraduate students may be elected or appointed to serve as members of the Human Ecology College Council, the official college student governing body. All students may participate in the College of Human Ecology Open House, which is held as a part of All-University Open House.

The College of Human Ecology Ambassadors are a select group of students who serve as hosts for the college and promote college programs.

Qualified students are invited to join the Phi Upsilon Omicron and Kappa Omicron Nu honor societies.

## Family Center

Stephan Bollman, Director

The Family Center provides applied educational experiences for graduate and undergraduate students of the College of Human Ecology.

The center offers educational programs, consultation, and therapy for individuals and families. These services, provided by students who are supervised by College of Human Ecology faculty, are available to students and the general public. Specific programs address

family topics, including working with parents, parent education, and family life.

Located north of Justin Hall on Campus Creek Road, the center is easily accessible to the students, faculty, and community.

## Galichia Institute for Gerontology and Family Studies

The Galichia Institute for Gerontology and Family Studies provides a physical and programmatic link between the Early Childhood Laboratory and the Family Center. This facility provides for research and educational programs in intergenerational studies. Workshops, seminars, and research studies explore the potential of the aging population to serve society in its retirement years in areas of need such as positive growth and development for young children in day care and other settings.

## The Sensory Analysis Center

Edgar Chambers IV, Director

The Sensory Analysis Center in the Department of Foods and Nutrition has the only university-operated professional sensory panel in the United States. Sensory properties of products are analyzed for companies, government entities, and researchers on campus to provide information about characteristics that are important in product development. The Sensory Analysis Center helps students link theory with practical experience in the study of sensory perception and evaluation of products.

## Clothing, Textiles and Interior Design

Virginia Moxley, Acting Head

Professors McCullough,\* Reagan,\* Stowe and White;\* Associate Professors Choi,\* Huck,\* and Peterson;\* Assistant Professors Annis,\* Mohr, Munson,\* Radcliffe,\* and Villasi;\* Instructors Cannon, Lamb, and McComas; Emeriti: Professors Brockman,\* Slinkman, and Tucker; Associate Professors Hill\* and J. Howe; Assistant Professors Craigie\* and Newby.

The Department of Clothing, Textiles, and Interior Design focuses on meeting human needs through the analysis, design, production, and evaluation of components in the near environment.

Programs leading to a bachelor of science degree are: apparel and textile marketing, apparel design, interior design, and textiles. Students are encouraged to participate in field experiences and internships to further understand their chosen professions.

Facilities include well-equipped studios and laboratories for interior design, housing, ap-

parel design and production, and textile analysis. An extensive historic textiles and costume collection, housed in a climate-controlled storage facility in Justin Hall, is available for study.

Students in all programs participate in field trips and study tours to design, production, and retail market centers across the U.S. and internationally. Student chapters of two professional organizations, the American Society of Interior Designers (ASID) and the American Association of Textile Chemists and Colorists (AATCC), offer opportunities for leadership and involvement.

## Apparel and textile marketing

Bachelor of science in clothing and textiles

The apparel and textile marketing program prepares students for careers in the production, distribution, and marketing of apparel and textile products. Professional courses are supplemented with study in business, including marketing, accounting, and management. During the junior or senior year, students complete an eight-week supervised field experience in textile production, retail, or manufacturing.

### General education courses (40–45 hours)

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 105	Public Speaking IA .....	2
	or	
SPCH 106	Public Speaking I .....	3
ECON 110	Principles of Macroeconomics .....	3
PSYCH 110	General Psychology .....	3
SOCIO 211	Introduction to Sociology .....	3
ECON 120	Principles of Microeconomics .....	3
	Approved economics course at 500 level or above .....	3
	(if STAT 350 and 351 are not taken)	
HIST 102	Western Civilization: The Modern Era ..	3
	Biological science elective .....	3–4
CHM 110	General Chemistry .....	3
CHM 111	General Chemistry Lab .....	1
CIS 110	Introduction to Personal Computers .....	3
MATH 100	College Algebra .....	3
STAT 350	Business and Economics Statistics I .....	3
	and	
STAT 351	Business and Economics Statistics II ....	3
	(if approved economics course at 500 level or above is not taken)	
KIN 101	Principles of Physical Fitness .....	1

### Professional courses (41–42 hours)

CT 220	Fundamentals of Apparel Design and Production .....	3
CT 230	Apparel and Textile Marketing .....	3
CT 265	Textiles .....	2
CT 266	Textiles Lab .....	1
CT 310	Fundamentals of Apparel Evaluation ....	3
CT 330	Clothing and Society .....	3
CT 430	Professional Development for Apparel and Textile Marketing .....	1
CT 435	Apparel and Textile Promotion .....	4
CT 450	Apparel and Textile Marketing Field Experience .....	5
	or	
MKTG 541	Retailing .....	3
	and	
MKTG 542	Sales Management .....	3
CT 520	Textile Merchandise Profit Analysis .....	3
CT 536	Merchandising Concepts .....	4
CT 545	Textile and Apparel Industry .....	3
CT 631	History of Costume from 1780 to Present .....	3

CT 635	Case Studies in Apparel and Textile Marketing .....	2
CT 650	Clothing and Textile Study Tour .....	1
<b>Supporting courses (26 hours)</b>		
HDFS 110	Introduction to Human Development ....	3
HDFS 400	Family Economics .....	3
ART 100	Design I .....	2
ACCTG 231	Accounting for Business Operations .....	3
MANGT 420	Management Concepts .....	3
MKTG 400	Marketing .....	3
MANGT 531	Personnel and Human Resources Management .....	3
<b>or</b>		
PSYCH 560	Industrial Psychology .....	3
MC 320	Principles of Advertising .....	3
<b>or</b>		
MC 325	Fundamentals of Public Relations .....	3
MKTG 450	Consumer Behavior .....	3
<b>or</b>		
PSYCH 545	Consumer Psychology .....	3
<b>Unrestricted electives</b> .....		<b>12–18</b>
<b>Total for graduation</b> .....		<b>125</b>

## Apparel design

### Bachelor of science in clothing and textiles

The apparel design program prepares students for positions in garment design, fashion illustration, and pattern theory and development in the apparel industry. The course work emphasizes commercial and industrial applications of design, and incorporates computer-aided apparel design. Students have access to the historic textile and costume collection for research and special projects.

<b>General education courses (43–45 hours)</b>		
ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 105	Public Speaking IA .....	2
<b>or</b>		
SPCH 106	Public Speaking I .....	3
ECON 110	Principles of Macroeconomics .....	3
ECON 120	Principles of Microeconomics .....	3
PSYCH 110	General Psychology .....	3
SOCIO 211	Introduction to Sociology .....	3
ART 195	Survey of Art History I .....	3
ART 196	Survey of Art History II .....	3
HIST 102	Western Civilization: Modern Era .....	3
Biological science elective .....		3–4
PHYS 101	The Physical World I .....	3
<b>and</b>		
PHYS 103	The Physical World I Lab .....	1
<b>or</b>		
CHM 110	General Chemistry .....	3
CHM 111	General Chemistry Lab .....	1
MATH 100	College Algebra .....	3
CIS 110	Introduction to Personal Computers .....	3
KIN 101	Principles of Physical Fitness .....	1

<b>Professional courses (61 hours)</b>		
CT 110	Apparel Construction.....	4
CT 220	Fundamentals of Apparel Design and Production .....	3
CT 230	Apparel and Textile Marketing .....	3
CT 265	Textiles .....	2
CT 266	Textiles Lab .....	1
CT 300	Advanced Apparel Construction .....	4
CT 315	Fashion Drawing and Illustration .....	2
CT 330	Clothing and Society .....	3
CT 410	Theory of Pattern Design I .....	3
CT 420	Design by Draping .....	2
CT 500	Intermediate Apparel Design .....	3
CT 515	Theory of Pattern Design II .....	3
CT 540	Advanced Apparel Design .....	3
CT 545	Textile and Apparel Industry .....	3
CT 610	Computer Aided Design of Apparel ....	3
CT 630	History of Costume to 1780 .....	3
CT 631	History of Costume 1780 to Present ....	3
CT 650	Clothing and Textiles Study Tour .....	1

CT 550	Apparel Design Field Experience .....	12
<b>or</b>		
Take three from the following courses:		
ECON 620	Labor Economics .....	3
ECON 640	Industrial Organization and Public Policy .....	3
ECON 681	International Trade .....	3
MANGT 530	Industrial and Labor Relations .....	3
MANGT 630	Labor Relations Law .....	3
MKTG 450	Consumer Behavior .....	3
PSYCH 560	Industrial Psychology .....	3
<b>and</b>		
CT 715	Advanced Pattern Design .....	3
<b>or</b>		
CT 620	Textile Yarns and Fabrics .....	3
<b>Supporting courses (18 hours)</b>		
HDFS 110	Introduction to Human Development ..	3
<b>or</b>		
HDFS 350	Family Relationships and Sex Roles ...	3
<b>or</b>		
HDFS 400	Family Economics .....	3
FN 132	Basic Nutrition .....	3
ART 100	Design I .....	2
ART 190	Drawing I .....	2
ART 200	Design II .....	2
MANGT 420	Management Concepts .....	3
MKTG 400	Marketing .....	3
<b>Unrestricted electives</b> .....		<b>4–6</b>
<b>Total for graduation</b> .....		<b>128</b>

## Interior design

### Bachelor of science in interior design

The interior design program is a four-year, professional curriculum accredited by the Foundation for Interior Design Education Research (FIDER). It provides the competencies required to meet the qualifications for the professional title of interior designer.

Interior designers identify, research, and creatively solve problems related to the function of interior environments in order to enhance quality of life and protect public health, safety, and welfare. Interior designers perform services such as programming, design analysis, space planning, preparing drawings and documents, and jobsite inspection using specialized knowledge of aesthetics, furnishings, interior construction, building systems and components, building regulations, equipment, and materials.

The fine arts-based interior design program emphasizes the interaction between humans and their near environment, that is, the design of interior spaces that enhance user satisfaction, productivity, and safety at all stages of the life cycle. Specializations within the program include design for special needs, interior finishes and furnishings, contract documents, interior design history, and preservation and restoration.

Entering students participate in joint first-year courses with students in the College of Architecture and Design.

Students are provided with the creative, aesthetic, and technical skills necessary to translate a design concept into three-dimensional reality. Students develop competencies in problem-solving, interior space planning, selection and specification of interior furnish-

ings and finishes, effective graphic and verbal presentation skills, and execution of contract documents. Supervised internships and study tours in the United States and abroad, and participation in the student chapter of the American Society of Interior Designers, enhance the program.

#### General education courses (40–42 hours)

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 105	Public Speaking IA .....	2
<b>or</b>		
SPCH 106	Public Speaking I .....	3
ECON 110	Principles of Macroeconomics .....	3
PSYCH 110	General Psychology .....	3
SOCIO 211	Introduction to Sociology .....	3
ART 195	Survey of Art History I .....	3
ART 196	Survey of Art History II .....	3
HIST 101	Western Civilization: Rise of Europe ....	3
Biological science elective .....		3–4
PHYS 101	The Physical World I .....	3
<b>and</b>		
PHYS 103	The Physical World I Lab .....	1
<b>or</b>		
PHYS 115	Descriptive Physics .....	4
MATH 100	College Algebra .....	3
CIS 110	Introduction to Personal Computers .....	3
KIN 101	Principles of Physical Fitness .....	1

#### Professional courses (55–57 hours)

CT 260	Textiles for Interiors .....	3
DSFN 201	Environmental Design Studio I .....	4
DSFN 202	Environmental Design Studio II .....	4
DSFN 203	Survey of the Design Professions .....	1
IDH 210	Design and Behavior in the Interior Environment .....	3
IDH 310	Construction Methods and Materials for Interior Design .....	3
IDH 315	Advanced Interior Design Graphics .....	3
IDH 320	History of Interior Design I .....	3
IDH 345	Space and Activity Planning .....	3
IDH 360	History of Interior Design II .....	3
IDH 410	Housing and Its Environment .....	3
IDH 415	Computer-Aided Design and Drafting for Interior Design .....	2
<b>or</b>		
PLAN 630	Computer Applications in Planning and Design .....	1–3
IDH 435	Interior Design and Housing Systems ...	3
IDH 445	Interior Design Contract Documents Studio .....	3
IDH 530	Interior Design Practices and Procedures .....	3
IDH 545	Senior Interior Design Studio I .....	3
IDH 645	Senior Interior Design Studio II .....	3
IDH 650	Advanced Design and Behavior in the Interior Environment .....	3
IDH 651	Design for Exceptional Needs .....	3

#### Professional electives (16 hours)

Select from lists below	
Studio arts .....	4
Professional applications .....	6
Business .....	6

#### Studio arts (4 hours)

ART 205	Graphic Design Techniques .....	2
ART 220	Watercolor I .....	2
ART 230	Sculpture I .....	2
ART 245	Painting I .....	2
ART 260	Design in the Crafts .....	2
ART 265	Ceramics I .....	2
ART 270	Metalsmithing and Jewelry .....	2
ART 275	Weaving .....	2
LAR 510	Landscape Architectural Delineation Techniques .....	2

#### Professional applications (6 hours)

CT 435	Apparel and Textile Promotion .....	4
CT 680	Physical Analysis of Textiles .....	3
IDH 600	Interior Design and Housing Internship .....	4
IDH 610	Housing for Special Needs .....	3

IDH 660	Kitchen and Utility Area Planning .....	3
IDH 680	Historic Fabric Design .....	3
IDH 710	Housing and Facilities Management Processes/Applications .....	3
IDH 760	Historic Preservation and Restoration of Interiors .....	3

**Business (6 hours)**

ACCTG 231	Accounting for Business Operations .....	3
FINAN 552	Real Estate .....	3
MC 325	Fundamentals of Public Relations .....	3
MANGT 390	Business Law I .....	3
MANGT 420	Management Concepts .....	3
MKTG 400	Marketing .....	3

**Supporting courses (9 hours)**

ARCH 301	Appreciation of Architecture .....	3
HDFS 110	Introduction to Human Development ....	3
FN or HRIMD elective	.....	3

**Unrestricted electives** ..... 6–10

**Total for graduation** ..... 130

## Textiles

### Bachelor of science in clothing and textiles

Students in the textiles program emphasize either textile science or textile chemistry by choosing the appropriate professional and supporting courses. The textile science emphasis is for students interested in the consumer aspects of the textile industry and includes quality control, fiber and fabric development, and textile testing. The textile chemistry emphasis incorporates course requirements for traditional chemistry majors, while providing students with a specialization in an applied field. Textile chemistry leads to careers in research and development with the textile industry.

**General education courses (44–48 hours)**

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 105	Public Speaking IA .....	2
	or	
SPCH 106	Public Speaking I .....	3
ECON 110	Principles of Macroeconomics .....	3
PSYCH 110	General Psychology .....	3
SOCIO 211	Introduction to Sociology .....	3
HIST 101	Western Civilization: Rise of Europe ....	3
	Humanities elective .....	3
	Biological science elective .....	3–4
CHM 210	Chemistry I .....	4
	and	
CHM 230	Chemistry II .....	4
	and	
CHM 271	Chemical Analysis .....	4
	or	
CHM 220	Chemical Principles I .....	5
	and	
CHM 250	Chemical Principles II .....	5
CIS 200	Fundamentals of Computer Programming .....	3
CIS 203	Fundamentals of Computer Programming Lab .....	1
STAT 320	Elements of Statistics .....	3
KIN 101	Principles of Physical Fitness .....	1

**Select Program I or II****Program I: Textile Science****Professional courses (31–33 hours)**

CT 265	Textiles .....	2
CT 266	Textiles Lab .....	1
CT 350	Fiber Science .....	3
CT 545	Textile and Apparel Industry .....	3
CT 620	Textile Yarns and Fabrics .....	3
CT 680	Physical Analysis of Textiles .....	3
CT 746	Textile Dyeing and Printing .....	4
CT 747	Textile Finishes .....	3

CT 765	Chemical and Optical Analysis of Textiles .....	3
CT 650	Clothing and Textiles Study Tour .....	1–2
	or	
	Clothing and textiles elective .....	3
CHM 350	General Organic Chemistry .....	3
	and	
CHM 351	General Organic Chemistry Lab .....	2
	or	
CHM 531	Organic Chemistry I .....	3
	and	
CHM 532	Organic Chemistry Lab .....	2
<b>Supporting courses (28 hours)</b>		
FN 132	Basic Nutrition .....	3
HDFS 400	Family Economics .....	3
CT 330	Clothing and Society .....	3
MATH 100	College Algebra .....	3
	or	
MATH	Math elective (200 level or above) .....	3
PHYS 115	Descriptive Physics .....	4
IDH 680	Historic Fabric Design .....	3
	Three courses from the College of Business Administration .....	9

**Unrestricted electives** ..... 16–22

**Total for graduation** ..... 125

**Program II: Textile Chemistry****Professional courses (40–43 hours)**

CT 265	Textiles .....	2
CT 266	Textiles Lab .....	1
CT 350	Fiber Science .....	3
CT 545	Textile and Apparel Industry .....	3
CT 620	Textile Yarns and Fabrics .....	3
CT 680	Physical Analysis of Textiles .....	3
CT 746	Textile Dyeing and Printing .....	4
CT 747	Textile Finishes .....	3
CT 765	Chemical and Optical Analysis of Textiles .....	3
CT 650	Clothing and Textiles Study Tour .....	1–2
	or	
	Clothing and textiles elective .....	3
CHM 531	Organic Chemistry I .....	3
CHM 532	Organic Chemistry Lab .....	2
CHM 550	Organic Chemistry II .....	3
CHM 551	Advanced Organic Lab .....	2
CHM 545	Chemical Separations .....	2
CHM 500	General Physical Chemistry .....	3
	or	
CHM 585	Physical Chemistry I .....	3

**Supporting courses (25 hours)**

FN 132	Basic Nutrition .....	3
HDFS 400	Family Economics .....	3
CT 330	Clothing and Society .....	3
MATH 220	Analytical Geometry and Calculus I ....	4
MATH 221	Analytical Geometry and Calculus II ....	4
PHYS 113	General Physics I .....	4
PHYS 114	General Physics II .....	4

**Unrestricted electives** ..... 9–16

**Total for graduation** ..... 125

## Clothing and textiles courses

**Undergraduate credit**

**CT 110. Apparel Construction.** (4) I, II. Fabrication of apparel; theories and principles of pattern alteration and garment fit; construction methods as applied to woven and knitted fabrics; evaluation of workmanship in apparel; introduction to ready-to-wear apparel techniques and production. Two hours rec. and six hours lab a week.

**CT 220. Fundamentals of Apparel Design and Production.** (3) I, II. Application of the elements and principles of design to apparel design; introduction to apparel production and the work of the apparel designer; basic fashion drawing and figure study. Two hours lec. and two hours rec. a week.

**CT 230. Apparel and Textile Marketing.** (3) II. Overview of the processes involved in the marketing of fashion goods.

**CT 260. Textiles for Interiors.** (3) II. Fundamentals of textiles as related to the design of residential and non-residential interiors. Two hours rec. and two hours lab a week. Pr.: Sophomore standing.

**CT 265. Textiles.** (2) I. Fundamentals of textiles as related to the production, sale, and use of apparel and other products. Conc. enrollment in CT 266.

**CT 266. Textiles Lab.** (1) I. Laboratory experiences related to the identification of fibers, yarns, and fabrics and to the care and performance of textile products. Conc. enrollment in CT 265.

**CT 300. Advanced Clothing Construction.** (4) I. Advanced techniques and experimentation with diverse fabrics; couture techniques as applied to woven or knitted fabrics; industrial techniques as applied to structured (i.e., tailored) garments. Two hours rec. and six hours lab a week. Pr.: CT 110; and CT 265 and 266 or conc. enrollment.

**CT 310. Fundamentals of Apparel Evaluation.** (3) I, II. Evaluation of fabric quality and garment construction in ready-to-wear; fit, sizing, and alteration of ready-to-wear garments; evaluation of garment construction through sample development. Two hours lec. and two hours lab a week. Pr.: CT 265 and 266.

**CT 315. Fashion Drawing and Illustration.** (2) I. In-depth study of the fashion figure and fashion drawing; fundamental fashion layout; development of stylized and mechanical figure and apparel drawings. Four hours lab a week; meets first half of semester. Pr.: ART 190; ART 200; CT 220; and CT 420 conc. enrollment.

**CT 330. Clothing and Society.** (3) I. Cultural, social, psychological, and economic aspects of clothing needs and practices of individuals and groups. Three hours lec. Pr.: SOCIO 211 or PSYCH 110.

**CT 350. Fiber Science.** (3) II. Introduction to structures and properties of fibers, including polymer science. Pr.: MATH 100 and CHM 350.

**CT 410. Theory of Pattern Design I.** (3) II. Introduction to basic principles and techniques used in the development, alteration, and styling of patterns through use of pattern drafting and flat pattern design. Pr.: CT 110.

**CT 420. Design by Draping.** (2) I. Principles and techniques of design by draping in muslin and fashion fabric. Four hours lab a week; meets second half of semester. Pr.: CT 300; and CT 315 conc. enrollment.

**CT 430. Professional Development for Apparel and Textile Marketing.** (1) II. Preparation for a six-week fashion marketing field experience. Exploration of the relationship between career goals and field experience. Interviewing for field experience placement. Pr.: CT 230 or conc. enrollment; major in CT option.

**CT 435. Apparel and Textile Promotion.** (4) II. Promotion of apparel and textile products including advertising, display, special events, and public relations. Pr.: CT 230 and MC 320 or 325.

**CT 450. Apparel and Textile Marketing Field Experience.** (5) I. Supervised work experience in the apparel and textile industry. Pr.: CT 230, 430; ACCTG 231; junior or senior in CT option, 2.5 cumulative GPA, and 2.5 GPA in professional courses.

**CT 485. Problems in Apparel Design.** (Var.) I, II, S. Independent study. Pr.: Consent of instructor.

**CT 499. Problems in Clothing and Textiles.** (Var.) I, II, S. Independent study. Pr.: Consent of instructor.

## Undergraduate and graduate credit in minor field

**CT 500. Intermediate Apparel Design.** (3) II. Creation and analysis of designs for body types in the size ranges produced by the apparel industry, creation and modification of industrial patterns suitable for mass production, industrial construction and production techniques. Introduction to computer-aided apparel design. Six hours lab a week. Pr.: CT 315, 410, or 420, 515 or conc.; CIS 110.

**CT 515. Theory of Pattern Design II.** (3) II. Advanced techniques of pattern development; elementary application of pattern techniques to original designs; introduction to industrial uses of pattern design. Six hours lab a week. Pr.: CT 410.

**CT 520. Textile Merchandise Profit Analysis.** (3) II, S. Concepts, practices, and procedures for analyzing textile merchandise profit including the development of user skills in the application of various software packages for data analyses and decision making in apparel and textile marketing. Pr.: ACCTG 231; CIS 110; and MKTG 400 or conc. enrollment.

**CT 525. Pattern Drafting Techniques.** (3) Alternate S. Study of advanced pattern drafting techniques with emphasis on the bodice and pants for different figure types. Six hours lab a week. Pr.: CT 410.

**CT 536. Merchandising Concepts.** (4) I. Analysis of the elements, processes, and controls involved in fashion merchandising. Pr.: CT 230 and junior or senior standing.

**CT 540. Advanced Apparel Design.** (3) I. Analysis of high fashion from origin of the haute couture to contemporary designers; use of inspiration sources for executing original design solutions; development of design portfolio and resume; introduction to functional apparel design. Six hours lab a week. Pr.: CT 500 and senior standing.

**CT 545. Textile and Apparel Industry.** (3) I. Analysis of fiber, textile, and apparel production; industry structure; impact of government regulations on production. Pr.: ECON 110.

**CT 550. Apparel Design Field Experience.** (12) II. Preplanned and supervised off-campus work experience in the apparel industry. Pr.: CT 300 and 500; junior or senior standing in apparel design; 2.5 cumulative GPA; 3.0 GPA in professional course work; consent of instructor.

### Undergraduate and graduate credit

**CT 600. Textile Analysis.** (3) Alternate S. Laboratory techniques used to characterize textile structures with emphasis on fiber, color, finish, care, and aging. Pr.: CT 265 and 266; CHM 110 and 111. Not open to textile science majors.

**CT 610. Computer-Aided Design of Apparel.** (3) I. Overview of computer-aided design as it relates to the apparel industry; introduction and application of computer hardware and software to apparel design, including apparel illustration, pattern design, pattern grading, and pattern marker development by computer. Six hours lab a week. Pr.: CIS 110.

**CT 620. Textile Yarn and Fabrics.** (3) II. Technological, structural, and functional aspects of yarns and fabrics. Pr.: CT 265 and 266.

**CT 630. History of Costume to 1780.** (3) II. Interrelationship of costume and social, cultural, political, and economic environments from antiquity to 1780 with emphasis on evolution of garment design and sources of costume information. Pr.: ART 195 and 196; or HIST 101.

**CT 631. History of Costume from 1780 to Present.** (3) II. Interrelationship of costume and social, cultural, political, and economic environments from 1780 to the present with emphasis on effects of the industrial revolution, dress reform movements, ready-to-wear development, and haute couture. Pr.: HIST 102.

**CT 635. Case Studies in Apparel and Textile Marketing.** (2) II. An integration of previous course work through the study of real-life and simulated problems in the apparel and textile marketing industries. Emphasis on decision making and strategic planning. Pr.: CT 230; MKTG 400; CT 520 or conc. enrollment.

**CT 650. Clothing and Textiles Study Tour.** (1–2) II, S. Supervised off-campus tour of facilities where textile products are designed, manufactured, tested, marketed, exhibited, and/or conserved. Pr.: CT 265 and 266 and 6 hours clothing and textiles.

**CT 680. Physical Analysis of Textiles.** (4) I. Theory, principles, and procedures in evaluating the physical properties of textile fibers, yarns, fabrics, and products for apparel, interior furnishings, and industrial uses. Three hours lec. and three hours lab a week. Pr.: CT 265 and 266.

**CT 710. Advanced Tailoring.** (3) II, alternate S. Construction of a garment, using different fabrics and custom tailoring techniques. Pr.: CT 400; and CT 410 or 420.

**CT 715. Advanced Pattern Design.** (3) I. Application of pattern design with emphasis on the development of pat-

terns for original designs. Six hours lab a week. Can be repeated for credit. Pr.: CT 410.

**CT 720. Functional Apparel Design.** (3) I. The design process; criteria for design and evaluation of clothing systems for protection from various environmental hazards; design and evaluation of clothing systems with emphasis on functional aspects. Two hours of lec. and two hours recitation. Pr.: CT 265 and 266; CT 410 or 420.

**CT 730. Textile Conservation.** (3) I, alternate years. Scientific theories of textile conservation related to fiber degradation, storage, repair, cleaning, and exhibition of historic items. Laboratory experience in solving conservation problems related to historic textiles. Two hours lec., two hours lab a week. Pr.: CHM 110 and 111; CT 620 or IDH 680.

**CT 741. Polymer Science.** (3) I, in alternate years. Theory, application, and methods of structural analysis with emphasis on synthetic polymers. Pr.: CHM 350 and junior standing.

**CT 742. Textile Fibers.** (3) I. In-depth study of fibers. Two hours rec. and three hours lab a week. Pr.: CT 265 and 266; and CHM 351.

**CT 746. Textile Dyeing and Printing.** (4) II. In-depth study of color systems, colorimetry, physical and chemical properties of dyes, methods of dye-fiber association, and industrial dyeing and printing methods. Two hours lec. and six hours lab a week. Pr.: CT 350 or 742.

**CT 747. Textile Finishes.** (3) II. Theory, application, evaluation, and identification of finishes and auxiliary products which are applied to textile fibers, yarns, and fabrics. Two hours lec. and three hours lab a week. Pr.: CT 350 or 742.

**CT 760. Clothing and Textiles Seminar.** (Var.) I, II. 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.

**CT 765. Chemical and Optical Analysis of Textiles.** (3) II, alternate years. Application of organic chemistry and optical analysis to fibers, dyes, and finishes. Two hours lec. and three hours lab a week. Pr.: CT 350 or 742.

**CT 770. Practicum in Clothing and Textiles.** (Var.) I, II, S. Preplanned and supervised off-campus experience in business, industry, museums, government agencies, or the cooperative extension service. May be repeated up to 6 hours. Pr.: Twelve hours in clothing and textiles and consent of department head.

**CT 775. Experimental Textiles.** (Var.) On sufficient demand. Individual investigation into textile research. Pr.: CT 350 or 742; CT 620.

**CT 780. Problems in Clothing and Textiles.** (Var.) I, II, S. Work is offered in apparel designing, textiles, history of costume, clothing economics. Pr.: Senior or graduate standing; consent of instructor.

**CT 785. Problems in Apparel Design.** (Var.) I, II, S. Problems planned with the student to meet particular needs. Pr.: CT 500 or consent of instructor.

## Design fundamentals courses

### Undergraduate credit

Design fundamentals courses have been jointly developed by the Colleges of Human Ecology and Architecture and Design. All first-year interior design students take DSFN 201 in the fall and its sequel 202 in the spring. DSFN 203 is also only offered in the fall and should be taken concurrently with DSFN 201.

**DSFN 201 and 202. Environmental Design Studio I (4) I and Environmental Design Studio II.** (4) II. Foundation studies introducing principles, processes, and vocabularies of environmental design. Instruction in two- and three-dimensional visualization of objects and spaces. Instruction in the use of instrument-aided drawing, freehand drawing, and model building to represent and communicate design ideas at different scales of observation. Pr.: Admission to the College of Human Ecology interior design program or

the College of Architecture and Design or permission of the dean of either college.

**DSFN 203. Survey of the Design Profession.** (3) I. Overview of the design professions. Comparative study of the working methods, and societal and occupational roles of the architect, interior architect, interior designer, landscape architect, and planner. Two lec. per week for 8 weeks.

## Interior design and housing courses

### Undergraduate credit

**IDH 210. Design and Behavior in the Interior Environment.** (3) I, II. Developing awareness of aesthetic and behavioral relationships fundamental to interior design. Three hours lec. per week.

**IDH 215. Interior Design Graphics.** (3) I, II. Development of graphic communication skills used by interior design professionals. Six hours studio a week.

**IDH 310. Construction Methods and Materials for Interior Design.** (3) I, II. Introduction to concepts, selection, and application of construction processes, materials, and finishes. Introduction to codes, working drawings, and model building. Two hours lec. and two hours lab per week. Pr.: IDH 215 or DSFN 201 and 202.

**IDH 315. Advanced Interior Design Graphics.** (3) I. Design presentation techniques for interiors: Perspectives, color rendering, and advanced drafting methods. Six hours studio a week. Pr.: IDH 210; and IDH 215 or DSFN 201 and 202.

**IDH 320. History of Interior Design I.** (3) I. A historic survey of furniture, textiles, and the minor arts from antiquity to 1850. Progressive development of design and ornamentation characteristics as related to interiors. Pr.: ART 195; ART 196 or conc. enrollment; and HIST 101.

**IDH 345. Space and Activity Planning.** (3) I, II. Application of human factors, space standards, and floorplanning principles to limited-scale living and working environments. Six hours studio a week. Pr.: IDH 210 and 310.

**IDH 360. History of Interior Design II.** (3) II. A survey of modern design evolution in furniture, textiles, and the minor arts from 1850 to the present. Concepts, development, and application of modern technology to contemporary design and interiors. Pr.: HIST 101.

**IDH 410. Housing and Its Environment.** (3) I, II. Socio-economic, political-legal, and consumer overview of housing. Includes individual, family, and public decisions related to residential alternatives, their acquisition, and housing and environmental standards. Three hours lec. a week. Pr.: Three hours sociology or economics.

**IDH 415. Computer-Aided Design and Drafting for Interior Design.** (2) I, II. Introduction to and application of microcomputer-aided design and drafting techniques used by interior design professionals. One hour lec. and two hours lab a week. Pr.: IDH 310, CIS 110.

**IDH 435. Interior Design and Housing Systems.** (3) I, II. Introduction to lighting, heating, ventilating, air conditioning, and acoustic systems; principles, performance requirements, and components related to function, behavior, and aesthetics. Three hours lec. a week. Pr.: PHYS 101 and 103 or PHYS 115; IDH 310.

**IDH 440. Home Appliance Design and Evaluation.** (3) I, II. Principles of design, operation, and care of appliances used in the home; methods of evaluating appliance performance; laboratory demonstrates application of principles. Two hours lec. and three hours lab a week.

**IDH 445. Interior Design Contract Documents Studio.** (3) I, II. Design and execution of working drawings and specifications for interior design projects. Six hours studio a week. Pr.: IDH 315, 415, 435, and admitted to the interior design major.

**IDH 499. Problems in Interior Design and Housing.** (Var.) I, II, S. Independent study. Pr.: Consent of instructor.

### Undergraduate and graduate credit in minor field

**IDH 500. Intermediate Interior Design Studio.** (3) S. Problem-solving in interior design. May substitute for

Interior Design Studio IDH 445, IDH 545, or IDH 645. Students should plan to substitute this course for the next level studio in sequence. Pr.: IDH 315, 345, 435, and admitted to the interior design major.

**IDH 530. Interior Design Practices and Procedures.** (3) II. Ethics, business procedures, and professional development; contract services and administration; and preparation for job market entry as applied to the practice of interior design. Three hours lec. a week. Pr.: IDH 445 or conc. enrollment.

**IDH 545. Senior Interior Design Studio I.** (3) I. Designing solutions to environmental and behavioral problems related to non-residential interiors. Planning, space analysis, and coordination of furnishings, fixtures, materials, and equipment. Six hours studio a week. Pr.: IDH 530.

### Undergraduate and graduate credit

**IDH 600. Interior Design and Housing Internship.** (3–4) I, II, S. Supervised off-campus professional experience in appropriate design-related firms, government agencies, or the housing industry. Pr.: Senior standing; 2.2 cumulative GPA and 2.5 GPA in professional area; IDH 445.

**IDH 610. Housing for Special Needs.** (3) I. Comprehensive overview of housing concerns and issues related to older adults, the disabled, lower-income people, minorities, and other groups. Encompasses physical, economic, and social-cultural factors and the residential alternatives available to these populations. Three hours lec. a week. Pr.: DH 410.

**IDH 625. Consumer and Energy Issues in Housing.** (3) II. An examination of current housing issues including conditions, regulations, finance, and policy as they relate to the consumer. Pr.: SOCIO 211, ECON 110, and IDH 410.

**IDH 630. Household Equipment Theory.** (3) I. Analytical study of appliance design, performance, and evaluation concepts for application in consumer decision-making. Not open to students with credit in IDH 440. Six hours rec. and lab a week. Pr.: Four hours lab science course.

**IDH 645. Senior Interior Design Studio II.** (3) II. Advanced design problems dealing with human activities in the living environment. Solutions for systems and products based on social, cultural, and behavioral functions. Aesthetic coordination and selection of furnishings, finishes, art, and accessories. Six hours studio a week. Pr.: IDH 530.

**IDH 650. Advanced Design and Behavior in the Interior Environment.** (3) I. The design of interior environments explored in an ecological, behavioral, and cultural context. Three hours lec. a week. Pr.: IDH 345.

**IDH 651. Design for Exceptional Needs.** (3) II. Problems encountered in designing interiors for children, the elderly, and the physically disabled. Pr.: IDH 410 and 445.

**IDH 660. Kitchen and Utility Area Planning.** (3) II. Functional and research basis for planning and arranging based on activity analysis, equipment, materials, lighting, and ventilation. Two hours lec. and two hours lab a week. Pr.: IDH 345 or ARCH 261.

**IDH 680. Historic Fabric Design.** (3) I. Interrelationships of fabric design and social, cultural, political, economic, and geographical environments from prehistoric times to present. Pr.: HIST 101; and CT 260 or 265 and 266.

**IDH 710. Housing and Facilities Management Processes/Applications.** (3) II. Application of theories, principles, and practices used in managing physical facilities and the residents or workers they house. Issues and problems encountered by professional managers in providing quality living or working environments within cost-effective operations. Three hours lec. a week. Pr.: IDH 410 and MANGT 420 or 720.

**IDH 740. Advance Household Equipment.** (3) II. 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.: IDH 440, PHYS 115, and senior or graduate standing.

**IDH 760. Historic Preservation and Restoration of Interiors.** (3) I. Principles, guidelines, and qualities of preservation and restoration of interiors. Research and ap-

plication. Pr.: IDH 320 and 360; or CT 630 and 631; or ENVD 250 and 251.

**IDH 780. Interior Design and Housing Seminar.** (2–3) II. Analysis of current developments and issues. May be taken more than one semester with a maximum of 6 credit hours. Pr.: Eight hours of credit basic to field and consent of instructor.

**IDH 782. Problems in Interior Design and Housing.** (Var.) I, II, S. Problems planned with the student to meet particular needs. Pr.: Six hours of credit in IDH.

## Foods and Nutrition

Jane Raymond Bowers,\* Head

Professors Bowers,\* Chambers,\* Clarke, Grunewald,\* Koo,\* Penner,\* Reeves,\* Setser,\* and Zayas;\* Associate Professors Harbers\* and Holcomb;\* Assistant Professors Aramouni,\* Herald,\* Pearson, and Peters; Emeriti: Professors Caul,\* Fryer,\* Newell,\* and Tinklin;\* Associate Professors Atkinson and Smith.\*

The programs in the Department of Foods and Nutrition focus on the physical, chemical, nutritional, and sensory properties of food; on the metabolism of nutrients; on nutrient requirements throughout the life span; and on issues related to diet and health.

The Department of Foods and Nutrition offers three programs leading to a bachelor of science degree in foods and nutrition: community health and nutrition, food science, and nutrition sciences.

A dual-degree program in nutrition and exercise sciences is offered jointly with the Department of Kinesiology. Students earn a B.S. in foods and nutrition and a B.S. in kinesiology.

Students in all programs gain valuable experience by completing field experiences with community and governmental agencies, food industries, and businesses. Students may also meet the academic requirements for membership in the American Dietetic Association (ADA).

Specialized laboratories for sensory analysis of food and food product development are available for research and instruction. The department has an animal laboratory that is fully accredited by the American Association for Accreditation of Laboratory Animal Care (AAALAC). In cooperation with the College of Veterinary Medicine, animals housed and maintained in the laboratory receive veterinary care to comply with the current NIH guidelines. A Nutritional Assessment laboratory includes facilities for physical and dietary assessments.

## Community health and nutrition\*

Bachelor of science in foods and nutrition

Students in community health and nutrition are prepared to develop and implement nutri-

tion and health programs through health agencies at the federal, state, and local levels. Nutritionists identify the physiological, cultural, social, economic, and environmental causes of malnutrition; determine which groups within the community (e.g., pregnant women, infants, or the elderly) have nutrition-related problems; develop community programs to promote good health; and educate community members about nutritional practices.

\*This program was under revision at the time of catalog printing. Contact the dean's office or advisor regarding requirements and status of the proposed change to public health nutrition.

### General education courses (62–65 hours)

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 105	Public Speaking IA .....	2
	<b>or</b>	
SPCH 106	Public Speaking I .....	3
PSYCH 110	General Psychology .....	3
ECON 110	Principles of Macroeconomics .....	3
SOCIO 211	Introduction to Sociology .....	3
PHILO 130	Introduction to Ethics .....	3
	Humanities elective .....	3
BIOCH 365	Elementary Biochemistry .....	3
BIOL 198	Principles of Biology .....	4
BIOL 240	Human Body .....	6
BIOL 455	General Microbiology .....	4
	<b>or</b>	
HRIMD 650	Fundamentals of Public Health/Food Safety .....	3
CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
CHM 350	General Organic Chemistry .....	3
CHM 351	General Organic Chemistry Lab .....	2
MATH 100	College Algebra .....	3
	<b>or</b>	
MATH 220	Analytic Geometry and Calculus I .....	4
STAT 330	Elementary Statistics for Social Science .....	3
	<b>or</b>	
STAT 340	Biometrics I .....	3
CIS 110	Introduction to Personal Computers .....	3
KIN 101	Principles of Physical Fitness .....	1

### Professional courses (42 hours)

FN 301	Food Trends, Legislation, and Regulation .....	3
FN 352	Personal Health .....	3
FN 400	Human Nutrition .....	3
FN 413	Science of Food .....	4
FN 500	Public Health Nutrition .....	3
FN 501	Food Science .....	3
FN 610	Life Span Nutrition .....	3
FN 630	Clinical Nutrition .....	4
FN 650	Practicum in Nutrition .....	3
FN 660	Nutrition and Food Behavior .....	3
FN elective*	.....	3
FN elective*	.....	2
HRIMD 440	Fundamentals of Quantity Food Production .....	5

### Supporting courses (15 hours)

HDFS 110	Introduction to Human Development ....	3
HDFS 400	Family Economics .....	3
MANGT 420	Management Concepts .....	3
HRIMD 445	Organization and Management of Food Service Operations .....	3
HRIMD 482	Employee Development for the Hospitality Industry .....	3

Unrestricted electives ..... 3–6

Total hours for graduation ..... 125

\*To be chosen in consultation with faculty advisor and department head.

## Food science

### Bachelor of science in foods and nutrition

Food scientists are concerned with all aspects of the food industry, from processing the raw material to consumer acceptance of the finished product. Food scientists provide an ever-increasing variety of foods to meet high standards of safety, sanitation, and quality. Students in this program may emphasize consumer communications, nutrition, or sensory analysis. Positions are available in food marketing, technical sales, quality control, sensory analysis, product development, food styling, consumer education, advertising copywriting, or managing food operations in retail companies.

This program is approved by the Institute of Food Technologists (IFT) for having met the standards for undergraduate education in food science and technology.

#### General education courses (63–65 hours)

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 105	Public Speaking IA .....	2
	or	
SPCH 106	Public Speaking I .....	3
ECON 110	Principles of Macroeconomics .....	3
PSYCH 110	General Psychology .....	3
SOCIO 211	Introduction to Sociology .....	3
	Humanities elective (foreign language recommended) ....	6
BIOL 198	Principles of Biology .....	4
BIOL 455	General Microbiology .....	4
CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
CHM 350	General Organic Chemistry .....	3
CHM 351	General Organic Chemistry Lab .....	2
BIOCH 521	General Biochemistry .....	3
BIOCH 522	General Biochemistry Lab .....	2
PHYS 115	Descriptive Physics .....	4
MATH 110	College Algebra .....	3
MATH 210	Technical Calculus I .....	3
	or	
MATH 220	Analytic Geometry and Calculus I .....	4
STAT 320	Elements of Statistics .....	3
	or	
STAT 340	Biometrics .....	3
KIN 101	Principles of Physical Fitness .....	1

#### Professional courses (38 hours)

FN 301	Food Trends, Legislation and Regulation .....	3
FN 400	Human Nutrition .....	3
FN 413	Science of Food .....	4
FN 501	Food Science .....	3
FN 701	Sensory Analysis of Foods .....	3
FN 705	Food Product Development .....	3
FN 790	Food Research Techniques .....	3
FN elective*	.....	3
ATM 440	Introduction to Food Engineering Technology .....	3
ATM 441	Introduction to Food Engineering Technology Lab .....	1
ASI 607	Food Microbiology .....	4

#### Six hours from foods processing electives:

ASI 350	Meat Science .....	3
ASI 502	Principles of Dairy Food Processing .....	4
ASI 671	Meat Selection and Utilization .....	2
ASI 695	Quality Assurance .....	3
GRSC 651	Food and Feed Plant Sanitation .....	4
GRSC 100	Principles of Milling .....	3
GRSC 625	Flour and Dough Testing .....	3
GRSC 635	Baking Science I .....	2
GRSC 636	Baking Science I Lab .....	2

#### Professional electives (Select 9 hours)

Professional executives (Secret) 9 hours		
At least 3 hours must be from FN courses		
FN 499	Problem in Foods and Nutrition .....	Var.

FN 600	Practicum in Foods and Nutrition .....	Var.
FN 610	Life Span Nutrition .....	3
FN 660	Nutrition and Food Behavior .....	3
FN 720	Food Systems .....	3
BIOL 240	Structure and Function of the Human Body .....	6
ENGL 516	Written Communications for the Sciences .....	3
MC 320	Principles of Advertising .....	3
MC 325	Fundamentals of Public Relations .....	3
MKTG 400	Marketing .....	3
MKTG 450	Consumer Behavior .....	3
PSYCH 480	Fundamentals of Sensation and Perception .....	3
	or	
PSYCH 570	Psychobiology .....	3
CIS 110	Introduction to Personal Computing .....	3

To emphasize sensory analysis:  
Select from FN 499 or 600, PSYCH 480 or 570, CIS 110, or MKTG 400.

To emphasize consumer communication:  
Select from FN 499 or 600, 610 or 660, ENGL 516, MC 320, 325, MKTG 400, 450, or CIS 110.

To emphasize nutrition:  
Select from FN 499 or 600, 610, 660, BIOL 240, or CIS 110.

#### Supporting courses (6 hours)

HDFS elective .....	3
CTID or HRIMD elective .....	3

#### Unrestricted electives .....

#### Total hours for graduation .....

\*To be chosen in consultation with faculty advisor and department head.

## Nutritional sciences (pre-medicine)

### Bachelor of science in foods and nutrition

The nutritional sciences program emphasizes the biological and physical sciences and provides students with the background necessary to understand the function and metabolism of nutrients. The program provides an excellent foundation for students considering careers in medicine, dentistry, and other health science professions. Academic requirements for entering medical school may be met through this degree.

#### General education courses (56–58 hours)

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 300	Expository Writing III .....	3
	or	
ENGL 516	Written Communication for the Sciences .....	3
SPCH 105	Public Speaking IA .....	2
	or	
SPCH 106	Public Speaking I .....	3
ECON 110	Principles of Macroeconomics .....	3
PSYCH 110	General Psychology .....	3
SOCIO 211	Introduction to Sociology .....	3
	Humanities electives .....	6
BIOL 198	Principles of Biology .....	5
BIOL 240	Human Body .....	6
BIOL 455	General Microbiology .....	4
MATH 150	Trigonometry* .....	3
MATH 220	Analytic Geometry and Calculus I .....	4
PHYS 113	General Physics I .....	4
PHYS 114	General Physics II .....	4
KIN 101	Principles of Physical Fitness .....	1

#### Professional courses (34 hours)

FN 201	Dimensions of Food and Nutrition .....	3
FN 400	Human Nutrition .....	3
FN 413	Science of Food .....	4
FN 450	Nutritional Assessment .....	2

FN 500	Public Health Nutrition .....	3
FN 550	Nutrient Metabolism .....	3
FN 610	Life Span Nutrition .....	3
FN 630	Clinical Nutrition .....	4
FN elective .....	.....	3
HRIMD elective .....	.....	3
HDFS elective .....	.....	3

#### Supporting courses (25 hours)

CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
CHM 271	Chemical Analysis .....	4
CHM 531	Organic Chemistry I .....	3
CHM 532	Organic Chemistry Lab .....	2
CHM 550	Organic Chemistry II .....	3
BIOCH 521	General Biochemistry .....	3
BIOCH 522	General Biochemistry Lab .....	2

#### Unrestricted electives .....

#### Total hours for graduation .....

This option is designed to meet requirements for entrance to medical school.

\*If taken in high school, substitute computer science, statistics, or higher mathematics course (3–4 hours).

## Nutrition and exercise sciences\*

### Bachelor of science in foods and nutrition Bachelor of science in kinesiology

Nutrition and exercise sciences is a dual-degree program. Students complete a total of 141–147 credit hours and earn two degrees, one from the Department of Foods and Nutrition and the second from the Department of Kinesiology. Graduates of this program may pursue careers in health programs offered by hospitals, industries, wellness centers, public and private clinics, fitness camps, and athletic clubs.

In addition, students in this program can fulfill the minimum academic requirements for membership in the American Dietetic Association by including four specified requirements in their course work.

Those interested in becoming registered dietitians can do so by completing an additional experience requirement and passing a national examination. Students who would like to meet these requirements should consult their advisor.

\*This program was under revision at the time of catalog printing. Contact the dean's office or advisor for new requirements in fall 1994.

#### General education and supporting courses (69–75 hours)

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 105	Public Speaking IA .....	2
	or	
SPCH 106	Public Speaking I .....	3
PSYCH 110	General Psychology .....	3
ECON 110	Principles of Macroeconomics .....	3
SOCIO 211	Introduction to Sociology .....	3

#### Additional courses as specified in the General Requirements section for Arts and Sciences:

Humanities .....	11–12
(One course each in fine arts, philosophy, Western heritage, and literary or rhetorical arts.)	
International studies overlay (I course) .....	0–3
KIN 101 Principles of Physical Fitness .....	1

BIOL 198	Principles of Biology .....	4
BIOL 240	Human Body .....	6
BIOL 455	General Microbiology .....	4
CHM 210	Chemistry I .....	4

CHM 230	Chemistry II .....	4
CHM 350	General Organic Chemistry .....	3
CHM 351	General Organic Chemistry Lab .....	2
BIOCH 365	Elementary Biochemistry .....	3
PHYS 115	Descriptive Physics .....	4
MATH 100	College Algebra .....	3
	or	
MATH 220	Analytic Geometry and Calculus I .....	4
STAT 320	Elements of Statistics .....	3
	or	
STAT 330	Elementary Statistics for the Social Sciences .....	3

**Nutrition science (36 hours)**

FN 301	Food Trends, Legislation, and Regulation .....	3
FN 352	Personal Health .....	3
FN 400	Human Nutrition .....	3
FN 413	Science of Food .....	4
FN 500	Public Health Nutrition .....	3
FN 501	Food Science .....	3
FN 610	Life Span Nutrition .....	3
FN 630	Clinical Nutrition .....	4
FN elective*	.....	2
HRIMD 440	Fundamentals of Quantity Food Production .....	5
CTID or HDFS elective	.....	3

**Nutrition science or exercise science (6 hours)**

FN 635	Nutrition and Exercise .....	3
	or	
KIN 635	Nutrition and Exercise .....	3
FN 650	Practicum in Nutrition .....	3
	or	
KIN 520	Practicum in Exercise Science .....	3

**Exercise science (30 hours)\*\***

KIN 200	Kinesiology: Introductory Analysis .....	3
KIN 325	Introduction to Physical Culture Western World .....	3
KIN 330	Biomechanics .....	3
KIN 335	Physiology of Exercise .....	3
KIN 340	Physical Activity in Contemporary Society .....	3
KIN 345	Psychological Dynamics of Physical Activity .....	3
KIN 350	Development of Motor Control .....	3
KIN 510	Measurement and Research Techniques in Kinesiology .....	3
KIN 625	Exercise Testing and Prescription .....	3
KIN 655	Fitness Promotion .....	3

**Total hours for graduation** ..... **141–147**

\*To be selected in consultation with faculty advisor and department head.

\*\*Certification required in standard first aid, community CPR, and basic life support for the professional rescuer through the Red Cross or American Heart Association courses.

## Foods and nutrition courses

### Undergraduate credit

**FN 132. Basic Nutrition.** (3) I, II, S. Concepts of human nutrition applied to personal food choices and health.

**FN 201. Dimensions of Food and Nutrition.** (3) I. Eating as a part of human behavior from a social, behavioral, economic, and global perspective; issues affecting food supply, food choices, and nutrition.

**FN 301. Food Trends, Legislation, and Regulation.** (3) II. Food laws, regulation, labeling, additives, and residues. Current trends in market forms, packaging, and utilization of various foods.

**FN 352. Personal Health.** (3) I. Impact of individual lifestyle, environment, psychosocial and biological factors, and the health care system on human health. Emphasis on health promotion and disease prevention at the individual and public levels. Pr.: Sophomore standing.

**FN 400. Human Nutrition.** (3) I, II. Sources and roles of nutrients and their importance to human health; the influences of age, gender, and physiological status on nutrient requirements. Pr.: CHM 110 and 111 or 210; BIOL 198.

**FN 413. Science of Food.** (4) I. Chemical, physical, sensory, and nutritional properties of food related to processes used in food preparation. Two hours rec. and six hours lab a week. Pr.: CHM 210 and 230.

**FN 450. Nutritional Assessment.** (2) II. Methods of nutritional assessment in humans to evaluate dietary intake and body composition; use of biologic markers of human nutritional status. One hour lec. and two hours lab a week. Pr.: FN 400; BIOL 240; and BIOCH 265 or 365. For FN and DT majors only.

**FN 499. Problem in Foods and Nutrition.** (Var.) I, II, S. Supervised individual project to study current topics or participation in research in foods and nutrition. Pr.: Six hours in FN and consent of instructor.

### Undergraduate and graduate credit in minor field

**FN 500. Public Health Nutrition.** (3) I. Nutritional components of public health agencies with emphasis on assessment, planning, implementation, and evaluation of nutrition services within a community or geographic area. Pr.: FN 400.

**FN 501. Food Science.** (3) I, II. Basic scientific principles of preparation of foods as related to their chemical and physical properties. Two hours rec. and three hours lab a week. Pr.: CHM 350 and 351, or 531 and 532; and FN 413.

**FN 503. Maternal and Child Nutrition.** (2–3) II. A study of the principles of prenatal, infant, and child nutrition emphasizing the practical application to life situations. Pr.: FN 132 and BIOL 198.

**FN 520. Topics in Foods and Nutrition.** (1–3) On sufficient demand. May be taken more than once for a maximum of 6 hours. Pr.: Junior standing and consent of instructor.

**FN 550. Nutrient Metabolism.** (3) I. Basic concepts of the mechanisms of actions, interactions, and the processes of cellular assimilation and utilization of nutrients in humans. Emphasis on the coordinated control of nutrient utilization among the major organs. Pr.: FN 400; BIOL 240 or 526; BIOCH 265 or 365.

### Undergraduate and graduate credit

**FN 600. Practicum in Foods and Nutrition.** (3–5) I, II, S. Supervised professional field experience in foods and nutrition. Graduate students may enroll for a maximum of 3 credits. Pr.: FN 400, 501, and consent of instructor.

**FN 610. Life Span Nutrition.** (3) I. Physiological and environmental influences on nutritional requirements; nutritional problems and eating patterns of age groups throughout the life cycle. Pr.: BIOCH 265 or 365; BIOL 240 or 526; and FN 400.

**FN 630. Clinical Nutrition.** (4) II. Nutrition in disease including physiological and biochemical basis of nutritional care, effects of disease on nutrient metabolism, diet therapy, nutritional assessment and nutrition counseling. Pr.: FN 550.

**FN 635. Nutrition and Exercise.** (3) II. The interrelationships among diet, nutrition, and exercise. Topics covered include physical fitness, weight control, nutrient metabolism during exercise, and athletic performance. Pr.: FN 132 or 400; BIOCH 265 or 365; and KIN 335. Cross-listed with College of Arts and Sciences; see KIN 635.

**FN 650. Practicum in Nutrition.** (Var.) I, II, S. Supervised professional field experience in nutrition. Pr.: FN 450 and 500 and consent of instructor.

**FN 660. Nutrition and Food Behavior.** (3) I, in even years. Focus on the physiological, environmental, cultural, and economic factors that influence the use of food. Identification of appropriate methodology to study these factors as well as programs to modify food behavior. Pr.: PSYCH 110 or SOCIO 211 or ANTH 200; and FN 400.

**FN 701. Sensory Analysis of Foods.** (3) I. Sensory analysis of food appearance, texture, aroma, flavor; physiology of sensory receptors; application of laboratory and consumer panels; and interpretation of data. Two hours rec. and two hours lab a week. Pr.: FN 501.

**FN 702. Nutrition in Developing Countries.** (3) I, in odd years. Nutritional problems in developing countries, including an analysis of factors which contribute to malnutrition,

effects of undernutrition, methods for assessing nutritional status, and interventions to combat nutrition problems. Pr.: FN 503 or 610.

**FN 705. Food Product Development.** (3) II. Development of food products including concepts, feasibility, formulation, evaluation, and production. One hour lec. and six hours lab a week. Pr.: FN 701 and 790.

**FN 710. Blonutrition.** (3) II. Nutrient interrelationships based on knowledge of biochemical and physiological processes, functions of specific nutrients, and evaluation of nutritional status. Pr.: BIOCH 521, BIOL 526, and FN 400.

**FN 718. Physical Health and Aging.** (3) I, alternate odd years. Focus is on the physiological theories of aging, the relationship between normal aging processes, and the major chronic and acute diseases of the elderly, and community health promotion/maintenance programs for older adults. Pr.: BIOL 198 or 310; HDFS 510.

**FN 720. Food Systems.** (3) II. Chemical and physical principles of food components; emulsions and colloidal food systems. Two hours lec. and three hours lab a week. Pr.: BIOCH 521 and FN 501.

**FN 731. Descriptive Sensory Analysis.** (3) II, even years. Flavor and texture profiling and other descriptive techniques for use in product development, research, and quality control. Practical experiences in conducting tests and leading panels. Two hours lec. and two hours lab a week. Pr.: FN 701.

**FN 741. Consumer Response Evaluation.** (3) II, odd years. Evaluating consumer attitudes and perceptions of products to provide quantitative and qualitative information for research guidance. Design and implementation of consumer questionnaires and development of guides for focus groups and interviews. Two hours lec. and four hours lab a week. Pr.: FN 400 or 501 or permission of the instructor.

**FN 750. Nutritional Aspects of Food Processing and Preparation.** (2–3) I. In alternate years. Stability of nutrients during processing, storage, and preparation of foods from raw food to products for human consumption. Pr.: FN 400, 501; and BIOCH 265 or 521.

**FN 780. Problems in Foods and Nutrition.** (Var.) 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.: FN 400 or 501.

**FN 782. Topics in Foods and Nutrition.** (1–3) On sufficient demand. May be taken more than once for a maximum of 6 hours. Pr.: Senior standing and consent of instructor.

**FN 790. Food Research Techniques.** (3) I. Fundamental principles of food quality evaluation and development of an independent research problem. Pr.: FN 501.

## General Human Ecology

Professors Moxley and Stowe; Instructors Pence and Sego.

General human ecology programs prepare students for careers in education, extension, and communication.

### General human ecology

Bachelor of science in human ecology

Degree programs in general human ecology allow students to integrate knowledge for an understanding of human needs, environments, and relationships. In the freshman and sophomore years, the general program allows flexibility in course selection for students who are undecided but interested in programs offered by the College of Human Ecology. Careful

planning allows students to explore options while completing courses applicable in most programs.

#### General education (38-39 hours)

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 105	Public Speaking IA .....	2
	<b>or</b>	
SPCH 106	Public Speaking I .....	3
ECON 110	Principles of Macroeconomics .....	3

Two of the following:

HDFS 110	Introduction to Human Development ....	3
PSYCH 110	General Psychology .....	3
SOCIO 211	Introduction to Sociology .....	3
Humanities electives	.....	6
BIOL 198	Principles of Biology .....	4
CHM 110	General Chemistry .....	3

**and**

CHM 111	General Chemistry Lab .....	1
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**or**

PHYS 101	The Physical World I .....	3
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**and**

PHYS 103	The Physical World I Lab .....	1
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MATH 100	College Algebra .....	3
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STAT 320	Elements of Statistics .....	3
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**or**

STAT 330	Elements of Statistics for Social Sciences .....	3
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**or**

STAT 350	Business and Economics Statistics .....	3
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KIN 101	Principles of Physical Fitness .....	1
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#### Human ecology courses (45 hours)

CT 310	Fundamentals of Apparel Evaluation ....	3
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**or**

CT 330	Clothing and Society .....	3
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CT 265	Textiles .....	3
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**and**

CT 266	Textiles Lab .....	1
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HDFS 105	Introduction to Personal and Family Finance .....	3
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**or**

HDFS 400	Family Economics .....	3
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HDFS 350	Family Relationships and Sex Roles ....	3
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HDFS 550	The Family .....	3
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**or**

HDFS 760	Family Decision Making .....	3
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HDFS 670	Working with Parents .....	3
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IDH 410	Housing and Its Environment .....	3
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FN 132	Basic Nutrition .....	3
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**or**

FN 400	Human Nutrition .....	3
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FN 301	Food Trends, Legislation and Regulation .....	3
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**or**

FN 413	Science of Food .....	4
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Human ecology electives (17-18 hours from at least two departments)

Students seeking certification in home economics education may apply 1-4 hours of specified EDSEC courses.\*

Select in consultation with advisor.

#### Supporting courses (15 hours)

In consultation with advisor choose 15 hours, 300-level or higher, in areas other than human ecology.

#### Unrestricted electives .....

27-28

#### Total for graduation .....

126

\*Students seeking certification in home economics education must meet certification standards as well as degree requirements. See home economics education certification requirements in this section of the catalog and the College of Education section of this catalog for more information.

#### Human ecology and mass communications

#### Bachelor of science in human ecology and mass communications

In this program students select areas of concentration in human ecology and mass communications according to their individual interests. In human ecology they may specialize in clothing, textiles, and interior design; foods and nutrition; hotel, restaurant, institution management and dietetics; or human development and family studies. In mass communications they may choose advertising, print or electronic journalism, public relations, or radio-TV.

Except for the basic introductory courses of Mass Communication in Society, Principles of Advertising, Fundamentals of Public Relations, and Radio-TV and Society, which have no prerequisites, enrollment in courses in the School of Journalism and Mass Communications requires a minimum 2.5 GPA based on completion of at least 30 hours at the 100-level or above.

#### General education (40-41 hours)

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 105	Public Speaking IA .....	2
	<b>or</b>	
SPCH 106	Public Speaking I .....	3
ECON 110	Principles of Macroeconomics .....	3

Two of the following:

HDFS 110	Introduction to Human Development ....	3
PSYCH 110	General Psychology .....	3
SOCIO 211	Introduction to Sociology .....	3
Humanities elective	.....	6
MATH 100	College Algebra .....	3

**or**

A college-level calculus course	.....	3
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Any 3-hour introductory statistics course	.....	3
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Any 3-hour computing literacy course	.....	3
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Biological sciences and physical sciences	.....	7
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(One course must be taken from each area; one course must include a laboratory.)

KIN 101	Principles of Physical Fitness .....	1
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#### Professional courses (60 hours)

#### Human ecology courses .....

21

Area of concentration in: CTID, HRIMD, HDFS, or FN

Selected in consultation with faculty advisor.

#### Journalism and mass communications courses

(39 hours)

In consultation with your advisor, select one of the options listed below:

#### 1. Print journalism

MC 235	Mass Communication in Society .....	3
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MC 400	News and Feature Writing .....	3
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MC 440	Editing and Design .....	3
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MC 500	Advanced News and Feature Writing ....	3
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MC 540	Advanced Editing and Design .....	3
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MC 565	Law of Mass Communications .....	3
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MC 595	Mass Communication Research .....	3
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Select one of the following:

MC 535	Photojournalism .....	3
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MC 600	Public Affairs Reporting .....	3
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Select one of the following:

MC 650	Newspaper Management .....	3
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MC 710	History of Journalism .....	3
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MC 720	Ethics in Mass Communications .....	3
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MC 730	Seminar in Future of the Media .....	3
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MC electives\* .....

At least 3 hours must be at the 500 level or above.

#### 2. Electronic journalism

MC 235	Mass Communication in Society .....	3
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MC 400	News and Feature Writing .....	3
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MC 500	Advanced News and Feature Writing ....	3
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MC 505	Electronic News Reporting .....	3
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MC 565	Law of Mass Communications .....	3
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MC 585	Advanced Electronic News Reporting ..	3
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MC 595	Mass Communication Research .....	3
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Select one of the following:

MC 550	Journalism Internship .....	3
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MC 570	Audio II .....	3
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MC 580	Video II .....	3
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MC 600	Public Affairs Reporting .....	3
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Select one of the following:

MC 685	Electronic Media Management .....	3
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MC 715	History of Electronic Media .....	3
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MC 720	Ethics in Mass Communications .....	3
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MC 730	Seminar in Future of the Media .....	3
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MC electives\* .....

At least 3 hours must be at the 500 level or above.

#### 3. Advertising

MC 235	Mass Communication in Society .....	3
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MC 320	Principles of Advertising .....	3
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MC 420	Advertising Writing .....	3
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MC 545	Advertising Media Planning .....	3
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MC 555	Advertising Techniques .....	3
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MC 565	Law of Mass Communications .....	3
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MC 595	Mass Communication Research .....	3
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MC 640	Advertising Campaigns .....	3
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Select one of the following:

MC 520	Newspaper Advertising Sales .....	3
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MC 525	Electronic Media Advertising Sales ....	3
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MC electives\* .....

At least 3 hours must be at the 500 level or above.

#### 4. Public relations

MC 235	Mass Communication in Society .....	3
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MC 325	Fundamentals of Public Relations .....	3
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MC 400	News and Feature Writing .....	3
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MC 440	Editing and Design .....	3
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MC 500	Advanced News and Feature Writing ....	3
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MC 550	Public Relations Internship .....	1-3
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MC 565	Law of Mass Communications .....	3
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MC 595	Mass Communication Research .....	3
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MC 635	Public Relations Techniques .....	3
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MC 645	Public Relations Campaigns .....	3
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MC electives\* .....

At least 3 hours must be at the 500 level or above.

#### 5. Radio-television

MC 235	Mass Communication in Society .....	3
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MC 410	Writing for the Electronic Media .....	3
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MC 470	Audio I .....	3
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MC 480	Video I .....	3
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MC 490	Junior Seminar in Electronic Media ....	3
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MC 550	Radio-TV Internship .....	1-3
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MC 595	Mass Communication Research .....	3
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Select one of the following:

MC 570	Audio II .....	3
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MC 580	Video II .....	3
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Select one of the following:

MC 525	Electronic Media Advertising Sales ....	3
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MC 655	Electronic Media Programming .....	3
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MC 685	Electronic Media Management .....	3
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Select one of the following:

MC 565	Law of Mass Communications .....	3
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MC 612	Gender Issues and the Media .....	3
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Or any 700-level course in the School of Journalism .....

MC electives\* .....

At least 3 hours must be at the 500 level or above.

\*The human ecology and mass communications degree allows application of a maximum of 39 credits in mass communications (MC) courses.

#### Supporting courses (18 hours)

Selected in consultation with faculty advisor.

CT 330	Clothing and Society .....	3
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FN 132	Basic Nutrition .....	3
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HDFS 350	Family Relationships and Sex Roles ....	3
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HDFS 400	Family Economics .....	3
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Additional human ecology courses .....

6

#### Unrestricted electives .....

7-8

#### Total for graduation .....

126

## Home economics education certification requirements

### Bachelor of science in human ecology

This program provides students with the skills and knowledge necessary to deliver home economics education to diverse populations in various settings. Graduates of the program work in secondary schools, vocational education programs, cooperative extension, business, and industry.

Upon successful completion of the teacher education program and the National Teacher Examination, graduates are eligible for certification to teach home economics in Kansas schools. See the College of Education section of this catalog for more information on eligibility requirements, admission to teacher education and admission to student teaching. Inquiries should be directed to the Center for Student and Professional Services, 13 Blue-mont Hall.

#### General education (48–53 hours)

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 105	Public Speaking IA .....	2
	<b>or</b>	
SPCH 106	Public Speaking I .....	3
ECON 110	Principles of Macroeconomics .....	3
ANTH 200	Introduction to Cultural Anthropology ..	3
PSYCH 110	General Psychology .....	3
One course in American or world history (HIST 101, 102, 251, or 252) .....		3
ART 100	Design I .....	2
Literature elective (ENGL 261, 262, 271, 272, 361, 362, 381, or 382) .....		3
Humanities elective (ENGL 230, 231, 233, or 234) .....		3
CHM 110	General Chemistry .....	3
	<b>and</b>	
CHM 111	General Chemistry Lab .....	1
	<b>or</b>	
CHM 210	Chemistry I .....	4
	<b>and</b>	
CHM 230	Chemistry II .....	4
CHM 350	General Organic Chemistry .....	3
	<b>and</b>	
CHM 351	General Organic Chemistry Lab .....	2
	<b>or</b>	
BIOCH 265	Introductory Organic and Biological Chemistry .....	5
BIOL 198	Principles of Biology .....	4
MATH 100	College Algebra .....	3
STAT 320	Elements of Statistics .....	3
	<b>or</b>	
STAT 330	Elements of Statistics for Social Science .....	3
	<b>or</b>	
STAT 350	Business and Economics Statistics .....	3
KIN 101	Principles of Physical Fitness .....	1

#### Professional human ecology courses (41 hours)

CT 310	Fundamentals of Apparel Evaluation ....	3
CT 265	Textiles .....	2
	<b>and</b>	
CT 266	Textiles Lab .....	1
FN 413	Science of Food .....	4
FN 400	Human Nutrition .....	3
HDFS 105	Introduction to Personal and Family Finance .....	3
	<b>or</b>	
HDFS 302	You and Your Sexuality .....	3
HDFS 310	Early Childhood .....	3
HDFS 313	Preschool Child Lab .....	1
HDFS 350	Family Relationships and Sex Roles .....	3
HDFS 670	Working with Parents .....	3
HDFS 760	Family Decision Making .....	3
IDH 410	Housing and Its Environment .....	3

IDH 440	Home Appliance Design and Evaluation .....	3
FN 501	Food Science .....	3
	<b>or</b>	
FN 352	Personal Health .....	3
	<b>or</b>	
HDFS 400	Family Economics .....	3
	<b>or</b>	
HDFS 506	Middle Childhood and Adolescence .....	3
	<b>and</b>	
HDFS 508	Adolescent Lab .....	1

#### Professional education courses (40 hours)

DED 102	Teaching as a Career* .....	1
HDFS 110	Introduction to Human Development* ..	3
EDCEP 315	Educational Psychology** .....	3
EDSP 323	Exceptional Students in the Secondary School** .....	2
EDSEC 376	Core Teaching Skills and Lab** .....	3
EDSEC 420	Block II Lab** .....	1
EDSEC 476	Content Area Methods in the Secondary School: Home Economics .....	2
EDSEC 477	Middle Level/Secondary Reading** .....	2
EDSEC 621	Program Planning in Vocational Education** .....	2
EDCIP 455	Teaching in a Multicultural Society** ..	1
EDCEP 525	Interpersonal Relations in the School** .....	1
EDSEC 586	Teaching Participation in the Secondary School and Professional Development Seminar** .....	12
EDSEC 620	Principles and Philosophy of Vocational Education .....	3
EDETC 318	Instructional Media and Technology ...	2
EDSEC 710	Occupational Home Economics* .....	2

\*These are the only professional education courses which can be taken prior to admission to teacher education.

\*\*These courses are blocked in three sequential semesters; courses in each block are to be taken concurrently and are prerequisites to the subsequent designated block of courses.

## General human ecology courses

### Undergraduate credit

**GNHE 208. Human Ecology Colloquium.** (Var.) I, II, S. Special topics for human ecology majors.

**GNHE 385. Problems in General Human Ecology.** (Var.) I, II, S. Independent study. Pr.: Consent of instructor.

**GNHE 399. Honors Seminar in Human Ecology.** (I) I, II. Selected topics in human ecology. May be taken more than once for credit. For students in honors program only.

### Undergraduate and graduate credit

**GNHE 780. Problems in General Human Ecology.** (Var.) I, II, S. Individual investigation into work in general human ecology. Pr.: Consent of instructor.

## Hotel, Restaurant, Institution Management and Dietetics

Judy Miller,\* Head

Professor Miller\* and Shanklin;\* Associate Professors Canter\* and Gould;\* Assistant Professors Barrett and Becker; Instructors Pesci, Petrillose, and Schalles; Emerita: Professor Spears;\* Associate Professors Riggs, Roach,\* and Ziegler.\*

The programs in the Department of Hotel, Restaurant, Institution Management and Dietetics prepare students to enter the profes-

sions of hotel and restaurant management, foodservice management, and dietetics.

The department offers a bachelor of science degree in dietetics and a bachelor of science degree in hotel and restaurant management. Two programs, the coordinated program in dietetics and general dietetics, lead to the bachelor of science degree in dietetics.

## Coordinated program in dietetics

### Program I

Students complete preprofessional study during the freshman and sophomore years, and apply for formal admission into the program at the end of the sophomore year. The coordinated program prepares students for the dietetic profession by integrating course work with 1,035 hours supervised practice experiences. Graduates are eligible for active membership in the American Dietetic Association and, upon passing a national qualifying examination, for registration as a dietitian (R.D.). The program is accredited by the American Dietetic Association Council on Education, Division of Accreditation/Approval, a specialized accrediting body recognized by United States Department of Education.

Junior and senior students gain foodservice management experience in Housing and Dining Services and the K-State Union on campus. Seniors also spend one semester in area health care facilities where they work directly with practicing dietitians in clinical and community practice settings.

Application for admission to the coordinated program in dietetics should occur during the second semester of the sophomore year or upon completion of general education courses as listed. Criteria for admission are:

An overall minimum grade point average of 2.75 on a 4.0 scale, with no grade lower than C in the physical and biological sciences;

A completed application form;

Two completed recommendation forms, one from a former instructor familiar with the applicant's scholastic abilities, and the other from an employer or other person well acquainted with the applicant;

And an interview with the program director, to be scheduled by the applicant.

Ongoing evaluation of the student's didactic and performance-based learning is an important component in the coordinated program in dietetics.

Criteria for progression to the senior year are:

An overall minimum grade point average of 2.75, with no grade lower than C in professional and supporting courses.

Recommendation of the student by faculty teaching the junior-level professional courses.

## General dietetics

### Program II

The program in general dietetics is approved by The American Dietetic Association Council on Education, Division of Accreditation/Approval as a Didactic Program in Dietetics. Completion of the program meets the academic requirements for membership in the American Dietetics Association.

Supervised practice experience, required for eligibility to take the national R.D. exam, must be obtained by the student after graduation through a dietetic internship or approved pre-professional practice program.

## Dietetics

### Bachelor of science in dietetics

Two programs are available in dietetics: Program I is the coordinated program in dietetics, and Program II is in general dietetics. See information earlier in this section.

#### General education courses (59–61 hours)

ENGL 100	Expository Writing I	3
ENGL 200	Expository Writing II	3
SPCH 105	Public Speaking IA	2
	or	
SPCH 106	Public Speaking I	3
ECON 110	Principles of Macroeconomics	3
PSYCH 110	General Psychology	3
SOCIO 211	Introduction to Sociology	3
Humanities electives		6
BIOL 198	Principles of Biology	4
BIOL 240	Structure and Function of the Human Body	6
HRIMD 650	Fundamentals of Public Health and Food Safety	3
	or	
BIOL 455	General Microbiology	4
CHM 210	Chemistry I	4
CHM 230	Chemistry II	4
BIOCH 265	Introduction to Organic and Biochemistry	3
MATH 100	College Algebra	3
	or	
	College-level calculus	
CIS 110	Introduction to Personal Computing	3
STAT 320	Elements of Statistics	3
	or	
STAT 330	Elements of Statistics for the Social Sciences	3
	or	
STAT 340	Biometrics I	3
	or	
STAT 350	Business and Economic Statistics I	3
KIN 101	Principles of Physical Fitness	1

Choose one of the professional programs: I, II.

#### Program I: Coordinated program in dietetics

##### Professional courses (62 hours)

ACCTG 231	Accounting for Business Operations	3
FN 400	Human Nutrition	3
FN 413	Science of Food	4
FN 450	Nutritional Assessment	2
FN 500	Public Health Nutrition	3
FN 550	Nutrient Metabolism	3
FN 610	Life Span Nutrition	3
FN 630	Clinical Nutrition	4
HRIMD 130	Introduction to Professional Dietetic Practice	1
HRIMD 440	Fundamentals of Quantity Food Production	5
HRIMD 455	Foodservice Systems	4
HRIMD 515	Counseling Strategies in Dietetic Practice	3

#### Management semester\*

HRIMD 560	Management in Dietetics	3
HRIMD 561	Management in Dietetics Practicum	6

#### Clinical semester

HRIMD 520	Applied Clinical Dietetics	7
HRIMD 521	Clinical Dietetic Practicum	8

#### Supporting courses (6 hours)

Choose two of the following, with at least one from HDFS:

FN 201	Dimensions of Food and Nutrition	3
FN 301	Food Trends, Legislation, and Regulation	3
HDFS 105	Introduction to Personal and Family Finance	3
HDFS 110	Introduction to Human Development	3
HDFS 301	The Helping Relationship	3
HDFS 350	Family Relationships and Sex Roles	3
HDFS 400	Family Economics	3

Unrestricted electives ..... 1–3

Total hours for graduation ..... 130

\*HRIMD 515 (3 hours) may be taken during the management semester.

#### Program II: General dietetics

##### Professional courses (43 hours)

ACCTG 231	Accounting for Business Operations	3
FN 400	Human Nutrition	3
FN 413	Science of Food	4
FN 450	Nutritional Assessment	2
FN 500	Public Health Nutrition	3
FN 550	Nutrient Metabolism	3
FN 610	Life Span Nutrition	3
FN 630	Clinical Nutrition	4
HRIMD 130	Introduction to Professional Dietetic Practice	1
HRIMD 440	Fundamentals of Quantity Food Production	5
HRIMD 445	Organization and Management of Foodservice Operations	3
HRIMD 476	Cost Controls in Hotel and Restaurant Operations	3
HRIMD 482	Employee Development for the Hospitality Industry	3
HRIMD 515	Counseling Strategies in Dietetic Practice	3

#### Supporting courses (9 hours)

Three of the following, with at least one from HDFS:

FN 201	Dimensions of Food and Nutrition	3
FN 301	Food Trends, Legislation and Regulation	3
HDFS 105	Introduction to Personal and Family Finance	3
HDFS 110	Introduction to Human Development	3
HDFS 301	The Helping Relationship	3
HDFS 350	Family Relationships and Sex Roles	3
HDFS 400	Family Economics	3

Unrestricted electives ..... 14–16

Total hours for graduation ..... 127

## Hotel and restaurant management

### Bachelor of science in hotel and restaurant management

The mission of the hotel and restaurant management program is to prepare students for professional careers in hospitality management by providing theory-based instruction and practical experience.

The program provides students with a broad liberal education, an understanding of business administration, a solid foundation of professional courses in both hotel and foodservice operations, and hands-on experience in the hospitality industry. A 400-hour field experience for academic credit is required.

Students apply concepts learned in the classroom to actual work situations. On-campus facilities include a quantity food production laboratory, Housing and Dining Services, and the K-State Union foodservices. Students gain valuable experience in commercial properties under the supervision of managers and faculty supervisors.

The hotel and restaurant management program prepares students for managerial careers in the hospitality industry. See information earlier in this section.

#### General education courses (53–54 hours)

ENGL 100	Expository Writing I	3
ENGL 200	Expository Writing II	3
ENGL 516	Written Communication for the Sciences	3
SPCH 105	Public Speaking IA	2
	or	
SPCH 106	Public Speaking I	3
GEOG 100	World Regional Geography	3
ECON 110	Principles of Macroeconomics	3
ECON 120	Principles of Microeconomics	3
PSYCH 110	General Psychology	3
SOCIO 211	Introduction to Sociology	3
Humanities electives		6
CHM 110	General Chemistry	3
CHM 111	General Chemistry Lab	1
CIS 110	Introduction to Personal Computing	3
MATH 100	College Algebra	3
	or	
	College-level calculus	
STAT 350	Business and Economic Statistics I	3
BIOL 198	Principles of Biology	4
HRIMD 650	Fundamentals of Public Health and Food Safety	3
KIN 101	Principles of Physical Fitness	1

#### Professional courses (35 hours)

HRIMD 120	Introduction to Hotel and Restaurant Management	1
HRIMD 230	Tourism and the Hospitality Industry	2
HRIMD 320	Commercial Food Preparation and Service	4
HRIMD 440	Fundamentals of Quantity Food Production	5
HRIMD 455	Foodservice Systems	4
HRIMD 465	Hotel Operations	4
HRIMD 468	Hotel and Restaurant Law	3
HRIMD 472	Hotel and Restaurant Marketing	3
HRIMD 475	Field Experience in Hotel, Restaurant Management, and Dietetics	3
HRIMD 476	Cost Controls in Hotel and Restaurant Operations	3
HRIMD 482	Employee Development for the Hospitality Industry	3

#### Professional electives (9 hours)

Select from the following:

ASI 671	Meat Selection and Utilization	2
HRIMD 240	Beverage Service in Restaurants	2
HRIMD 456	Hotel and Foodservice Purchasing	3
HRIMD 466	Convention Services and Meeting Planning	2
HRIMD 670	Seminar in Hotel, Restaurant Management, and Dietetics	1
MANGT 531	Personnel and Human Resource Management	3
MKTG 450	Consumer Behavior	3
MKTG 543	Promotional Strategies	3
POLSC 325	U.S. Politics	3

#### Supporting courses (24 hours)

FN 132	Basic Nutrition	3
HDFS 110	Introduction to Human Development	3
ACCTG 231	Accounting for Business Operations	3
ACCTG 241	Accounting for Investing and Financing	3
MKTG 400	Marketing	3
MANGT 420	Management Concepts	3

MANGT 530	Industrial and Labor Relations .....	3
ECON 620	Labor Economics .....	3
FINAN 450	Essentials of Finance .....	3
Unrestricted electives .....		6-7
Total for graduation .....		128

## Hotel, restaurant, institution management and dietetics courses

### Undergraduate credit

**HRIMD 120. Introduction to Hotel and Restaurant Management.** (1) I. A survey of career opportunities and the scope, history, and development of the hotel and restaurant industry. Industry guest lecturers and field trips.

**HRIMD 130. Introduction to Professional Dietetic Practice.** (1) I. A survey of career opportunities in dietetic practice. Discussion of characteristics and skills needed for success; routes to becoming a registered dietitian.

**HRIMD 230. Tourism and the Hospitality Industry.** (2) II. Analysis of tourism development and its effect on the hospitality industry. Emphasis on the economic and social values relating tourism to hotels and restaurants.

**HRIMD 240. Contemporary Issues: Controlled Beverages.** (2) I. The study of historic, social, and legal issues relating to alcoholic beverage service and use in contemporary America with emphasis on responsible and knowledgeable service of beer, wine, and spirits in hospitality operations.

**HRIMD 320. Commercial Food Preparation and Service.** (4) I, II. Principles of food preparation; presentation and service in commercial operations, tableside cookery, cooking to order, buffets, banquets; customer relations and teamwork. Three credits rec., 1 credit lab. Pr.: HRIMD 120 or conc. enrollment and sophomore standing.

**HRIMD 440. Fundamentals of Quantity Food Production.** (5) I, II. Principles and methods of preparing food in quantity; considerations of menu planning, quality food, food acceptability, work methods, sanitation, safety, and production controls. Three hours lec., five hours lab, and one hour rec. Pr.: FN 413 or HRIMD 320; CHEM 110 and CHEM 111 or CHEM 210; and minimum cumulative 2.0 GPA.

**HRIMD 445. Organization and Management of Foodservice Operations.** (3) II, in alternate years. Effective use of resources to meet organizational objectives unique to foodservice operations. Challenges of foodservice in the health care arena. Pr.: HRIMD 440 and MANGT 420.

**HRIMD 455. Foodservice Systems.** (4) I, II. Foodservice operations as a system with emphasis on procurement, production, distribution, service, and maintenance. Concepts covered in lecture sessions applied in practicum. Field trip required. Two credits rec., two credits practicum. Pr.: HRIMD 440 and minimum cumulative 2.0 GPA.

**HRIMD 456. Hotel and Foodservice Purchasing.** (3) I, II. Purchasing of food and supplies for hotels and restaurants and institutional foodservices. Field trips required. Pr.: HRIMD 320 or FN 413.

**HRIMD 465. Hotel Operations.** (4) I, II. Analysis of the guest cycle through various operating departments. Organization and management of hotel operation systems such as front office, sales, food and beverage, properties, and housekeeping. Emphasis on departmental relationships. Three credits rec., 1 credit practicum. Pr. or conc.: HRIMD 230 and minimum cumulative 2.0 GPA.

**HRIMD 466. Convention Services and Meeting Planning.** (2) I. An analysis of the planning and conduct of meetings as they impact on the hotel industry. The perspectives and responsibilities of both the hotel staff and the meeting planner are explored. Pr.: HRIMD 465.

**HRIMD 468. Hotel and Restaurant Law.** (3) I. Legal aspects of operating hotels and restaurants, rights and responsibilities of the operator, patron civil rights, governmental regulations, franchising contracts, and commercial transactions. Pr.: HRIMD 455 or 465.

**HRIMD 470. Seminar in Hotel and Restaurant Management.** (1) Offered on demand. Current developments and trends in hotel and restaurant management. Pr.: HRIMD 455 and 465.

**HRIMD 472. Hotel and Restaurant Marketing.** (3) II. Application of marketing principles to the hotel and restaurant industry through analysis of concepts, plans, and strategies. Pr.: MKTG 400; and HRIMD 455 or 465.

**HRIMD 475. Field Experience in Hotel, Restaurant Management, and Dietetics.** (1-3) I, II, S. Supervised work experience in hotels, restaurants, or dietetic operations. Pr.: For HRM students: junior standing, HRIMD 440 and either 455 or 465; and 400 hours of work experience in hotel/restaurant industry, exclusive of course work, in the preceding three years; and a minimum of 2.0 GPA.

**HRIMD 476. Cost Controls in Hotel and Restaurant Operations.** (3) I, II. Application of accounting principles; methods of analysis and control of food, beverage, and labor costs in the hotel and restaurant operations. Relationship of cost, profit, and revenue. Pr.: ACCTG 241; and HRIMD 455 or 465.

**HRIMD 480. Management in the Hotel and Restaurant Industry.** (3) Offered on demand. Management of personnel and other resources in the hotel and restaurant industry. Emphasis on employee development and training. Pr.: HRIMD 455 or 465 and MANGT 420.

**HRIMD 482. Employee Development for the Hospitality Industry.** (3) I, II. Emphasizes the role of the hospitality manager and dietitian as facilitator, trainer, and motivator of employees. Focuses on the fundamentals of successful training and development of a service-oriented work force. Special attention is given to the unique problems associated with the labor intensive hospitality and foodservice industries. Pr.: HRIMD 440.

**HRIMD 499. Problems in Hotel, Restaurant, Institution Management and Dietetics.** (Var.) I, II, S. Independent study under the supervision of a faculty member. Pr.: Consent of instructor.

### Undergraduate and graduate credit

**HRIMD 510. Introduction to Clinical Dietetics.** (1) Offered on demand. Application of concepts and skills in clinical dietetics in a simulated practice environment. One hour rec. per week. Pr.: FN 400; BIOCH 265; and BIOL 240; and conc. enrollment in FN 630.

**HRIMD 515. Counseling Strategies in Dietetic Practice** (3) I. Application of interviewing, counseling, and educational techniques in dietetics, including individual and group methods. Three hours lec. per week. Pr.: PSYCH 110; FN 450.

**HRIMD 520. Applied Clinical Dietetics.** (7) I, II. Application of principles of clinical nutrition in the nutritional care and education of persons throughout the life cycle. Must be taken concurrently with HRIMD 521. Pr.: FN 610, 630; and admission to coordinated program in dietetics.

**HRIMD 521. Clinical Dietetic Practicum.** (8) I, II. Supervised clinical/community experience in the nutritional care of patients/clients. Practicum experiences are arranged with participating healthcare facilities. Must be taken concurrently with HRIMD 520. Pr.: FN 610, 630; and admission to coordinated program in dietetics.

**HRIMD 560. Management in Dietetics.** (3) I, II. Functions of management in dietetic practice. Financial control, policy making, inter- and intradepartmental relationships, personnel issues, use of TQM and other quality assurance mechanisms. Pr.: HRIMD 455; ACCTG 231.

**HRIMD 561. Management in Dietetics Practicum.** (6) I, II. Supervised practice experience in the application of management principles in foodservice operations or other dietetics practice settings. Pr.: HRIMD 455; ACCTG 231 and admission to the coordinated program in dietetics and previous or concurrent enrollment in HRIMD 560.

**HRIMD 570. Seminar in Hotel, Restaurant Management and Dietetics.** (1) I, II. Current trends, research, and developments in hotel and restaurant management and dietetics. Pr.: Senior standing in hotel/restaurant management or dietetics programs.

**HRIMD 635. Foodservice Equipment and Layout.** (2) I, II. Factors affecting the selection and arrangement of equip-

ment in foodservice systems. Field trip required. Pr.: HRIMD 440.

**HRIMD 640. Consultation in Hotel/Restaurant Management and Dietetics.** (3) II or S. On sufficient demand. Roles and responsibilities of the independent consultant in working with hospitality and/or health care operations. Development of skills required for private practice. Pr.: HRIMD 440.

**HRIMD 650. Fundamentals of Public Health and Food Safety.** (3) I. Organization and function of food inspection services; principles of disease transmission; diseases transmitted to man through the food chain. (Jointly with LM 650.) Pr.: BIOL 198 and consent of staff.

**HRIMD 705. Computer Implementation In Foodservice and Hospitality Operations.** (3) S. In alternate years. Review of computer development in foodservice and hospitality operations; development of criteria for implementation of a computer system; analysis of foodservice and hospitality hardware and software. Pr.: CIS 110; and HRIMD 480 or 560 or MANGT 420.

**HRIMD 710. Readings in Foodservice and Hospitality Management.** (1-3) I, II, S. Directed study of current literature in foodservice and hospitality management and related areas. Pr.: HRIMD 480 or 560 or MANGT 420.

**HRIMD 720. Current Issues in Hotel, Restaurant, Institution Management and Dietetics.** (1-3) Recent developments and concerns related to management of foodservice and hospitality operations. Pr.: HRIMD 440, 480 or 560 or MANGT 420.

**HRIMD 780. Problems in Hotel, Restaurant, Institution Management and Dietetics.** (Var.) I, II, S. Individual investigation of problems in institution management. Conferences and reports at appointed hours. Pr.: HRIMD 440; and HRIMD 480 or 560 or MANGT 420.

**HRIMD 785. Practicum in Foodservice Systems Management.** (1-6) I, II, S. Professional experiences in approved foodservice organization as a member of the management team under faculty supervision. Pr. or conc.: HRIMD 440; and HRIMD 480 or 560 or MANGT 420.

## Human Development and Family Studies

John P. Murray,\* Head

Professors Bollman,\* Jurich,\* Moxley,\* J. Murray,\* Russell,\* and Smith; Associate Professors Balk,\* Bergen,\* Bradshaw, Jones, A. Murray,\* Poresky,\* Scheidt,\* Schumm,\* Walker, Wanska,\* and Wright;\* Assistant Professors Coulson, De Luccie,\* Miller,\* and Wilken; Instructors Cantrell, Hoover, Meyer, and West; Emeriti: Professors Hoeflin,\* Huyck,\* Kennedy,\* Long,\* Morse,\* and Stith;\* Associate Professor McNeil;\* Assistant Professor Larson.

The Department of Human Development and Family Studies focuses on the study of individuals and families from a multidisciplinary perspective. Programs emphasize developmental processes throughout the life cycle, interpersonal relationships, family economics, and educational programming for children and families.

Four programs are available at the undergraduate level. They are early childhood education, family and consumer economics, family life and community services, and life span human development. The department offers a dual degree program in human development

and family studies and social work. In addition, students often combine degree programs in early childhood education and elementary education.

The program in speech pathology-audiology is scheduled to be transferred from the College of Arts and Sciences to the College of Human Ecology in the the Department of Human Development and Family Studies effective July 1, 1994. Changes in curricula and other program components are under discussion as this catalog goes to press. Please contact an advisor for current information.

The department places great importance on laboratory and field experiences along with classroom experiences. Field experiences for both undergraduate and graduate students are available in the Early Childhood Laboratory, Family Center, Galichia Institute for Gerontology and Family Studies, and the Hoefflin Stone House Child Care Center.

For students pursuing early childhood education, the Early Childhood Laboratory and the Hoefflin Stone House Child Care Center provide on-campus observation and teaching. Both facilities are licensed by the state of Kansas and accredited by the National Academy of Early Childhood Programs.

Students in the family life and community services program must complete a field experience in a public or private agency that serves families, adolescents, single adults, children, or the elderly. Agency staff and department faculty guide students in the planning, direction, and evaluation of these supervised experiences. On-campus opportunities for gaining experience are available through the Family Center, FONE (a crisis hotline), the Galichia Institute for Gerontology and Family Studies, and various organizations and offices which address students' needs.

## Bachelor of science in human development and family studies

### General education

These general education courses are identical for all programs leading to a bachelor of science in human development and family studies.

### Communication (8-9)

ENGL 100	Expository Writing I .....	3
ENGL 200	Expository Writing II .....	3
SPCH 105	Public Speaking IA .....	2
	or	
SPCH 106	Public Speaking I .....	3

### Social sciences (9)

ECON 110	Principles of Macroeconomics .....	3
PSYCH 110	General Psychology .....	3
SOCIO 211	Introduction to Sociology .....	3

### Humanities electives (6)

### Sciences (7-10)

Biological sciences and physical sciences electives (One course must be taken from each area; one course must include a laboratory)

### Quantitative studies (6)

MATH 100	College Algebra .....	3
	or	
	A college-level calculus course .....	3
	Any 3-unit introductory statistics course .....	3

### Physical education (1)

KIN 101	Principles of Physical Fitness .....	1
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### HDFS foundation

These foundation courses form the common knowledge base for HDFS and are identical for all programs, with the exception of minor variations in early childhood education and family and consumer economics.

HDFS 110	Introduction to Human Development ....	3
HDFS 301	Helping Relationship .....	3
	or	
HDFS 420	Interaction Techniques with Young Children .....	3
HDFS 302	You and Your Sexuality .....	3
HDFS 310	Early Childhood .....	3
HDFS 400	Family Economics .....	3
HDFS 506	Middle Childhood and Adolescence ....	3
HDFS 510	Human Development and Aging .....	3
HDFS 550	The Family .....	3

## Early childhood education

Bachelor of science in human development and family studies

This program is for students who wish to work in prekindergarten education programs in administrative or teaching positions, including work with parents and community resources as well as with young children.

The National Council for Accreditation of Teacher Education has approved K-State's early childhood education program. Students completing the early childhood education program in human development and family studies are eligible for certification by the Kansas State Board of Education in Early Childhood Education. Early childhood special education certification is available with advanced study. To complete the ECE program students must have full admission into the teacher education program.

### Admission to teacher education

Application forms for admission to teacher education are available in the Center for Student and Professional Services, 13 Bluemont Hall. The application should be filed two years prior to graduation. (See the College of Education section of this catalog for details.)

Students transferring 50 or more hours from another institution should apply at the time of initial enrollment.

Requirements for admission to early childhood teacher education program may also be found in the College of Education section. Details concerning these requirements include:

1. Hours: 50 total hours completed including all transfer and K-State credits, 35 of the 50 hours constitute a designated core of general education requirements which must have a 2.75 GPA. Students should consult with the advisor regarding specific requirements.
2. Expository writing: Both Expository Writing I and II must be completed satisfactorily with grades no lower than a C.
3. Public speaking: SPCH 105, 106, or 109. A grade of C or better is required in one of the

public speaking courses. Students may complete the requirement with the quiz-out conducted by the speech department.

4. Mathematics and statistics: A grade of C or better is required in 3 hours College Algebra or a college-level calculus course and 3 hours of statistics.

5. Foundation and professional supporting courses: For admission to teacher education a 2.5 GPA is required in all foundation and professional supporting courses.

6. Overall GPA: For full admission, a 2.5 is required in all college work attempted, including transfer and K-State credits. Probationary admission may be granted when a student has a 2.4 GPA in all college work, provided all other requirements have been met. The student must achieve the required 2.5 GPA by the end of the next 30 hours completed or the student will be dropped from teacher education.

7. Pre-Professional Skills Test: Students must take and pass the Pre-Professional Skills Test in reading, writing, and mathematics. Scores of 172 in writing, 173 in reading, and 174 in mathematics are required for admission to teacher education.

The Pre-Professional Skills Test will be scheduled during both fall and spring semesters. Registration for the test must be completed by the announced deadline. Application forms for registration for the test are available in 13 Bluemont Hall.

### Laboratory courses

Before participating in laboratory courses involving contact with children, students must undergo a physical examination, including a tuberculosis test, at their own expense. Students must not have any physical or mental conditions that would interfere with the health, safety, or welfare of children.

Students will be screened by the Kansas Department of Health and Environment for criminal and child abuse histories (through the Kansas Bureau of Investigation and Social and Rehabilitative Services). Students with questionable histories, as determined by the Kansas Department of Health and Environment, will be dropped from the early childhood education program.

### Directed experiences (student teaching)

Application for student teaching must be made no later than the semester in which the student is enrolled in HDFS 545 Early Childhood Program Lab 1. Application forms are available in the advising center, Department of Human Development and Family Studies, 314 Justin Hall.

Enrollment in directed experiences is by permission only. Directed experiences may not be taken until the student has obtained full admission into teacher education and has completed HDFS 420, 540, 541, 545 and 546.

## Certification

To be eligible for certification in early childhood education, students must maintain grade point averages required for full admission into teacher education, complete the early childhood education option, including a grade of C or better in directed experiences, and receive recommendation from the Department of Human Development and Family Studies for submission to Kansas State University's certifying officer. Students must pass the National Teachers Examination as described in the College of Education section of this catalog.

Application for certification must be made during the semester in which the degree will be received. Forms are available in the Center for Student and Professional Services, College of Education, 13 Bluemont Hall.

### General education courses (37–38 hours)

See listing at the beginning of the degree requirements.

### HDFS foundation courses (15 hours)

HDFS 110	Introduction to Human Development ....	3
HDFS 420	Interaction Techniques with Young Children .....	3
HDFS 310	Early Childhood .....	3
HDFS 400	Family Economics .....	3
HDFS 550	The Family .....	3

### Professional supporting courses (39 hours)

HDFS 313	Preschool Child Lab .....	1
HDFS 524	Professional Seminar in Early Childhood .....	3
HDFS 528	Exceptional Development in Early Childhood .....	3
HDFS 540	Curriculum for Cognitive and Language Development for Young Children .....	3
HDFS 541	Curriculum for Emotional, Social, and Physical Development of Young Children .....	3
HDFS 545	Early Childhood Program Lab I .....	1
HDFS 546	Early Childhood Program Lab II .....	2
HDFS 589	Administration of Early Childhood Programs .....	3
HDFS 598	Directed Experiences* .....	8
FN 132	Basic Nutrition .....	3
FN 352	Concepts of Personal Health .....	3
FN 503	Maternal and Child Nutrition .....	3
SPPAT 555	Language Development .....	3

### Professional electives (12 hours)

ACCTG 231	Accounting for Business Operations .....	3
HDFS 300	Problems in HDFS: Preschool Lab Experience .....	Var.
HDFS 302	You and Your Sexuality .....	3
HDFS 312	Infant Observation Lab .....	1
HDFS 350	Family Relationships and Sex Roles .....	3
HDFS 506	Middle Childhood and Adolescence .....	3
HDFS 510	Human Development and Aging .....	3
HDFS 670	Working with Parents .....	3
HDFS 710	Child Care: Components and Issues ..	2-3
HDFS 728	Assessment of Young Children .....	3

### Additional requirements for certification (14 hours)

Social science elective** .....	3
Literature elective*** .....	3

Select additional electives from the areas of humanities, social sciences, sciences, mathematics, general religion, philosophy, art and music history, and appreciation of art, architecture, music, or theatre to fulfill the general education requirements for teaching certification in early childhood education .....

Unrestricted electives ..... 7–8

Total for graduation ..... 125

\*First aid/CPR certification required before enrollment in HDFS 598. This requirement can be met by successful completion of Red Cross or American Heart Association courses.

\*\*A minimum of 9 hours other than psychology is required for certification.

\*\*\*Literature for Children and Literature for Adolescents may not be used as literature electives but may be used to fulfill additional general education requirements.

## Family and consumer economics

Bachelor of science in human development and family studies

The emphasis of this program is family financial planning, which combines course work in personal finance, family relationships and decision making, consumer rights, insurance, investments, retirement and estate planning, economics, and accounting. Emphasis is placed on understanding financial products and how they work, as well as the role of family in financial decisions. Students prepare for a variety of financial planning and counseling related job opportunities.

### General education courses (37–38 hours)

See listing at the beginning of the degree requirements; however, students should take STAT 350.

### HDFS foundation courses (6 hours)

HDFS 110	Introduction to Human Development ....	3
HDFS 350	Family Relationships and Sex Roles .....	3

### Professional courses (33 hours)

HDFS 105	Introduction to Personal and Family Finance .....	3
HDFS 301	The Helping Relationship .....	3
HDFS 400	Family Economics .....	3
HDFS 405	Advanced Personal and Family Finance .....	3
HDFS 412	Consumer Rights and Responsibilities ..	3
HDFS 505	Families, Employment Benefits and Retirement Planning .....	3
HDFS 525	Estate Planning for Families .....	3
HDFS 550	The Family .....	3
HDFS 595	Professional Seminar in Family Financial Planning .....	3
HDFS 609	Families in the American Economy .....	3
HDFS 760	Family Decision Making .....	3

### Supporting human ecology courses (6 hours)

To be taken from two different departments.

Elective from CTID, FN or HRIMD .....	3
Elective from CTID, FN or HRIMD .....	3

### Other supporting courses (30 hours)

ECON 120	Principles of Microeconomics .....	3
ACCTG 231	Accounting for Business Operations .....	3
ACCTG 241	Accounting for Investing and Financing .....	3
MANGT 390	Business Law I .....	3
ACCTG 422	Taxation I .....	3
FINAN 450	Essentials of Finance .....	3
AGEC 513	Agricultural Finance .....	3
FINAN 460	Insurance .....	3
ECON 520	Intermediate Microeconomic .....	3
AGEC 505	Agricultural Market Structures .....	3
ECON 530	Money and Banking .....	3
FINAN 551	Introduction to Investments .....	3

Unrestricted electives ..... 12–13

Total for graduation ..... 125

## Family life and community services

Bachelor of science in human development and family studies

Family life and community services prepares students to develop and implement preventive

education programs designed to strengthen family life and family relationships. Courses focus on the development of the individual in a family context throughout the life cycle.

### General education courses (37–38 hours)

See listing at the beginning of the degree requirements.

### HDFS foundation courses (24 hours)

See listing at the beginning of the degree requirements; however, HDFS 301 is required.

### Professional courses (33 hours)

HDFS 350	Family Relationships and Sex Roles .....	3
HDFS 580	Directed Field Experience .....	8
HDFS 585	Professional Seminar in Family Life Education .....	4
HDFS 652	Black Families .....	3
HDFS 670	Working with Parents .....	3
HDFS elective .....		3
One lab (HDFS 312, 313, 507, or 508) .....		1
SOCWK 260	Introduction to Social Work .....	3
PSYCH 202	Drugs and Behavior .....	2
ANTH 510	Kinship and Marriage .....	3
or		
ANTH 200	Introduction to Cultural Anthropology ..	3

### Supporting human ecology courses (6 hours)

FN 132	Basic Nutrition .....	3
or		
FN 352	Concepts of Personal Health .....	3
Elective from CTID or HRIMD .....		3

### Other supporting courses (11–12 hours)

A course in group processes .....		2-3
(e.g., HDFS 440 and 441, SPCH 326, PSYCH 550)		
Literature or language elective .....		3
Philosophy or language elective .....		3
One of the following courses:		
HIST 102	Western Civilization: The Modern Era ..	3
	or	
HIST 512	Women in European History .....	3
	or	
HIST 541	Women in American History .....	3
	or	
WOMST 105	Introduction to Women's Studies .....	3

Unrestricted electives ..... 12–14

Total for graduation ..... 125

## Life span human development

Bachelor of science in human development and family studies

This program combines the study of human development with a strong foundation in the arts, sciences, and humanities. Course work emphasizes the development of individuals across the life span, the processes underlying development and aging through the life cycle, and the factors that enhance, support, or impede human development. The life span human development program prepares students for graduate study in a variety of applied and academic fields.

### General education courses (40–41 hours)

See listing at the beginning of the degree requirements; however, BIOL 198 and BIOL 310 are required.

### HDFS foundation courses (24 hours)

See listing at the beginning of the degree requirements.

### Professional courses (15 hours)

Select 3 of the 4 labs listed below.

HDFS 312	Infant Observation Lab .....	1
or		
HDFS 313	Preschool Child Lab .....	1
or		
HDFS 507	Middle Childhood Lab .....	1
or		
HDFS 508	Adolescence Lab .....	1

HDFS 350	Family Relationships and Sex Roles .....	3
FN 352	Concepts of Personal Health .....	3
HDFS 670	Working with Families .....	3
Elective: any course in the American ethnic studies secondary major .....		3
<b>Supporting human ecology courses (6 hours)</b>		
FN 132	Basic Nutrition .....	3
Elective from CTID or HRIMD .....		3
<b>Professional electives (24 hours)</b>		
HDFS or social science electives (300 level or above)		
<b>Unrestricted electives .....</b>		<b>15-16</b>
<b>Total for graduation .....</b>		<b>125</b>

## Dual degree: Human development and family studies and social work

Bachelor of science in human development and family studies

Bachelor of science, social work major

This program leads to a B.S. degree in human development and family studies through the College of Human Ecology, and to a B.S. degree with a social work major through the College of Arts and Sciences. The unique goal of this program is to give students skills in and knowledge of interpersonal relationships, an understanding of the developmental processes of children and families, and beginning social work skills. Upon completion of the program students are equipped to work with families and individuals in social work settings. They are also eligible to take the social work licensure examination. The social work major, housed in the Department of Sociology, Anthropology, and Social Work, is accredited by the Council on Social Work Education.

<b>General education courses (56-57 hours)</b>			
ENGL 100	Expository Writing I .....	3	
ENGL 200	Expository Writing II .....	3	
SPCH 105	Public Speaking IA .....	2	
<b>or</b>			
SPCH 106	Public Speaking I .....	3	
PSYCH 110	General Psychology .....	3	
ECON 110	Principles of Macroeconomics .....	3	
POLSC 301	Introduction to Political Thought .....	3	
SOCIO 211	Introduction to Sociology .....	3	
BIOL 198	Principles of Biology .....	4	
Physical science with lab .....			4
Biological or physical science .....			3
Biological or physical science with prerequisite in the same department .....			3
MATH 100	College Algebra .....	3	
STAT 330	Elementary Statistics for Social Science .....	3	
Fine arts elective .....			3
Philosophy elective .....			3
Literary or rhetorical arts course .....			3
Western heritage course .....			3
ANTH 200	Introduction to Cultural Anthropology .....	3	
KIN 101	Principles of Physical Fitness .....	1	
<b>Human development and family studies (26 hours)</b>			
HDFS 110	Introduction to Human Development ..	3	
HDFS 310	Early Childhood .....	3	
HDFS 313	Preschool Child Lab .....	1	
HDFS 350	Family Relationships and Sex Roles ...	3	
HDFS elective .....			3
HDFS 506	Middle Childhood and Adolescence ...	3	
HDFS 507	Middle Childhood Lab .....	1	
<b>or</b>			
HDFS 508	The Adolescent Lab .....	1	

HDFS 510	Human Development and Aging .....	3
HDFS 550	The Family .....	3
HDFS 670	Working with Parents .....	3
<b>Human ecology supporting courses (11 hours)</b>		
FN 132	Basic Nutrition .....	3
HDFS 400	Family Economics .....	3
HDFS electives	.....	5
<b>Social work professional courses (46 hours)</b>		
SOCWK 260	Introduction to Social Work .....	3
SOCWK 510	Social Welfare as a Social Institution ..	3
SOCWK 550	Field Practicum Research .....	1
SOCWK 560	Social Work Practice I .....	3
SOCWK 561	Social Work Practice II .....	3
SOCWK 562	Field Experience .....	12
SOCWK 564	Social Work Professional Seminar .....	3
SOCWK 565	Program and Policy Formation.....	3
SOCWK 567	Human Behavior in Social Environment .....	3
SOCWK 568	Social Work Practice III .....	2
SOCWK 519	Methods of Social Work .....	4
SOCIO 511	Comparative Social Theories .....	3
SOCIO 532	Community Organization .....	3
<b>Total for graduation .....</b>		<b>139-140</b>

See Department of Sociology, Anthropology, and Social Work, College of Arts and Sciences, regarding acceptance into the social work component of this program.

## Speech pathology-audiology

The program in speech pathology-audiology is scheduled to be transferred from the College of Arts and Sciences to the College of Human Ecology in the Department of Human Development and Family Studies effective July 1, 1994. Changes in curricula and other program components are under discussion as this catalog goes to press. Please contact an advisor for current information.

## Human development and family studies courses

### Undergraduate credit

**HDFS 105. Introduction to Personal and Family Finance.** (3) I, II. Fundamental principles for making financial decisions. Analysis and evaluation of personal and family money management strategies.

**HDFS 110. Introduction to Human Development.** (3) I, II. A study of life span human development through an individual's awareness and understanding of his or her own physical, social, and psychological growth and relationships with family, peers, and others.

**HDFS 200. Sexuality and Health.** (2) I, II. Introduction to human sexuality and health, including sexually transmitted diseases and AIDS. Attributes of comprehensive programs, K-12, that incorporate state-defined goals for sexuality education and health needs of children and adolescents.

**HDFS 300. Problems in Human Development and Family Studies.** (Var.) I, II, S. Independent or small group study. Pr.: Consent of instructor.

**HDFS 301. The Helping Relationship.** (2-3) I. 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.: HDFS 110 or PSYCH 110.

**HDFS 302. You and Your Sexuality.** (3), I, II. Study of the role and meaning of human sexuality in relation to oneself as well as in interrelationships with others. Pr.: HDFS 110 or PSYCH 110.

**HDFS 310. Early Childhood.** (3) I, II. Principles of growth and development of children from conception through age five, including familial, societal, and other ecological factors affecting young children's development. Pr.: HDFS 110 or PSYCH 110.

**HDFS 312. Infant Observation Lab.** (1) I, II. Observation of the behavior and development of children from infancy through toddlerhood. Prior or concurrent enrollment with HDFS 310.

**HDFS 313. Preschool Child Lab.** (1) I, II. On sufficient demand. Observation of the development and guidance of children from 18 months to five years of age with emphasis on observation of children in groups. Prior or concurrent enrollment with HDFS 310.

**HDFS 350. Family Relationships and Sex Roles.** (3) I, II. Effects of family interaction upon individual development and sex roles; consideration of premarital, marital, and parent-child relationships. Pr.: HDFS 110 or PSYCH 110 or SOCIO 211.

**HDFS 400. Family Economics.** (3) II. The influence of socioeconomic factors on families. Emphasis on current economic issues and their potential for impacting families and society. Pr.: ECON 110 or conc. enrollment.

**HDFS 405. Advanced Personal and Family Finance.** (3) I, II. In-depth applications of personal and family money management principles with emphasis on credit, savings, insurance, and budgeting. Pr.: HDFS 105.

**HDFS 412. Consumer Rights and Responsibilities.** (3) I, in alternate years. Issues and problems confronting consumers. Economic and legal implications of governmental policies and consumer choices.

**HDFS 420. Interaction Techniques with Young Children.** (3) I. 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. Two hours lec. and one hour lab. Pr.: HDFS 310.

**HDFS 440. Human Development Facilitation.** (2) I, II. Applied study of leadership skills in small discussion groups, with emphasis on learning and facilitating Introduction to Human Development concepts. Taken conc. with HDFS 441. Pr.: HDFS 110, preparatory workshop, and consent of instructor.

**HDFS 441. Human Development Facilitation Lab.** (1) I, II. Recitation group leader for HDFS 110. Assists students in discussion and preparing group presentations; evaluates written work and course participation of students in group. Conc. with HDFS 440.

**HDFS 499. Independent Study in Family Economics.** (Var.) I, II, S. Independent study. Pr.: Consent of instructor.

### Undergraduate and graduate credit in minor field

**HDFS 505. Families, Employment Benefits, and Retirement Planning.** (3) I. Study of micro and macro considerations for retirement planning. Survey of various types of retirement plans, ethical considerations in providing retirement planning services, assessing and forecasting financial needs in retirement, and integration of retirement plans with government benefits. Pr.: HDFS 405.

**HDFS 506. Middle Childhood and Adolescence.** (3) I. Principles of growth and development during middle childhood and adolescence, including familial, societal, and other ecological factors affecting development of youth. Pr.: HDFS 110 or PSYCH 110.

**HDFS 507. Middle Childhood Lab.** (1) I. Analysis of situations facing children age six to twelve and design of interventions to enable these children to cope with these situations. Prior or conc. enrollment in HDFS 506.

**HDFS 508. Adolescent Lab.** (1) I. Analysis of situations facing adolescents and design of interventions to enable adolescents to cope with these situations. Prior or conc. enrollment in HDFS 506.

**HDFS 510. Human Development and Aging.** (3) I. Survey of issues, research, and problems in aging and human development throughout adulthood, with particular emphasis upon the later years. Pr.: HDFS 110 or PSYCH 280.

**HDFS 524. Professional Seminar in Early Childhood Education.** (3) II. Examination of programs for young children, including philosophical and theoretical foundations. Implementation and evaluation of program models and related issues and research. Pr.: HDFS 310 or PSYCH 280.

**HDFS 525. Estate Planning for Families.** (3) II. Introduction to fundamentals of the estate planning process. Includes property transfer, tax consequences, probate avoidance, powers of appointment, and various tools/techniques used in implementing an effective estate plan.. Pr.: HDFS 405.

**HDFS 528. Exceptional Development in Early Childhood.** (3) II. Exceptional development in early childhood (birth to five years), including sensory impairments, physical impairments, communication disorders, mental retardation, behavioral problems, and gifted performance; formal and informal assessment in all developmental areas; the family's role in the assessment/referral/intervention process. Pr.: HDFS 310.

**HDFS 540. Curriculum for Cognitive and Language Development of Young Children.** (3) I. Planning for the enhancement of cognitive and language development. The application of child development theory to the planning of programs for young children within the major curriculum areas. Conc. with HDFS 545 or 546. Prior or conc. with SPPAT 555. Pr.: HDFS 310 and 313 and admission into teacher education.

**HDFS 541. Curriculum for Emotional, Social, and Physical Development of Young Children.** (3) II. Planning for the enhancement of physical, social, and emotional development. The application of child development theory to the planning of programs for young children within the major curriculum areas. Conc. with HDFS 545 or 546. Pr.: HDFS 310 and 313 and admission into teacher education.

**HDFS 545. Early Childhood Program Lab I.** (1) I, II. Application of principles and techniques to planning, implementing, and evaluating developmentally appropriate activities for young children in a supervised lab setting and in recitation sessions. Conc. with HDFS 540 or 541. Pr.: HDFS 310 and 313 and admission into teacher education.

**HDFS 546. Early Childhood Program Lab II.** (2) I, II. Advanced application of principles and techniques for developmentally appropriate programs for young children. Planning, implementing, and evaluating activities in a supervised lab setting. Conc. with HDFS 540 or 541. Pr.: HDFS 545 and admission into teacher education.

**HDFS 550. The Family.** (3) II. Consideration of the family throughout the family life cycle; developmental tasks at each stage. Use and impact of family support services. Pr.: Nine hours in HDFS or other social science and junior standing.

**HDFS 580. Directed Field Experience.** (8) II. A block field placement in local agencies. Faculty-supervised experience in direct service to clients: individuals, groups, and communities. Weekly seminar during placement emphasizes theory underlying the practice. Pr.: HDFS 301 or SOCWK 260; HDFS 550; and consent of instructor.

**HDFS 585. Professional Seminar in Family Life Education.** (4) II. Consideration of professional philosophy, identity, ethics, career development, and characteristics of client populations. Development of skills for family life educators working in agencies with various socioeconomic, age, and ethnic groups. Pr.: Conc. enrollment in HDFS 580.

**HDFS 589. Administration of Early Childhood Programs.** (3) I. Rationale for and techniques of administering programs for preschool children, including health, education, social services, parent involvement. Pr.: Nine hours in HDFS or other social science and junior standing.

**HDFS 590. Proseminar in Human Development and Family Studies.** (1–3) On sufficient demand. Review of specific issues or professional practices affecting children and/or families. Pr.: Junior standing and consent of instructor.

**HDFS 595. Professional Seminar in Family Financial Planning.** (3) II. Examination of professional issues in family financial planning, including ethical considerations, regulation and certification requirements, communication skills, and professional responsibility. Development of skills needed for family financial planners working with families in meeting their financial needs. Pr.: Senior standing and HDFS 405.

**HDFS 598. Directed Experiences in Early Childhood Education.** (8) I, II, S. Participation in a preschool program: planning, instruction, evaluation. Prearrangement and consent of instructor required. Pr.: HDFS 420, 540, 541, 545, 546, and admission into teacher education.

### Undergraduate and graduate credit

**HDFS 600. Economic Status of Women.** (3) On sufficient demand. Socioeconomic factors affecting the economic roles of women. Income, wealth, discrimination, employment, household production, and attitudes as they pertain to the economic position of women in society. Pr.: Junior standing and ECON 110.

**HDFS 603. Coping with Life Crises.** (3) I. Examination of the effects of human competencies and coping strategies on successful adaptation to anticipated life crises, developmental transitions, and sudden, unexpected life events. Pr.: HDFS 110 or PSYCH and 6 hours of social science.

**HDFS 609. Families in the American Economy.** (3) II, in alternate years. Impact of socio-economic and public policy factors on family economic well-being. The special issues faced by financially disadvantaged and non-traditional households will be addressed. Pr.: Nine hours in HDFS or other social science.

**HDFS 652. Black Families.** (2–3) Selected topics for understanding life styles of black families. Implications for professionals working with black children and families. Pr.: Nine hours in HDFS or other social science and junior standing.

**HDFS 654. Death and the Family.** (2–3) II. Exploration of contemporary attitudes toward death and dying; related influences on individual development and family life. Pr.: HDFS 550 or SOCIO 640.

**HDFS 670. Working with Parents.** (3) II. Approaches to parenting and parent education with emphasis on programmatic implications of life-span developmental principles within a family context. Pr.: HDFS 350 or 550.

**HDFS 675. Field Study in Family Economics.** (1–3) I, II. Supervised experiences in financial counseling, community action, or consumer services. Pr.: Consent of instructor.

**HDFS 700. Problems in Human Development and Family Studies.** (Var.) I, II, S. Independent study on aspects of human development and family studies. Pr.: Consent of instructor.

**HDFS 704. Seminar in Human Development and Family Studies.** (Var.) I, II, S. Interpretation and evaluation of information on varied topics relating to family members. May be taken for a maximum of nine hours. Pr.: Nine hours of HDFS or other social science.

**HDFS 708. Topics in Human Development and Family Studies.** (2–3) I, II, S. Review of recent research and theory related to exploration of methods and family and interpersonal processes. Pr.: Consent of instructor. May be taken more than one semester.

**HDFS 710. Child Care: Components and Issues.** (2–3) II. 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.: Fifteen hours of either social science and/or HDFS.

**HDFS 728. Assessment of Young Children.** (3) I. Theory and practice of individual assessment of handicapped and normal children, infancy to age eight, including cognitive, language, fine and gross motor, social, and self-help skills. Focus on selection, administration, interpretation, and evaluation of screening and comprehensive evaluation instruments for assessment and individual program planning. Pr.: HDFS 310.

**HDFS 760. Family Decision Making.** (3) I, in alternate years. Analysis of conceptual frameworks of processes by which families and individuals allocate resources. Pr.: HDFS 550.

**HDFS 770. Economics of Aging.** (3) On sufficient demand. Analysis of economic factors associated with aging; implications for individuals, society, and the economy. Pr.: Nine hours of HDFS or other social sciences.

# Technology

Jack C. Henry, Dean  
Loren E. Riblett, Assistant Dean  
Mike Renk, Director of Fiscal Affairs  
Bonnie J. Scranton, Director of College Advancement

2409 Scanlan Avenue  
Salina, KS 67401  
826-2600

The College of Technology in Salina provides education of technicians and technologists in the fields of aeronautical technology, engineering technology, information technology, and science technology. The college also provides education or training in related technical or occupational fields.

The College of Technology offers bachelor of science degrees in electronic and mechanical engineering technology. The college offers associate of technology degrees in aviation maintenance, environmental engineering technology, civil engineering technology, computer engineering technology, computer information systems technology, computer science technology, electronic engineering technology, industrial engineering technology, mechanical engineering technology, professional pilot, and surveying technology. In addition the college offers the associate of applied science degree in avionics and aviation maintenance, and a certificate in aviation maintenance.

Technology courses typically combine lecture and laboratory experiences. For most lab courses, the contact time is twice that of recitation courses.

## Accreditation and certification

The Technology Accreditation Commission of the Accreditation Board for Engineering and Technology accredits the following degrees: civil engineering technology, computer engineering technology, electronic engineering technology, and mechanical engineering technology

The aircraft maintenance program is certified as an "Aviation Maintenance Technician School No. BZ9T052R" by the Federal Aviation Administration.

## Support services

The College of Technology provides a number of support services on the Salina campus. Admissions, student financial assistance, registrar, and career services/placement personnel are available to assist students. These Salina offices function as extensions of the related university offices.

K-State at Salina has a locally run student union and campus bookstore. A new 100-bed residence hall is open on campus. Health services are provided by a number of local clinics and physicians. Personal counseling is available through a local agency.

## Cooperative education

The College of Technology, through the co-op program, offers opportunities for students to obtain experience in industry as part of their college education. Students enroll through Career and Employment Services and are selected following formal interviews with participating companies. Once selected, students will be paid to work from two to five periods (semesters or summers) in positions related to their academic major or career objectives.

## Library services

The College's Tullis Library/Resource Center is located in the Technology Center. The library meets standards set for college libraries by the American Library Association.

It contains a collection of up-to-date technical information and reference materials covering a range of technological subjects. The library's subject strengths are computer science, information systems, aeronautical technology, professional pilot, mechanical engineering technology, civil engineering technology, chemical engineering technology, and industrial engineering technology.

The resource center houses general information and technical periodicals, newspapers, fiction books, a reading room/lounge, typewriters, computers, a copy center, and audio/visual resource center. Fax service is also available.

## Continuing education

The Division of Continuing Education offers workshops, seminars, and short-term and full-term courses in the fields of technology.

Continuing education programs cover a variety of subjects for both occupational and personal use. Class schedules are set for the convenience of the students during both daytime and evening hours.

Special courses can be designed to meet the needs of individuals, groups, and organizations. These services can be provided on campus, in-plant, or in communities where technical services are needed but not readily available. Continuing education units may be granted in appropriate cases.

# Aeronautical Technology

Kenneth W. Barnard, Head

Professor Barnard; Associate Professor Gross; Assistant Professors Garrison and Kennedy; Instructors Claussen, Graves, Kelley, Rankin, and Smith.

## Airframe and powerplant certificate (APC)

69 hours required for completion

This two-year program prepares students for the Federal Aviation Administration airframe and powerplant certificate. Students who successfully complete the program with perfect attendance will be awarded a certificate of completion.

Upon passing the FAA written, oral, and practical exams, graduates will be certified airframe and powerplant maintenance technicians.

Airframe and powerplant mechanics inspect, repair, modify, and maintain aircraft for manufacturers, commercial airlines, businesses, corporations, and general aviation operators.

### Freshman

#### Fall semester

MATH 125	Elementary Functions .....	3
AVM 121	Aircraft Drawings .....	1
AVM 141	Aircraft Science .....	5
AVM 131	Aircraft Standards .....	3
AVM 111	Aircraft Basic Electricity .....	4
		<b>16</b>

#### Spring semester

AVM 112	Aircraft Welding .....	2
AVM 142	Airframe Systems .....	4
AVM 152	Airframe Structures and Repair .....	5
AVM 132	Aircraft Fluid Power .....	3
AVM 162	Airframe Electrical Systems .....	4
		<b>18</b>

### Sophomore

#### Fall semester

AVM 241	Navigation Aids and Communications Systems .....	3
AVM 261	Inspection and Assembly .....	5
AVM 231	Aircraft Finish and Fabrication .....	3
AVM 221	Powerplant Fundamentals .....	4
AVM 251	Powerplant Ignition and Electrical Systems .....	3
		<b>18</b>

#### Spring semester

AVM 342	Powerplant Induction and Fuel Systems .....	4
AVM 212	Propellers .....	2
AVM 222	Powerplant Operations and Troubleshooting .....	3
AVM 252	Powerplant Overhaul .....	3
AVM 332	Gas Turbine Powerplants .....	5
		<b>17</b>

## Aviation maintenance degree (AVM)

Associate of applied science  
83 hours required for graduation

The applied science degree in aviation maintenance is a terminal degree that can be earned in two years. The degree goes beyond the airframe and powerplant certificate program to include general education courses recommended by the Kansas Board of Regents.

### Freshman

#### Fall semester

MATH 100	College Algebra .....	3
AVM 121	Aircraft Drawings .....	1
AVM 141	Aircraft Science .....	5
AVM 131	Aircraft Standards .....	3
AVM 111	Aircraft Basic Electricity .....	4
SPCH 106	Public Speaking I .....	3
		<b>19</b>

#### Spring semester

AVM 112	Aircraft Welding .....	2
AVM 142	Airframe Systems .....	4
AVM 152	Airframe Structures and Repair .....	5
AVM 132	Aircraft Fluid Power .....	3
AVM 162	Airframe Electrical Systems .....	4
		<b>18</b>

#### Summer session

ENGL 100	Expository Writing I .....	3
ECON 110	Principles of Macroeconomics .....	3
PSYCH 110	Psychology .....	3
		<b>9</b>

### Sophomore

#### Fall semester

AVM 241	Navigation Aids and Communications Systems .....	3
AVM 261	Inspection and Assembly .....	5
AVM 231	Aircraft Finish and Fabrication .....	3
AVM 221	Powerplant Fundamentals .....	4
AVM 251	Powerplant Ignition and Electrical Systems .....	3
		<b>18</b>

#### Spring semester

AVM 342	Powerplant Induction and Fuel Systems .....	4
AVM 212	Propellers .....	2
AVM 222	Powerplant Operation and Troubleshooting .....	3
AVM 252	Powerplant Overhaul .....	3
AVM 332	Gas Turbine Powerplants .....	5
MATH 151	Applied Plane Trigonometry .....	2
		<b>19</b>

## Aviation maintenance technology (AVMT)

Associate of technology  
96 hours required for graduation

In addition to the aviation maintenance certificate program, 27 additional credits in math, English, and science fulfill requirements for an associate degree in aviation maintenance. Airlines, large corporations, and aircraft companies are supporting an associate degree requirement for their supervisory positions. This degree can be transferred to other four-year universities through articulation agreements. The College of Technology anticipates offering a bachelor's degree in aviation maintenance in fall 1995, pending Kansas Board of Regents approval. Contact the Department of Aeronautical Technology for details.

MATH 100	College Algebra .....	3
MATH 151	Applied Plane Trigonometry .....	2
ENGL 100	Expository Writing I .....	3
SPCH 106	Public Speaking I .....	3
PPIL 111	Private Pilot .....	4
PHYS 113	General Physics I .....	4
ECON 110	Principles of Macroeconomics .....	3
PSYCH 110	General Psychology .....	3
CMIS 105	Introduction to PC Software .....	2

### Helicopter maintenance option

Students receive instruction and experience on a variety of helicopters. Servicing, component repair, reconstruction, and troubleshooting techniques using the latest in tracking and balancing equipment will be performed. Reciprocating and turbine powered helicopters that are flown regularly are used in the curriculum.

AVM 285	Helicopter Maintenance .....	7
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## Aviation maintenance review (AVMR)

Aviation maintenance review courses are designed to provide training for those students qualifying under FAR 65.77. This training is usually necessary to pass the FAA written, oral, and practical exams for the airframe and powerplant certificate. The credit hours for this training can be applied toward requirements for an associate degree in aviation maintenance. A maximum of 30 semester credit hours can be waived for the FAA certificate for airframe and powerplant maintenance when enrolled in an associate degree program at the college.

AVMR 220	Aviation Maintenance Review/General .....	4
AVMR 230	Aviation Maintenance Review/Airframe .....	4
AVMR 250	Aviation Maintenance Review/Powerplant .....	4

## Avionics technology (AVIO)

Associate of applied science  
70 hours required for graduation

Avionics is a contraction of aviation electronics. It deals with all electronics on board an aircraft, and includes the areas of communication, navigation, and flight control. The program primarily prepares students to work in general aviation avionics repair stations. There is a tremendous need for trained, qualified technicians in avionics, and coupled with the rapid advances in technology, the need is growing at a greater rate than for any other aviation-related career field.

### Freshman

#### Fall semester

ELET 101	DC Circuits .....	4
MATH 100	College Algebra .....	3
MATH 151	Applied Plane Trigonometry .....	2
AVM 131	Aircraft Standards .....	3
CMST 101	Applied BASIC Programming .....	2
ENGL 100	Expository Writing .....	3
		<b>17</b>

#### Spring semester

ELET 102	AC Circuits .....	4
ELET 110	Semicon. Elect. .....	4
CMET 150	Digital And Microprocess .....	3

PHYS 113	General Physics I .....	4
ECON 110	Principles of Macroeconomics .....	3
		<b>18</b>

### Sophomore

#### Fall semester

AVIO 240	Aero Communications .....	4
AVIO 241	Navigation I .....	4
AVIO 242	Installation .....	4
AVIO 243	FCC License Study .....	1
AVM 121	Aircraft Drawings .....	1
SPCH 106	Public Speaking I .....	3
		<b>17</b>

#### Spring semester

AVIO 244	Navigation II .....	4
AVIO 245	Pulse I .....	4
AVIO 246	Pulse II .....	4
AVIO 247	Flight Control Systems .....	3
PSYCH 110	General Psychology .....	3
		<b>18</b>

## Professional pilot program (PPIL)

Associate of technology  
66 hours required for completion

The Cessna Pilot Center integrated flight training program is utilized to obtain private, commercial, instrument, certified flight instructor, and multi-engine ratings.

The two-year associate degree emphasizes business courses as a complement to the English, math, and science requirements. Professional pilot graduates may fly as certified flight instructors, or charter, business, corporate, or airline pilots.

This program requires additional costs above the standard tuition, books, and supplies. The College of Technology anticipates offering a bachelor's degree in professional pilot in fall 1995, pending Kansas Board of Regents approval. Contact the Department of Aeronautical Technology for more information.

The flight training program is an FAR 141 approved flight school. The approval allows students to meet the commercial instrument minimum-flight-hour requirement in 190 hours instead of 250 hours.

This "savings" of 60 flight hours allows students to add additional ratings or realize reduced training costs. Flight training devices are used for additional cost savings and training benefits.

Veterans who are approved for flight training benefits are eligible for financial assistance.

Lab time reflected in the pilot course descriptions are minimum times. Significant time commitment is necessary for labs and flight training.

### Freshman

#### Fall semester

PPIL 111	Private Pilot .....	4
PPIL 113	Private Pilot Flight Lab .....	1
CMIS 105	Introduction to PC Software .....	2
BUS 110	Introduction to Business .....	3
MATH 100	College Algebra .....	3
BUS 251	Financial Accounting .....	3
		<b>16</b>

**Spring semester**

PPIL 112	Professional Instrument Pilot .....	3
PPIL 114	Professional Instrument Pilot Flight Lab .....	3
MATH 151	Applied Plane Trigonometry .....	2
ENGL 100	Expository Writing I .....	3
PSYCH 110	General Psychology .....	3
ECON 110	Principles of Macroeconomics .....	3
		<b>17</b>

**Sophomore****Fall semester**

PPIL 211	Professional Commercial Pilot .....	3
PPIL 213	Professional Commercial Pilot Flight Lab .....	2
SPCH 106	Public Speaking I .....	3
PHYS 113	General Physics I .....	4
PPIL 121	Preventive Maintenance .....	2
BUS 210	Marketing .....	3
		<b>17</b>

**Spring semester**

ENGL 202	Technical Writing .....	3
BUS 215	Business Law .....	3
BUS 115	Supervisory Management .....	3
PPIL 262	Multi-Engine Certification .....	2
PHYS 142	Aviation Meteorology .....	4
KIN 101	Principles of Physical Fitness .....	1

**Aviation maintenance courses****Undergraduate credit**

**AVM 111. Basic Aircraft Electricity.** (4) I. A basic concept of DC/AC circuits, with basic laws relating to the following: measuring voltage, current, resistance, continuity and leakage; relationship of voltage, current and resistance in electrical circuits; reading and interpretation of electrical circuit diagrams; electrical devices and inspection and servicing of batteries. Three hours lec. and three hours lab a week.

**AVM 112. Aircraft Welding.** (2) II. Theory and skill development in aircraft welding processes. Exercises in gas welding processes as applied to ferrous and nonferrous materials. Oxygen/acetylene, inert gas, and resistance welding processes are to be studied. One hour rec. and three hours lab a week.

**AVM 121. Aircraft Drawings.** (1) I. The course is designed to teach the student how to recognize and identify each kind of line as it appears in aircraft drawings and to interpret the meaning of the lines as they relate to surfaces and details in drawings. Three hours lab a week.

**AVM 131. Aircraft Standards.** (3) I. A survey of the organization of the Federal Aviation Administration and the Civil Aeronautics Board. Emphasis will be placed on the regulations, standards, and specifications of each of these organizations. Two hours rec. and three hours lab a week.

**AVM 132. Aircraft Fluid Power.** (3) II. A study of basic fluid mechanics as it applies to practical applications in aircraft systems. Compressible and incompressible fluid systems will be studied. Two hours rec. and three hours lab a week. Pr.: AVM 141, MATH 125.

**AVM 141. Aircraft Science.** (5) II. A survey of aircraft nomenclature, basic physics, theory of flight and aerodynamics, aircraft ground operation and servicing, and aircraft hardware, materials, and processes. Three hours rec. and six hours lab a week.

**AVM 142. Airframe Systems.** (4) II. A study of the airframe systems and components to include: pressurization, heating and cooling, and structural device. Two hours rec. and six hours lab a week. Pr.: AVM 141.

**AVM 152. Airframe Structures and Repair.** (5) II. A study of materials commonly used in airframe structures and the associated study of making structural repairs according to recommended procedures. Skills in sheetmetal are stressed. Three hours rec. and six hours lab a week. Pr.: AVM 141.

**AVM 162. Airframe Electrical Systems.** (4) II. An advanced study of DC/AC circuits law relating to circuit analysis and a detailed study of measuring instruments. Advanced study of relays, switches, alternator, and other devices encountered in circuit analysis, troubleshooting,

and repair. Two hours rec. and six hours lab a week. Pr.: AVM 111.

**AVM 212. Aircraft Propellers.** (2) II. A study of the use, maintenance, and inspection of propellers and their related control systems. One hour rec. and three hours lab a week.

**AVM 221. Powerplant Fundamentals.** (4) I. A study of the principles of operation, design features, and operating characteristics of reciprocating aircraft engines. Includes overhaul inspection procedures on current horizontal opposed and radial engines. Three hours rec. and three hours lab a week. Pr.: AVM 131, 141.

**AVM 222. Powerplant Operation and Troubleshooting.** (3) II. Experience in installation, operation, and removal of aircraft engines. Engine analysis and diagnosis of malfunctions, including methods of remedy, are performed on airworthy engines. One hour rec. and six hours lab a week. Pr.: AVM 221.

**AVM 231. Aircraft Finish and Fabrication.** (3) I. This course is designed to acquaint the student with the wood and fabric coverings and procedures used on aircraft, and methods used in preparation for and application of paint finishes to aircraft surfaces. One hour rec. and six hours lab a week.

**AVM 241. Navigational Aids and Communications Systems.** (3) I. A survey study of the aids to navigation and communications used in light and intermediate class aircraft. Operation and installation of the various types of equipment will be stressed. Two hour rec. and six hours lab a week. Pr.: AVM 111.

**AVM 251. Powerplant Ignition and Electrical Systems.** (3) I. A study of battery, magneto high- and low-tension ignition systems including turbine ignitors for today's aircraft. Emphasis will be placed on troubleshooting, repair, and timing of aircraft ignition systems. Two hours rec. and three hours lab a week. Pr.: AVM 111.

**AVM 261. Aircraft Inspection and Assembly.** (5) I. A study of assembly and manufacturing procedures and inspection of aircraft components. This course also covers in detail annual and 100-hour inspections. Three hours rec. and six hours lab a week. Pr.: MATH 125, AVM 121, 131, 141.

**AVM 285. Helicopter Maintenance.** (7) S. A study of airframe, rotor transmission, and engine components of turbine and reciprocating engine helicopters. Also includes a detailed study of required maintenance, historical records, and inspection of components. Three hours rec. and 12 hours lab a week. Pr.: Aviation maintenance major or consent of instructor.

**AVM 290. Problems in AVM.** (Var.) I, II, S. Advanced study in a specific area chosen by the instructor. Pr.: Consent of instructor.

**AVM 300. Composite Technology.** (4) I. This course will be taught for the A&P technician needing advanced training in composite technology repair procedures techniques required for repairs to fiberglass materials, Kevlar, and graphite. This will cover basic requirements for repairs and not specific to any particular aircraft or aircraft manufacturer requirements. This student will be required to complete the required testing and lab projects successfully. Consent of instructor.

**AVM 305. Non-Destructive Testing.** (3) II. This course will concern the NDT methods and requirements. With the aging fleet inspection requirements now being enforced the NDT requirements have been greatly expanded. This also has expanded the requirements for capabilities of the NDT technician. This course will explore NDT in general and then the specific application for aircraft and what types of testing are required, what the requirements for the technician are and a brief introduction to hands on testing procedures. Consent of instructor.

**AVM 332. Gas Turbine Powerplant.** (5) II. Advanced study of the fundamentals of gas turbine powerplants including operation, studies of supporting systems and inspection methods are fundamental to this course. Two hours rec. and nine hours lab a week. Pr.: AVM 221.

**AVM 342. Powerplant Induction and Fuel Systems.** (4) II. A study of aircraft induction and fuel metering systems including fuels, carburetors, fuel injection systems, superchargers, and other induction system components used to

ensure a dependable and accurate fuel supply at any flight configuration and attitude. Two hours rec. and six hours lab a week. Conc.: AVM 221.

**AVM 352. Powerplant Overhaul.** (3) II. Practical experience in overhauling reciprocating engines. Engines are assembled and operationally checked in lab. One hour rec. and six hours lab a week. Pr.: AVM 221.

**Aviation maintenance review courses****Undergraduate credit**

**AVMR 220. Aviation Maintenance Review/General.** (4) The general review course is designed for those individuals who have met the Federal Aviation Administration's eligibility requirements under FAR 65.77. The review conforms to the three levels of training set forth by the FAA. Three hours rec. and three hours lab a week. Pr.: Departmental consent. This course may be offered in two parts as: AVMR 221 Aviation Maintenance Review/General I and AVMR 222 Aviation Maintenance Review/General II.

**AVMR 230. Aviation Maintenance Review/Airframe.** (4) The airframe review course is designed for those individuals who have met the Federal Aviation Administration's eligibility requirements under FAR 65.77. The review conforms to the three levels of training set forth by the FAA. Pr.: Departmental consent. This course may be offered in two parts as: AVMR 231 Aviation Maintenance Review/Airframe I and AVMR 232 Aviation Maintenance Review/Airframe II.

**AVMR 250. Aviation Maintenance Review/Powerplant.** (4) The powerplant review course is designed for those individuals who have met the Federal Aviation Administration's eligibility requirements under FAR 65.77. The review conforms to the three levels of training set forth by the FAA. Pr.: Departmental consent. This course may be offered in two parts as: AVMR 251 Aviation Maintenance Review/Powerplant I and AVMR 252 Aviation Maintenance Review/Powerplant II.

**Avionics courses****Undergraduate credit**

**AVIO 240. Aero Communications.** (4) I. A study of electronic communications principles which includes the RF spectrum from VLF through microwaves, concentrating on those special techniques applied in aviation. This includes the modulation systems of AM, SSB, pulse, digital, and video. The use of microprocessor systems to control circuitry and frequency synthesizers is thoroughly investigated. Typical operation of the growing use of satellites for aero communications is covered. Emphasis is placed on performance tests and measurements of transmitters and receivers, and troubleshooting to the component level. The course concludes with the operation and maintenance of the emergency locator transmitter system. Pr.: ELET 102 and 110.

**AVIO 241. Navigation I.** (4) I. A study of the aeronautical navigation systems classified as short range navigation, which includes the VOR, ILS (LOC/GS/MKR), and NDB/ADF equipment. Both the emitted ground signals and airborne receiving, processing, and display equipment is studied. The HSI and slaved compass systems are covered. An overview of the microwave landing systems is made. The course concludes with a study of various avionics audio systems, including microphones, headsets, audio control panels, and intercom systems (ICS). Pr.: ELET 102 ELET 110, and CMET 150.

**AVIO 242. Installation.** (4) I. This course studies the over-all requirements of operating a FAA-certified Avionics Repair Station including the FARs that govern repair and alteration procedures and the proper documenting of those procedures. Techniques of installing avionics equipment in various types of fixed and rotary wing aircraft are studied and applied. Actual installation in airworthy aircraft is performed for "real world" student practice. The mechanical aspects of installation are covered including precision soldering, aviation hardware, airframe alteration practices, fabrication of special components, and computation of weight and balance of the completed installation. Throughout the course good record-keeping practices are ingrained

into the student including completion of Repair Station Work Orders, FFA Form 337s, and all aircraft logbook entries. Pr.: AVM 131.

**AVIO 243. FCC License Study.** (1) I. This course is a one-hour-per-week, recitation-only study of the knowledge required to pass the Federal Communications Commission general license examination. A question/answer study book is used to guide the class.

**AVIO 244. Navigation II.** (4) II. A study of the long range navigation techniques used in aviation, which includes the LORAN, global positioning system, OMEGA/VLF, and inertial navigation systems. The shorter range but direct route system using VOR-DME called RNAV is also studied. The student explores the signals emitted by the various types of ground stations to fully understand the airborne receiving and processing techniques required of each system. The interconnections to other aircraft avionics such as flight control systems and flight management systems is also studied. Pr.: AVIO 241.

**AVIO 245. Pulse I.** (4) II. This course studies two of the pulse systems used in avionics known as distance measuring equipment and ATC radar transponder equipment. The characteristics of the airborne or ground emitted signals are studied, then the reception and processing of those signals is investigated in detail to the component level. This includes typical troubleshooting and alignment of the airborne equipment. An overview study is done of the traffic alert and collision avoidance system, and the course concludes by studying altitude encoders used with the ATC radar beacon TXP system and altitude alerters required by higher performance aircraft. Pr.: CMET 150.

**AVIO 246. Pulse II.** (4) II. This course continues the study of avionics pulse systems with the airborne weather radar system, radio altimeter system, and storm-scope system. The radar antenna, receiver/transmitter, and processing/display sections are studied to the component level. This includes theory, operation, alignment, and troubleshooting details. The multi-function display is explained in this course and is often used to display radar data. The radio altimeter system is studied, and the course concludes with an overview and capabilities of the stormscope system. Pr.: CMET 150.

**AVIO 247. Flight Control Systems.** (3) II. A study is done of aerodynamic flight control laws, and servo control systems, error signal generation, summing, processing, and amplification to control actuators of various types. Analog and digital flight control systems are both covered. The electronic flight instrument system, head up display, and fly by wire and light systems are covered from a conceptual, block diagram, and operational view. The course concludes with methods of integrating all avionics equipment into a complete package for an aircraft, and assuring compatibility with all other equipment installed on the aircraft. Problems that can occur between avionics units and other aircraft systems are explored from a "systems approach" to troubleshooting. Pr.: AVM 131.

## Professional pilot courses

### Undergraduate credit

**PPIL 111. Private Pilot.** (4) I. The subject areas necessary for completion and passing of the FAA Private Pilot Written Examination are presented. Four hours rec. a week.

**PPIL 112. Professional Instrument Pilot.** (3) II. A study of the procedures, regulations, and techniques required to safely fly in instrument meteorological conditions within our national airspace system. The course will prepare the student to pass the FAA Instrument Airplane Written Examination. Three hours rec. a week. Pr.: PPIL 111.

**PPIL 113. Private Pilot Flight Lab.** (1) I. An introduction of the fundamentals of flight. Solo flights to include all flight operations and maneuvers necessary for meeting the aeronautical experience for the FAA Private Pilot Certificate. Three hours lab a week. Conc.: PPIL 111.

**PPIL 114. Professional Instrument Pilot Flight Lab.** (3) II. Instructional flight training necessary to maneuver the aircraft safely in actual or simulated instrument meteorological conditions within the national airspace system. Nine hours lab a week. Pr.: PPIL 111, 113. Conc.: PPIL 112.

**PPIL 121. Preventive Maintenance.** (2) I. This course will give the student hands-on experience with the 25 maintenance tasks allowed under FAR 43 entitled preventive maintenance. Two hours rec. a week.

**PPIL 211. Professional Commercial Pilot.** (3) I. A continuation of PPIL 111-Private Pilot. For preparation to pass the FAA Commercial Pilot written examination. Three hours rec. a week. Pr.: PPIL 111.

**PPIL 212. Certified Flight Instructor Ground School.** (6) II. Instruction techniques, practices, and procedures necessary to provide skill in organizing and presenting lessons. This course will prepare the student for the FAA Certified Instructor Written Examination. Six hours rec. a week. Pr.: PPIL 211.

**PPIL 213. Professional Commercial Pilot Flight Lab.** (2) I. An introduction to complex airplane operations and a review of those operations required of a commercial pilot. The completion of this course readies the student to take the commercial FAA flight test. Six hours lab a week. Pr.: PPIL 113. Conc.: PPIL 211.

**PPIL 214. Certified Flight Instructor Flight Lab.** (2) II. The needed flight skills and proper display of teaching ability will be emphasized. The demonstration of flight maneuvers with recognition of common errors in students performing the demonstrated maneuvers is stressed. Six hours lab a week. Pr.: PPIL 114. Conc.: PPIL 212.

**PPIL 262. Multi-Engine Certification.** (2) II. Instruction and flight experience in a multi-engine aircraft to develop the aeronautical skill and knowledge to meet the requirements for a multi-engine land class rating to the student's existing pilot certificate. One hour rec. and three hours lab a week.

**PPIL 271. Helicopter Pilot (Add On).** (1) I. Provides the student with the aeronautical skills and experience necessary to meet the requirements for the addition of a rotocraft helicopter rating to the pilot certificate. One hour rec. a week. Pr.: PPIL 111, 113 or Private Pilot Certificate Airplane Single Engine Land, or Commercial Pilot Certificate Airplane Single Engine Land.

**PPIL 272. Certified Flight Instructor Helicopter.** (3) II. Provides the student with the basic information leading to the helicopter flight instructor certificate. The course is divided into two sections. The first section consists of the fundamentals of teaching and learning, including effective teaching methods, aerodynamics responsibilities, and proper use of the flight training syllabus. The second section is concerned with the analysis of the helicopter flight maneuvers involved in the private, commercial, and flight instructor certificates. Three hours rec. a week. Pr.: PPIL 271, 273. Conc.: PPIL 274.

**PPIL 273. Helicopter Pilot Flight Lab.** (3) I. Provides the student with the aeronautical skills and experience necessary to meet and demonstrate the skills requirements for the addition of a rotocraft helicopter rating to his or her pilot certificate. Nine hours lab a week. Pr.: PPIL 111, 113 or Private Pilot certificate Airplane Single Engine Land, or Commercial Pilot Certificate Airplane Single Engine Land.

**PPIL 274. Certified Flight Instructor Helicopter Flight Lab.** (2) II. This course provides the student with the necessary flight training leading to an FAA Certified Flight Instructor Certificate in helicopters. The course involves dual flight instruction covering all maneuvers necessary for teaching private and commercial certificate requirements. Six hours lab a week. Pr.: PPIL 271, 273. Conc.: PPIL 272.

**PPIL 285. Airline Transport Pilot Rating.** (2) 5. Provides the student with the aeronautical knowledge necessary to prepare for the FAA Airline Transport Pilot written examinations. The demonstration of flight maneuvers, with recognition of proper control of emergencies in compliance of the Airline Transport Pilot Practical Test Standards will be stressed. One hour rec. and three hours lab a week. Pr.: Consent of instructor and evaluation of student's pilot experience as it relates to FAR 61.151 through 61.157.

**PPIL 300. Aviation Legislation.** (3) I, II. A survey of state, federal, and international regulation of the aviation industry. Historical and current events, past and present legislation, conventions and treaties will be examined. Emphasis is on the historical and legislative aspects as they correlate to the development and control of aviation.

**PPIL 305. Aviation Safety.** (3) I, II. A course designed to assist the student to develop an attitude and philosophy for accident prevention. The course includes ideal and practical, personal and organizational safety procedures and goals; safety philosophies; aircraft accident reports; human factors; principles of accident investigation; accident prevention program and accident statistics; current events; NTSB special studies.

**PPIL 310. Aircraft Certification.** (3) I, II. A presentation of Federal Aviation Regulations pertinent to aircraft certification, maintenance and associated documents, publication records, and weight and balance computations.

**PPIL 315. Human Factors.** (3) I, II. Aeromedical information, causes, symptoms, prevention, and treatment of flight environment disorders. Altitude effects, spatial disorientation, body heat imbalance, visual abnormalities and psychological factors are included as they relate to pilot performance and survival effectiveness.

**PPIL 320. Advanced Aerodynamics.** (3) I, II. Incompressible flow airfoil theory, wing theory. Calculations of stall speed, drag, and basic performance criteria. Configuration changes, high and low speed conditions. Special flight conditions. Introduction to compressible flow. Aerodynamic performance of aircraft powered by reciprocating, turboprop, and jet turbine engine. Stability and control, weight and balance, and operating data.

**PPIL 325. Advanced Aircraft Systems.** (3) I, II. Electrical, environmental, hydraulic, fuel, ignition, and lubrication systems, including theory of operation and calculations. Principles, systems, analysis, operation, and limitations of advanced electronic navigation, flight director, and automatic flight control systems, including Inertial Navigation Systems, VLF/OMEGA, LORAN, GPS.

**PPIL 335. Air Transportation.** (3) I, II. The development and present status of air transportation, federal legislation, characteristics and classification of air carriers; the organization and function of the FAA and the Civil Aeronautic Board are reviewed.

**PPIL 340. FAR 135 Operations.** (3) I, II. Aircraft and equipment evaluation, maintenance, flight operations, administration, fiscal considerations. Emphasis will be placed on Federal Aviation regulations, marketing, training requirements, record keeping.

**PPIL 382. Certified Instrument Flight Instructor.** (2) II. Instrument instruction techniques, practices, and procedures necessary to provide skills in organizing and presenting lessons in instrument flying procedures. This course will prepare the student for the FAA Certified Instrument Flight Instructor written exam. One hour rec. and three hours lab a week. Pr.: PPIL 212.

**PPIL 392. Certified Multi-Engine Flight Instructor.** (2) II. Provides the student with the aeronautical skills and experience necessary to meet the requirements for the addition of an airplane, multi-engine rating to the flight instructor certificate. One hour rec. and three hours lab a week. Pr.: PPIL 212, 214, 262.

## Arts, Sciences, and Business

Nancy Mosier, Acting Head

Professors Ahlvers, Bingham, Creech, Heublein, Homolka, and Riblett; Associate Professor Stephens; Assistant Professors Barnes and Mosier.

Kansas State University at Salina programs are intended to provide students the opportunity to acquire sufficient specialization in the technical field of their choice and a general education background intended to enhance their common knowledge. Each curriculum requires general education courses.

This department includes courses in business, developmental studies, English/communications, mathematics, science, social science, and humanities.

## Business courses

### Undergraduate credit

**BUS 110. Introduction to Business.** (3) This course surveys the objectives, decisions, and activities within a business organization. Topics include a study of management responsibilities and controls, organizational structures, and marketing activities. Three hours rec. a week.

**BUS 115. Supervisory Management.** (3) An analysis of the responsibilities of the supervisor, with an examination of the skills and practices helpful in developing effective relations with people in a work setting. Three hours rec. a week.

**BUS 121. Human Relations in Organizations.** (2) Focuses on the many psychological and social pressures people experience when they interact with each other. Two hours rec. a week.

**BUS 210. Marketing.** (3) Study of coordination and control of marketing activities in relation to management and society. Three hours rec. a week. Pr.: ECON 110.

**BUS 215. Business Law.** (3) This course introduces the student to the rules of common law under which the business world operates as well as the basic understanding of the legal rights and duties arising from common business transactions. Three hours rec. a week.

**BUS 251. Financial Accounting.** (3) Study of business topics such as alternative forms of business organizations; typical business practices; legal instruments such as notes, bonds, and stocks; and financial statements and analysis. The main objective is to develop the ability to provide information to stockholders, creditors, and others who are outside an organization. Three hours rec. a week.

**BUS 252. Managerial Accounting.** (3) This course outlines the use of internal accounting data by managers in directing the affairs of business and non-business organizations. Three hours rec. a week. Pr.: BUS 251.

**BUS 253. Accounting Using Microcomputers.** (3) This course covers material that will prepare the student to select, install, set up, and operate commercial accounting software packages. The hands-on approach is used. Students will learn to identify inputs, reports, periodic table updates, and data flow for accounting applications. The class will physically install, set up, and run a commercial accounting software package. Emphasis is on accounting using the microcomputer. Two hours rec. and one hour lab a week. Pr.: BUS 251.

## College of Technology general courses

### Undergraduate credit

**COT 010. College Study Skills.** (1) I, II. This eight-week course is designed to aid the student who sees a need for, or is perceived to need, help or information which can augment his/her study skills in the following areas: note taking, time management, test-taking, reading comprehension, goal setting, and library use. May not be used toward a degree.

**COT 110. College Life Skills.** (1) I, II. This eight-week course is designed to aid the student in obtaining information covering personal issues such as communication, finance, and health. May not be used toward a degree.

**COT 139. Emergency Medical Technician.** (6) I, II. This course is designed to prepare students to take the state of Kansas EMT Certification exam.

## English/communications courses

### Undergraduate credit

**ENGL 080. Developmental English.** (3) Basics of standard edited (written) English with emphasis on grammar, usage, and sentence structure. This course does not fulfill requirements for the associate degree. Three hours rec. a week.

**ENGL 100. Expository Writing I.** (3) Introduction to expressive and informative writing. Frequent discussions, workshops, and conferences. Offers extensive practice in the process of writing: getting ideas, drafting, analyzing drafts, revising, and editing.

**ENGL 200. Expository Writing II.** (3) Introduction to writing persuasively and in response to literature. As with ENGL 100, uses discussion, workshops, and conferences, and emphasizes the writing process. Pr.: ENGL 100 or 110.

**ENGL 202. Technical Writing.** (3) Technical Writing applies rhetorical skills to the special writing needs of business and industry. Special emphasis is placed on the writing process and audience analysis. Three hours rec. a week. Pr.: ENGL 100.

**ENGL 255. Literature and Technology.** (3) Students will read literature about technology from a variety of perspectives including novels, short stories, articles, and excerpts from other types of writing. Three hours rec. a week. Pr.: ENGL 100.

**MC 191. Basic Black and White Darkroom Techniques.** (1) Basic darkroom techniques combine camera work with normal darkroom processing and printing operations. It is designed for students with little or no laboratory background and/or limited experience with film processing. Two hours lab a week. Pr.: 35-mm photography or equivalent.

**MC 192. Advanced Black and White Darkroom Techniques.** (1). This course is designed for individuals wishing to move beyond basic darkroom skill levels. Students will work with various types of papers, developers, and techniques used in professional printing applications. Two hours lab a week. Pr.: MC 191.

**COT 200. Utilization of Media.** (3) Surveys the uses, theories, research, practices, programs, skills, and foundation of instructional technology. Principles are applicable to school, college, library, business, industry, organizational, and alternative learning settings. Three hours rec. a week.

**SPCH 105. Public Speaking IA.** (2). Alternate to SPCH 106. Principles and practice of message preparation, audience analysis, presentational skills, and speech criticism. Primarily granted for students whose curricula require a 2-credit hour course. Credit not granted for both SPCH 105 and 106.

**SPCH 106. Public Speaking I.** (3) Principles and practice of message preparation, audience analysis, presentational skills, and speech criticism permitting greater practice in oral presentation. Credit not granted for both SPCH 105 and 106.

## Mathematics courses

### Undergraduate credit

**MATH 015. Beginning Algebra.** (5) This course provides coverage of the topics considered essential in an introductory algebra course. Five hours rec. a week. May not be used toward degree.

**MATH 020. College Algebra Review.** (2). Supplemental algebra lab to be taken in conjunction with MATH 100 for students who need additional instruction in algebra. The student will receive 2 hours credit, which will not count toward graduation. Students are placed in this course on the basis of their score on the College of Technology Math Placement Exam or ACT score. Two hours rec. a week.

**MATH 100. College Algebra.** (3). Pr.: B or better in MATH 015, or two years of high school algebra and a score of 22 or more on Enhanced ACT mathematics, or a score of at least 17 on the mathematics placement exam.

**MATH 120. Logic.** (2). Set theory is introduced on an intuitive basis and developed as a mathematical structure to include Boolean algebra. Symbolic logic will be introduced and then will be applied to the solutions of problems including statements, truth tables, arguments, and proofs. Two hours rec. a week.

**MATH 125. Elementary Functions.** (3) A 3-credit hour course composed of 2 credit hours of in-class lecture and 1 credit hour of laboratory. The lecture portion includes basic algebraic, geometric, and trigonometric concepts. The purpose of the laboratory is to help review mathematic concepts, provide individual help, and apply mathematical con-

cepts related to the student's technical area. Two hours rec. and two hours lab a week.

**MATH 150. Plane Trigonometry.** (3) I, II. S. Trigonometry and inverse trigonometric functions, trigonometric identities and equations; applications involving right triangles and applications illustrating the laws of sines and cosines. Pr.: C or better in MATH 100, or two years of high school algebra and a score of 25 or more in Enhance ACT mathematics, or a score of at least 20 on the mathematics placement exam.

**MATH 151. Applied Plane Trigonometry.** (2) The fundamentals of college trigonometry with emphasis on applications to engineering technology. Course content includes right and oblique triangle solutions, vectors, polar coordinates, angular velocities, use of trigonometry in surveying, tool and machine design, sine and cosine law uses, and introduction to identities solutions. Students are placed in this course on the basis of their score on the College of Technology math placement exam or ACT score. Two hours rec. a week.

**MATH 214. Advanced Topics in Mathematics.** (4). I. Course content will include solving definite multiple integrals, first order-linear differential equations, linear constant-coefficient equations, mutually independent treatments of systems, the Laplace transform, power series solutions, numerical methods, and Fourier series methods for partial differential equations. Pr.: MATH 215 or 220.

**MATH 215. Calculus I.** (5). Course content includes a brief review of pre-calculus materials of algebra and trigonometry, functions, limits, differentiation, applications of differentiation, integration, and applications of the definite integral. Theory is presented in a style tailored for first-semester students of mathematics. Five hours rec. a week. Pr.: MATH 100, 151.

**MATH 216. Calculus II.** (5) An extension of MATH 215, Calculus I, to include integration, differentiation, and applications of transcendental functions. Five hours rec. a week. Pr.: MATH 220 or MATH 215.

**MATH 220. Analytic Geometry and Calculus I.** (4) I, II. S. Analytic geometry, differential and integral calculus of algebraic and trigonometric functions. Pr.: B or better in MATH 100 and C or better in MATH 150; or three years of college preparatory mathematics including trigonometry and a score of 27 or more on the Enhanced ACT mathematics examination; or a score of at least 26 on the mathematics placement exam.

**MATH 221. Analytic Geometry and Calculus II.** (4) I, II. S. Continuation of MATH 220 to include transcendental functions, techniques of integration, and infinite series. Pr.: C or better in MATH 220.

## Science courses

### Undergraduate credit

**CHM 192. Organic Chemistry.** (4) A study of the reaction mechanism of industrially important reactions including alkylation, aromatization, dehydration, halogenation, hydrogenation, isomerization, nitration, oxidation reduction, pyrolysis, and polymerization. Laboratory work emphasizes the analysis and synthesis of representative organic compounds. Three hours rec. and two hours lab a week. Pr.: CHM 210.

**CHM 210. Chemistry I.** (4). First course of a two-semester study of the principles of chemistry and the properties of the elements and their compounds. Three hours lec. and three hours lab a week. Conc.: MATH 100.

**CHM 230. Chemistry II.** (4). Second course of a two-semester study of the principles of chemistry and the properties of the elements and their compounds. Three hours lec. and three hours lab a week. Pr.: CHM 210.

**GEOG 242. Physical Geography.** (3) In this course the student will explore the issues of world geography and its physical elements. Three hours rec. a week. Pr.: MATH 100, 151, MET 111, CET 110.

**GEOL 102. Geology.** (4) This course is designed to acquaint the student with various geological processes, materials, and physical characteristics. Conceptually oriented themes will be explored emphasizing selected learnings through a combination of classroom study and field trips to specific sites. Three hours rec. and three hours lab a week.

**PHYS 010. Technical Science.** (1). A 1-hour, non-degree credit course that coordinates the principles in beginning algebra with selected physical science activities. Two hours lab a week.

**PHYS 113. General Physics I.** (4). A basic development of the principles of mechanics, heat, fluids, oscillations, waves, and sound. Emphasis is on conceptual development and numerical problem solving. Two hours lec., one hour rec., one hour quiz, and two hours lab a week. Pr.: MATH 100, 151.

**PHYS 114. General Physics II.** (4). The continued treatment of the fundamentals of electricity and magnetism, light and optics, atomic and nuclear physics. These concepts are used to understand D.C. and A.C. circuits, motors, and generators. Emphasis is placed on conceptual development and problem solving. Two hours lec., one hour rec., one hour quiz, and two hours lab a week. Pr.: PHYS 113.

**PHYS 142. Aviation Meteorology.** (4). Students will study structured concepts relating to the understanding of various atmospheric phenomena. Causes for seasonal and daily weather pattern changes, modern prediction techniques, as well as aviation-related meteorological hazards are examined in detail. Particular attention will be given to specific atmospheric conditions affecting the professional pilot. Four hours rec. a week.

## Social science/humanities courses

### Undergraduate credit

**ART 150. The Humanities Through the Arts.** (2). This course is a general introduction to the humanities, focusing on what they are and their basic importance to man. Among the various arts explored will be painting, sculpture, architecture, literature, drama, music, dance, film, and photography. Emphasis in the class will be on participation, involvement, guest speakers, tours, and enjoyment. Two hours rec. a week.

**ECON 110. Principles of Macroeconomics.** (3). I, II, S. Basic facts, principles, and problems of economics; determination of the level of employment, output, and the price level; the monetary and banking system; problems and policies of economic instability, inflation, and growth; principles of economics development; other economic systems. Pr.: Two years of high school algebra or MATH 010.

**HIST 231. History of Technology.** (2). This course presents an overview of the development of technology from ancient times to modern day. Perspectives on the impact of technology on the quality of life will be explored. Two hours rec. a week.

**KIN 101. Principles of Physical Fitness.** (1). Physical Fitness principles that contribute to overall health. Fitness self-assessment, program design principles appropriate for the development and maintenance at optimal fitness levels, and activities appropriate for the reduction of risks associated with coronary heart disease and obesity are emphasized.

**PSYCH 110. General Psychology.** (3) An introductory survey of the general content areas of psychology, including methods, data, and principles.

**PSYCH 120. Dealing with Difficult People.** (1) Designed to help people cope with the broad spectrum of difficult people. One hour rec. a week.

**SOCIO 211. Introduction to Sociology.** (3) Development, structure, and functioning of human groups; social and cultural patterns; and the principal social processes.

## Statistics courses

### Undergraduate courses

**STAT 320. Elements of Statistics.** (3) I, II. 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.

# Engineering Technology

James Keating, Head

Professors Ashburn, Buchwald, Delker, Farmer, Hassan, and Powell; Associate Professors Anderson, Francisco, Kinsler, Richolson, Shreves, Swanson, Thompson, and Wilson; Assistant Professors Barnes, Goll, Kenney, and Simmonds.

## Environmental engineering technology (EVET)

Associate of technology  
68 hours required for graduation

The environmental engineering technology program has a heavy emphasis in chemistry and process engineering and is concerned with monitoring processes that produce useful products in a safe, efficient, and cost-efficient manner. An environmental engineering technician might improve a chemical process to reduce toxic emissions, collect and analyze samples in the field, or work in an environmental laboratory. This person might also be involved in aspects of environmental management and regulation.

In the environmental engineering technology program at Kansas State University at Salina you'll learn how chemical processes are developed in the laboratory and pilot plant and are scaled up for industrial production. Environmental considerations and quality control are strongly emphasized. Many courses in this program will review the requirements imposed by environmental regulations and the preparation for litigation. In this atmosphere, there will be many opportunities for discussion of professional ethics.

Computers are heavily integrated into this program and are used in industry in such areas as problem solving, data collection, process simulation, optimization, and control.

Environmental engineering technology students gain laboratory experience in instrumental analysis, organic chemistry, environmental chemistry, microbiology, unit operations, and process control laboratories. In addition, they are encouraged to pursue summer internships in the chemical industry, when such positions are available.

### Freshman

#### Fall semester

CMST 101	Applied BASIC Programming .....	2
MET 111	Technical Drafting .....	2
ENGL 100	Expository Writing I .....	3
MATH 151	Applied Plane Trigonometry .....	2
MATH 100	College Algebra .....	3
CHM 210	Chemistry I .....	4
		<b>16</b>

#### Spring semester

CHET 142	Material and Energy Balances .....	3
MATH 220	Analytic Geometry and Calculus I .....	4
PHYS 113	General Physics I .....	4

Business/humanities/social science elective .....	3
CHM 230      Chemistry II .....	4
	<hr/>
	18

### Sophomore

#### Fall semester

CHET 241	Unit Operations I .....	4
EVET 230	Environmental Chemistry and Toxicology .....	2
CHM 191	Organic Chemistry .....	4
CHET 253	Industrial Processes .....	4
IET 264	Electric Power and Devices .....	3
		<b>17</b>

#### Spring semester

CHET 242	Unit Operations II .....	4
EVET 250	Environmental Analysis .....	2
EVET 260	Environmental Sampling* .....	2
SPCH 105	Public Speaking IA .....	2
Business/humanities/social science elective .....		2
EVET 270	Hazardous Waste Management .....	2
ENGL 202	Technical Writing .....	3
		<b>17</b>

\*Enrollment in either Internship or Environmental Sampling is required. Internships may be undertaken during the summer session between the first and second years or in the summer session following the second year.

## Civil engineering technology

Associate of technology  
67 hours required for graduation

Civil engineering technicians perform functions in the control and layout of horizontal locations and vertical elevations for proposed construction of buildings, bridges, and transportation facilities. Their work includes preliminary and final surveys, assisting in design and detailing stage, or supervision of construction to maintain quality control.

The program prepares civil technicians for employment in industries dealing with the design and construction of highways, bridges, railroads, airports, water supply and distribution projects, and other projects ranging from small-scale construction jobs to those involving tremendous capital expenditures.

Accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology.

### Freshman

#### Fall semester

MATH 100	College Algebra .....	3
MATH 151	Applied Plane Trigonometry .....	2
CET 120	Materials Sampling and Testing .....	2
MET 111	Technical Drafting .....	2
ENGL 100	Expository Writing 1 .....	3
CMST 101	Applied BASIC Programming .....	2
Humanities/social science elective	.....	2
		<b>16</b>

#### Spring semester

PHYS 113	General Physics I .....	4
MATH 220	Analytic Geometry and Calculus I .....	4
CET 130	Plane Surveying .....	4
CET 110	Civil Technology Drafting .....	2
ENGL 202	Technical Writing .....	3
		<b>17</b>

### Sophomore

#### Fall semester

MET 252	Fluid Mechanics .....	3
CET 220	Soils and Foundations .....	2
CET 233	Route Location Surveying .....	4
CET 241	Construction Methods and Estimating ..	2
CET 311	Statics and Strength of Materials .....	5
		<b>16</b>

**Spring semester**

SPCH 105	Public Speaking IA .....	2
CET 312	Transportation Systems .....	4
CET 313	Structural Design .....	5
CHM 210	Chemistry I .....	4
	or	
PHYS 114	General Physics II .....	4
CET 210	Civil CAD .....	2
	or	
Humanities/social science elective*	.....	3
		<b>18</b>

\*To be selected from ECON 110, PSYCH 110, ENGL 255, or HIST 231.

**Construction option**

This option stresses the construction aspects of civil engineering technology. Courses are taught on contracts and specifications, construction surveying, print reading, and building electrical and mechanical systems.

Emphasis will be in the area of heavy construction. In lieu of CET 110 Civil Technology Drafting and CET 312 Transportation Systems, the following courses must be substituted to complete the construction option:

CET 140	Print Reading for Civil Construction .....	1
CET 231	Construction Surveying .....	2
CET 240	Contracts and Specifications .....	1
CET 340	Mechanical and Electrical Systems .....	3

**Surveying technology (SRVT)**

Associate of technology  
67 hours required for graduation

Surveying is necessary for the planning, design, and layout of all major engineering projects. Surveys are used for subdivisions, buildings, bridges, railroads, highways, airports, canals, dams, irrigation and drainage projects, and in preparation of any kind of map.

Surveying technology graduates may seek employment in construction, as government surveyors (federal, state, county, and municipal), as engineering consultants, and as private surveyors.

Any person who goes into private practice must be licensed. This program, combined with the necessary work experience, will help individuals qualify to take the Registered Land Surveyors Examination.

**Freshman****Fall semester**

MATH 100	College Algebra .....	3
MATH 151	Applied Plane Trigonometry .....	2
MET 111	Technical Drafting .....	2
ENGL 100	Expository Writing I .....	3
CMST 101	Applied BASIC Programming .....	2
SPCH 105	Public Speaking IA .....	2
Civil elective	.....	3
		<b>17</b>

**Spring semester**

CET 110	Civil Technology Drafting .....	2
PHYS 113	General Physics I .....	4
MATH 220	Analytic Geometry and Calculus I .....	4
CET 130	Plane Surveying .....	4
CET 230	Land Surveys .....	3
		<b>17</b>

**Sophomore****Fall semester**

CET 232	Surveying Astronomy .....	3
CET 233	Route Location Surveying .....	4
CET 311	Statics and Strength of Materials .....	5

ENGL 202	Technical Writing .....	3
Civil elective	.....	2
		<b>17</b>

**Spring semester**

CET 234	Advanced Surveying .....	2
CET 235	Surveying Law .....	3
CET 312	Transportation Systems .....	4
CHM 210	Chemistry I .....	4
	or	
PHYS 114	General Physics II .....	4
Humanities/social science elective	.....	3
		<b>16</b>

Civil electives must be a minimum of two credits from CET 120, CET 220, CET 241, CET 231, or CET 210.

Humanities/social science elective is to be selected from ECON 110, PSYCH 110, ENGL 255, or HIST 231.

**Geographic information systems option**  
68 hours required for graduation

The geographic information systems option addresses a rapidly increasing need for technicians familiar with the GIS technology. GIS is a computer-based mapping system that stores, integrates, and analyzes information about land aspects: what is on it; who owns it; what it is worth; and where the natural resources, utilities, and environmentally sensitive areas are located relative to each other and to other land aspects.

GIS technology is currently being used in tax mapping; resource management; routing of emergency vehicles, delivery vans, and trucks; facilities management; planning; management of transportation systems and utility networks; legislative reapportionment; and monitoring environmental hazards.

**Freshman****Fall semester**

MATH 100	College Algebra .....	3
MATH 151	Applied Plane Trigonometry .....	2
ENGL 100	Expository Writing I .....	3
MET 111	Technical Drafting .....	2
CMST 240	FORTRAN .....	3
CMIS 100	Operating Systems .....	3
		<b>16</b>

**Spring semester**

PHYS 113	General Physics I .....	4
CET 110	Civil Technology Drafting .....	2
CET 130	Plane Surveying .....	4
CET 150	Introduction to GIS .....	3
MET 212	Introduction to Computer-Aided Drafting .....	1
CMST 225	Commercial Software Analysis .....	3
		<b>17</b>

**Sophomore****Fall semester**

CET 250	Photogrammetry .....	3
CET 251	Georeferencing .....	3
GEOL 102	Geology .....	4
GEOG 242	Physical Geography .....	3
CET 350	Advanced Issues in GIS .....	3
Business/social science elective	.....	2
Optional work/study internship*	.....	1
		<b>18-19</b>

**Spring semester**

CMST 250	Networking I .....	3
STAT 320	Elements of Statistics .....	3
CET 255	Operating a GIS .....	2
ENGL 202	Technical Writing .....	3
CET 355	Projects in GIS .....	2
SPCH 105	Public Speaking IA .....	2
Business/social science elective	.....	2
Optional work/study internship*	.....	1
		<b>17-18</b>

\*Two semesters of work/study internship at 1 credit hour per semester are optional.

Business/social science elective is to be selected from ECON 110, PSYCH 110, ENGL 255, and HIST 231.

**Computer engineering technology (CMET)**

Associate of technology  
68 hours required for graduation

The computer engineering technology curriculum provides a solid foundation in both computer electronics and in computer software topics. Students in this program study circuit analysis, digital electronics, microprocessor programming and interfacing, programming languages, and hardware/software integration. These technical subjects are taught in conjunction with courses in mathematics, science, and interpersonal communications.

Employers of computer engineering technicians include companies that use and develop data communications equipment, automated manufacturing systems, and computer peripheral equipment. Computer engineering technicians work in industrial automation, computer products design, computer networking, as well as computer system installation and maintenance.

Accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology.

**Freshman****Fall semester**

ELET 101	Direct Current Circuits .....	4
MATH 100	College Algebra .....	3
MATH 151	Applied Plane Trigonometry .....	2
ENGL 100	Expository Writing I .....	3
CMST 103	Algorithmic Design .....	3
CMST 240	FORTRAN .....	3
		<b>18</b>

**Spring semester**

ELET 102	Alternating Current Circuits .....	4
ELET 110	Semiconductor Electronics .....	4
MATH 220	Analytic Geometry and Calculus I .....	4
SPCH 105	Public Speaking IA .....	2
CMET 150	Digital Electronics and Microprocessors .....	3
		<b>17</b>

**Sophomore****Fall semester**

ELET 260	Electronic Measurements .....	4
PHYS 113	General Physics I .....	4
CMET 250	Digital System Design I .....	4
CMST 245	Applications in C Programming .....	3
Social science/humanities elective	.....	2
		<b>17</b>

**Spring semester**

CHM 210	Chemistry I .....	4
	or	
PHYS 114	General Physics II .....	4
CMET 251	Digital System Design II .....	4
ENGL 202	Technical Writing .....	3
MET 111	Technical Drafting .....	2
Business elective	.....	3
		<b>16</b>

## Computer science technology (CMST)

Associate of technology  
66 hours required for graduation

The computer science technology curriculum includes science and mathematics, as well as courses in computer programming, advanced manufacturing, and scientific computer applications. Courses require a significant amount of laboratory work; the time spent in the lab will vary depending on the abilities of each student.

### Freshman

#### Fall semester

MATH 100	College Algebra .....	3
MATH 151	Applied Plane Trigonometry .....	2
CMST 100	Operating Systems .....	3
SPCH 105	Public Speaking IA .....	2
CMST 103	Algorithmic Design .....	3
CMST 240	FORTRAN.....	3
		<b>16</b>

#### Spring semester

PHYS 113	General Physics I .....	4
MATH 220	Analytic Geometry and Calculus I .....	4
CMST 221	Pascal .....	3
CMST 300	Assembly Language Programming .....	3
ENGL 100	Expository Writing I .....	3
		<b>17</b>

### Sophomore

#### Fall semester

CMST 245	Applications in C Programming .....	3
CMST 340	Computer Science Technology Seminar .....	2
Business/social science electives .....		5
CMST 321	Data Structures .....	2
ENGL 202	Technical Writing .....	3
		<b>15</b>

#### Spring semester

CHM 210	Chemistry I .....	4
<b>or</b>		
PHYS 114	General Physics II .....	4
ELET 100	Basic Electricity .....	3
CMST 301	Computer Graphics .....	2
CMST 315	Networking II .....	3
CMST 325	Database Concepts .....	3
CMST 331	Statistics with Computer Applications ..	3
		<b>18</b>

## Computer information systems technology (CMIS)

Associate of technology  
66 hours required for graduation

Computer information systems technology emphasizes algorithmic design skills, which provide fundamental problem-solving approaches. Structured programming provides the tools for implementing problem solutions. Information systems and business theory classes provide an understanding of the context within which systems are implemented. Programming class assignments are structured to prepare students for real-life programming projects. The curriculum places a strong emphasis on PC hardware, networking, and commercial software use.

### Freshman

#### Fall semester

BUS 251	Financial Accounting .....	3
MATH 100	College Algebra .....	3
ENGL 100	Expository Writing I .....	3

CMST 100	Operating Systems .....	3
CMST 103	Algorithmic Design .....	3
CMST 225	Commercial Software Analysis .....	3
		<b>18</b>

#### Spring semester

CMST 130	PC Hardware .....	2
CMST 220	COBOL I .....	3
CMST 230	RPG .....	3
BUS 252	Managerial Accounting .....	3
ENGL 202	Technical Writing .....	3
SPCH 105	Public Speaking IA .....	2
		<b>16</b>

### Sophomore

#### Fall semester

CMST 250	Networking I .....	3
CMST 320	COBOL II .....	3
BUS 253	Accounting Using Computers .....	3
Social science elective .....		3
CMST 245	Applications in C Programming .....	3
CMST 330	System Analysis and Design .....	3
		<b>18</b>

#### Spring semester

CMST 300	Assembly Language Programming .....	3
CMST 315	Networking II .....	3
CMST 325	Database Concepts .....	3
Social science elective .....		6
		<b>15</b>

## Electronic engineering technology (ELET)

Associate of technology  
68 hours required for graduation

The electronic engineering technology curriculum emphasizes the theory and application of electronic circuits, instrumentation, and systems. Numerous laboratory experiences reinforce the concepts taught in the classroom. Coursework in this curriculum includes a strong foundation in basic circuit theory, semiconductor applications, digital systems, microprocessor programming and interfacing, plus essential concepts in mathematics, science, and interpersonal communications.

Electronic engineering technicians work in all areas of the electronics industry, including industrial control electronics, communications, and digital systems. These individuals work closely with electronic engineering technologists, electrical engineers, computer scientists, and other professionals in the design, development, marketing, and maintenance of electronic products and systems.

Accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology.

### Freshman

#### Fall semester

ENGL 100	Expository Writing I .....	3
MET 111	Technical Drafting .....	2
MATH 100	College Algebra .....	3
MATH 151	Applied Plane Trigonometry .....	2
CMST 101	Applied BASIC Programming .....	2
ELET 101	Direct Current Circuits .....	4
SPCH 105	Public Speaking IA .....	2
		<b>18</b>

#### Spring semester

PHYS 113	General Physics I .....	4
MATH 220	Analytic Geometry and Calculus I .....	4
ELET 102	Alternating Current Circuits .....	4
ELET 110	Semiconductor Electronics .....	4
		<b>16</b>

### Sophomore

#### Fall semester

ELET 210	Linear Circuit Design .....	5
ELET 260	Electronic Measurements .....	4
ELET 290	Electronic Seminar I .....	1
CMET 150	Digital Electronics and Microprocessors .....	3
ENGL 202	Technical Writing .....	3
		<b>16</b>

#### Spring semester

ELET 220	RF Communications Systems .....	4
ELET 291	Electronic Seminar II .....	1
CMET 250	Digital System Design I .....	4
CHM 210	Chemistry I .....	4
<b>or</b>		
PHYS 114	General Physics II .....	4
Social science/humanities elective .....		2
Business elective .....		3
		<b>18</b>

## Bachelor of science in electronic engineering technology

128 hours required for graduation

Students may continue their studies in electronic engineering technology beyond the associate degree level to obtain the bachelor of science degree in electronic engineering technology. The baccalaureate degree typically requires two years of study beyond the associate degree.

Course work in the junior and senior years of the baccalaureate degree program provides additional depth of understanding of circuit analysis techniques, digital systems, data communications, and industrial electronics. Individual and group project assignments are emphasized. Additional mathematics, science, and elective courses provide a strong background with which graduates are prepared for the technical professions of tomorrow.

Graduates work as electronic engineering technologists in many industrial settings. Career activities include product design and development, industrial automation, technical sales, and project management.

### Junior

#### Fall semester

ELET 330	Electric Motors and Controls .....	4
CMST 222	Applications in C for Engineering Technology .....	3
MATH 214	Advanced Topics in Mathematics .....	4
KIN 101	Principles of Physical Fitness .....	1
Science elective .....		4
		<b>16</b>

#### Spring semester

ELET 310	Industrial Electronics .....	3
MET 231	Physical Materials and Metallurgy .....	3
ENGL 200	Expository Writing II .....	3
Social science/humanities elective .....		3
Management/business elective .....		3
		<b>15</b>

### Senior

#### Fall semester

CMET 450	Advanced Data Communications .....	3
ELET 400	Advanced Network Analysis .....	3
IET 263	System Analysis and Quality Control ...	3
Social science/humanities elective .....		6
		<b>15</b>

**Spring semester**

ELET 420	Electronic Communications Circuits .....	5
ELET 590	Electronic Design Laboratory .....	2
CMET 451	Digital Circuits and Systems .....	4
Social science/humanities elective .....		3
		<b>14</b>

## Industrial engineering technology (IET)

Associate of technology  
68 hours required for graduation

Industrial engineering technicians are involved in the manufacturing process from start to finish, from research and development through production and customer servicing. Industrial engineering technicians work in quality control, safety, time and motion study, and many other areas.

**Freshman****Fall semester**

MATH 100	College Algebra .....	3
MATH 151	Applied Plane Trigonometry .....	2
CMST 101	Applied BASIC Programming .....	2
MET 111	Technical Drafting .....	2
ENGL 100	Expository Writing I .....	3
CHM 210	Chemistry I .....	4
		<b>16</b>

**Spring semester**

ELET 100	Basic Electricity .....	3
MATH 220	Analytic Geometry and Calculus I .....	4
PHYS 113	General Physics I .....	4
CMST 240	FORTTRAN .....	3
SPCH 105	Public Speaking IA .....	2
Business/social science/humanities elective .....		2
		<b>18</b>

**Sophomore****Fall semester**

IET 264	Electric Power and Devices .....	3
CET 311	Statics and Strength of Materials .....	5
PHYS 114	General Physics II .....	4
ENGL 202	Technical Writing .....	3
MET 121	Manufacturing Methods I .....	2
		<b>17</b>

**Spring semester**

MET 123	Manufacturing Methods II .....	3
CHET 252	Instrumentation and Control .....	2
IET 263	System Analysis and Quality Control ...	3
CHET 271	Plant Engineering Technology .....	2
CHM 230	Chemistry II .....	4
Business/social science/humanities elective .....		3
		<b>17</b>

## Mechanical engineering technology (MET)

Mechanical engineering technology offers an associate of technology degree with two options and a bachelor of science in engineering technology degree. The programs prepare graduates for positions in mechanical and/or manufacturing industries as engineering technicians or technologists. The programs embrace the design, manufacture, test sales, and maintenance of mechanical products, including the tools and machines by which they are made. Programs help students develop the ability to use trade and technical literature to solve technical problems.

Graduates are employed by manufacturing industries, testing laboratories, marketing firms, consulting firms, government agencies, and in businesses they themselves establish.

**Design option**

Associate of technology  
69 hours required for graduation

The mechanical engineering technician choosing this option is concerned with the development, testing, evaluation, detailing, and design of machinery, equipment, instruments, and other mechanical devices.

The technician's duties may involve drafting, use of handbooks and tables, calculations of strength and reliability, selection of materials, and cost estimating for the development or modification of the design of almost any type of machine or mechanism. Technicians may conduct performance and endurance tests on various devices and report the results.

During the first year of study students develop a strong base in mathematics, physical science, materials of industry, manufacturing processes, and written and graphic communications. During the second year, students develop abilities in strength of materials, fluid mechanics, mechanisms, computer-aided-drafting and design, CNC machine processes, and design of mechanical elements.

Accredited by the Technology Accreditation Commission of the Accreditation Board of Engineering and Technology.

**Freshman****Fall semester**

MATH 100	College Algebra .....	3
MATH 151	Applied Plane Trigonometry .....	2
MET 111	Technical Drafting .....	2
MET 115	Descriptive Geometry .....	1
MET 121	Manufacturing Methods I .....	2
ENGL 100	Expository Writing I .....	3
CMST 101	Applied BASIC Programming .....	2
SPCH 105	Public Speaking IA .....	2
		<b>17</b>

**Spring semester**

PHYS 113	General Physics I .....	4
MET 117	Mechanical Detailing .....	2
MET 123	Manufacturing Methods II .....	3
MET 231	Physical Materials and Metallurgy .....	3
MATH 220	Analytic Geometry and Calculus I .....	4
Business/social science elective .....		2
		<b>18</b>

**Sophomore****Fall semester**

CHM 210	Chemistry I .....	4
<b>or</b>		
PHYS 114	General Physics II .....	4
CET 311	Statics and Strength of Materials .....	5
MET 252	Fluid Mechanics .....	3
MET 242	Elements of Mechanisms .....	3
MET 260	Design Technology I .....	2
MET 212	Introduction to Computer Aided Drafting .....	1
		<b>18</b>

**Spring semester**

ENGL 202	Technical Writing .....	3
MET 331	Mechanical Testing Lab .....	1
MET 271	Thermodynamics I .....	2
ELET 100	Basic Electricity .....	3
MET 261	Design Technology II .....	4
Humanities/social science elective .....		3
		<b>16</b>

**Automated manufacturing option**

Associate of technology  
69 hours required for graduation

This option allows for more concentrated study in manufacturing processes including both traditional and advanced manufacturing systems. The emphasis during the second year is on computer-aided manufacturing, automated systems, industrial instrumentation and controls, sensors, and robotics.

**Freshman****Fall semester**

MATH 100	College Algebra .....	3
MATH 151	Applied Plane Trigonometry .....	2
MET 111	Technical Drafting .....	2
MET 115	Descriptive Geometry .....	1
MET 121	Manufacturing Methods I .....	2
ENGL 100	Expository Writing I .....	3
CMST 101	Applied BASIC Programming .....	2
SPCH 105	Public Speaking IA .....	2
		<b>17</b>

**Spring semester**

PHYS 113	General Physics I .....	4
MET 117	Mechanical Detailing .....	2
MET 123	Manufacturing Methods II .....	3
MET 231	Physical Materials and Metallurgy .....	3
MATH 220	Analytic Geometry and Calculus I .....	4
Humanities/social science elective .....		2
		<b>18</b>

**Sophomore****Fall semester**

CET 311	Statics and Strength of Materials .....	5
MET 212	Introduction to Computer-Aided Drafting .....	1
MET 230	Automated Manufacturing Systems I ....	3
MET 242	Elements of Mechanisms .....	3
MET 252	Fluid Mechanics .....	3
ELET 100	Basic Electricity .....	3
		<b>18</b>

**Spring semester**

CHM 210	Chemistry I .....	4
<b>or</b>		
PHYS 114	General Physics II .....	4
ENGL 202	Technical Writing .....	3
MET 282	Industrial Instrumentation and Controls	3
MET 381	Automated Manufacturing Systems II ...	3
Humanities/social science electives .....		3
		<b>16</b>

## Bachelor of science in mechanical engineering technology

128 hours required for graduation

Students may wish to continue with the mechanical engineering technology program toward a bachelor of science in mechanical engineering technology. This is accomplished using a 2 + 2 concept.

All students will complete the associate degree design option requirements. After two years, students may graduate with an associate degree or continue for another two years of upper-division courses. The upper-division curriculum provides greater and more rigorous depth in mechanical theory and applications. Along with more mechanical specialty courses, additional study of mathematics, communications, social sciences, humanities, and related business and industrial operations provides breadth beyond the student's major concentration.

**Junior****Fall semester**

MET 230	Automated Manufacturing Systems I ....	3
MET 344	Dynamics of Machines .....	2
IET 264	Electric Power and Devices .....	3
CMST 222	Applications in C for Engineering Technology .....	3
KIN 101	Principles of Physical Fitness .....	1
MATH 214	Advanced Topics in Mathematics .....	4
		<b>16</b>

**Spring semester**

MET 282	Industrial Instrumentation and Controls .....	3
MET 364	Machine Design .....	2
MET 383	CAD/CAM .....	2
ENGL 200	Expository Writing II .....	3
Science elective (PHYS 114 or CHM 210) .....		4
		<b>14</b>

**Senior****Fall semester**

ECON 110	Macroeconomics.....	3
Humanities/social science elective .....		2
IET 263	System Analysis and Quality Control ...	3
MET 333	Advanced Materials Science .....	2
MET 353	Fluid Mechanics IIA .....	2
MET 462	Senior Design Project I .....	1
MET 480	Computer Integrated Manufacturing .....	2
		<b>15</b>

**Spring semester**

Humanities/social science elective .....		3
Business/management elective .....		3
Approved technical elective .....		3
MET 460	Tool Design for Manufacturing .....	3
MET 464	Senior Design Project II .....	2
		<b>14</b>

**Additional electives**

MET 490	Industrial Work Internship .....	2
MET 499	Selected Topics in Mechanical Engineering Technology .....	Var.

## Chemical engineering technology courses

**Undergraduate credit**

**CHET 142. Material and Energy Balances.** (3) II. Material balance problem solutions by direct, algebraic, and tie-component methods including recycle, bypass, and purge calculations. General energy balance including energy balances with chemical reactions. Three hours rec. a week. Pr.: CHM 210, MATH 100.

**CHET 231. Chemical Reaction.** (2) I. Review of fundamental kinetic and thermodynamic relations and energy balances with chemical reactions. Laboratory includes experimentation with various chemical reactions to illustrate thermodynamic and kinetic principles. One hour rec. and two hours lab a week. Pr.: MATH 122, CHET 142, and CHM 230.

**CHET 241. Unit Operations I.** (4) I. Equation of continuity, Bernoulli's equation, and application to sizing of pumps and compressors. Laboratory involves experimental work in the unit operations studied in the lecture. Two hours rec. and four hours lab a week. Pr.: CHET 142 and PHYS 113.

**CHET 242. Unit Operations II.** (4) II. Phase equilibria and its application to the study of distillation, liquid extraction, and gas absorption. Additional topics include humidification, dehumidification, filtration, and drying operations and their application in industry. Laboratory involves experimental work in the unit operations studied in lecture. Two hours rec. and four hours lab a week. Pr.: CHET 241.

**CHET 252. Instrumentation and Control.** (2) II. Principles of measurement and control. Transfer functions and their application to control of temperature, pressure, liquid level, and concentration. Laboratory involves experimental work with a liquid-level and temperature control system. One hour rec. and two hours lab a week. Pr.: PHYS 113 and MATH 122.

**CHET 253. Industrial Processes.** (4) I. A broad survey of chemical process industries with emphasis on process flow sheet interpretation. Laboratory work involves testing of water, fuels, and select chemicals by instrumental methods. Two hours rec. and four hours lab a week. Pr.: CHM 230.

**CHET 261. Internship.** (2) I, II, S. Student works as a summer intern in chemical or allied industry. A report detailing duties performed and tasks accomplished is required at the end of the internship period. Four hours lab a week. Recommended to be taken between freshman and sophomore year.

**CHET 262. Process Design Lab.** (2) II. Student is assigned a project requiring design equipment procurement and assembly, experimentation, data collection, and calculations preferably done on the computer. Weekly progress report memos and a final report are required. Enrollment in either Internship or Process Design Lab is required. Four hours lab a week. Pr.: CHET 241. Conc.: CHET 242.

**CHET 271. Plant Engineering Technology.** (2) II. Introduction to unit operations and chemical engineering and chemical processing equipment. Materials of construction and corrosion, materials handling, maintenance, utilities and services, and plant safety. Evaluation of purchased equipment and equipment depreciation costs. Overview of plant design report. Two hours rec. a week. Recommended for sophomore year.

**CHET 293. Problems in CHET.** (Var.) Opportunity for advanced study and practical experience with specific problems of the student's choice in the field of chemical engineering technology. Pr.: Instructor's consent.

## Civil engineering technology courses

**Undergraduate credit**

**CET 110 Civil Technology Drafting.** (2) II. A course in drafting the types of drawings common to civil engineering technology, including ownership certificates, plans and profiles, contour maps, site grading drawings, and topographic layouts. Drawings are made using traditional drafting equipment and computers. Six hours lab a week. Pr.: MET 111.

**CET 120. Materials Sampling and Testing.** (2) I. A course in the proper use of aggregates and concrete materials (Portland cement and asphalt) in construction. Sampling and testing methods conform with American Society of Testing Materials standards. Six hours lab a week.

**CET 130. Plane Surveying.** (4) II. A beginning course in the theory and practice of field measurements and notes for surveying. Emphasis is placed on accuracy and avoidance of common errors and mistakes. Two hours rec. and six hours lab a week. Pr. or conc.: MATH 151.

**CET 140. Print Reading for Civil Construction.** (1) I. A course dealing with methods used to retrieve information from construction plans in order to build all or part of the project. Two hours lab a week.

**CET 150. Introduction to GIS.** (3) II. In this introductory course in geographic information systems the student will review hardware and software components, explore several applications, and be introduced to data structures and basic functions. The student will explore application issues in GIS, operational and management issues, and which issues to consider when proposing and implementing a new GIS. Hands-on experience will be gained using a commercial GIS software package (pc ARC/INFO) on a PC-based graphics workstation. Two hours rec. and two hours lab a week. Pr.: CMST 240 and 245.

**CET 210. Civil CAD.** (2) II. This course makes use of the computer as a tool for the generation of drawings typical of those used in civil and surveying fields. One hour rec. and two hours lab a week. Pr.: CMST 101. Pr. or conc.: CET 110.

**CET 211. Statics.** (2) II. A study of forces and their effects on the bodies upon which they act. Two hours rec. a week. Pr.: PHYS 113.

**CET 220. Soils and Foundations.** (2) I. A course in the identification and classification of soils by the Unified method and the American Association of State Highway and Transportation Officials method. Routine field tests are covered and used in the laboratory. One hour rec. and two hours lab a week. Pr.: MATH 122.

**CET 230. Land Surveys.** (3) II. A course dealing with the history of land surveying, procedures for researching records, construction boundary surveys, writing descriptions, and producing documents. Two hours rec. and three hours lab a week. Pr. or conc.: CET 130.

**CET 231. Construction Surveying.** (2) I. A study of vertical and horizontal alignment and methods used to maintain control stations on a construction job. Emphasis is on practical methods and solutions to problems found on the construction job site. One hour rec. and three hours lab a week. Pr.: CET 130.

**CET 232. Surveying Astronomy.** (3) I. A course in the use of spherical trigonometric calculations to determine bearing, azimuth, latitude, longitude, and time from solar, polar, and star observations. Star recognition, locations and determination of line direction are emphasized. Two hours rec. and three hours lab a week. Pr.: CET 130.

**CET 233. Route Location Surveying.** (4) II. A course in the geometric methods of horizontal and vertical curve alignment. In addition, transitional spirals are examined and calculated. The laboratory portion provides a grounding of these concepts in the field by actual calculation and staking of control for roads, streets, and various types of routes. Two hours rec. and six hours lab a week. Pr.: CET 130.

**CET 234. Advanced Surveying.** (2) II. A study of the advanced areas of surveying with primary emphasis on control networks, state plane systems, tachemetry, geodetic surveying, and the use of electronic surveying equipment. One hour rec. and three hours lab a week. Pr.: CET 130.

**CET 235. Surveying Law.** (3) II. A study of the legal aspects that apply to the surveying profession, and the role of the surveyor within the judicial framework of our court system. Three hours rec. a week. Pr.: CET 130.

**CET 240. Contracts and Specifications.** (1) I. A study of the way a set of contracts and specifications are put together and how they act as a source of data on a construction job. The course also stresses the way information is gained from documents with speed and accuracy. One hour rec. a week. Pr.: CET 140 and 231.

**CET 241. Construction Methods and Estimating.** (2) I. A study of the basic equipment needs, usage, costs, and quantity determinations for planning and estimating construction projects. Field trips through construction sites and visitations with inspectors assist in developing reporting procedures and inspection responsibilities. One hour rec. and two hours lab a week. Pr.: MATH 100.

**CET 250. Photogrammetry.** (2) I. A class in which aerial photographs are used to create topographic drawings. Hands-on experience will be gained by using stereoscopic plotters to convert photographic data into engineering maps. One hour rec. and two hours lab a week. Pr.: CET 130.

**CET 251. Georeferencing.** (3) I. This course introduces spatial referencing concepts. A framework for spatial referencing is a necessary part of a geographic information system if different layers of information are to be interrelated. Two hours rec. and two hours lab a week. Pr.: MATH 100 and 151, CET 110 and 130.

**CET 252. Internship.** (1) I, II, S. Student works during summer or regular semester as an intern in a civil engineering, surveying, or other GIS-related industry. A report detailing duties performed and tasks accomplished is required at the end of the internship period. (Recommended during summer before second year and during second year). May be repeated for credit.

**CET 255. Operating a GIS.** (2) I. This course covers the issues which must be addressed to successfully operate a geographic information system in a production environment. One hour rec. and two hours lab a week. Pr.: CMIS 245 and CMST 240.

**CET 300. Problems in CET.** (Var.) I, II, S. A course in which advanced study is done in a specific area chosen by the student. Pr.: consent of instructor.

**CET 310. Strength of Materials.** (3) II. A study of the internal resistance to external forces. The course also deals with the resulting changes in the dimensions and shapes of bodies produced by outside forces. Three hours rec. a week. Pr.: CET 211.

**CET 311. Statics and Strength of Materials.** (5) I. Statics is a study of the results of applying external loads to a body and the resolution of forces in several planes. Strength of materials calculations are used to determine the internal reaction of the body to such forces. This course covers friction, centroids, moment of inertia, connections, beams, torsion, and columns. Five hours rec. a week. Pr.: PHYS 113.

**CET 312. Transportation Systems.** (4) II. A study of the design of transportation systems with emphasis on highways, urban roadways, railroads, and airports. Two hours rec. and four hours lab a week. Pr.: CET 233.

**CET 313. Structural Design.** (5) II. A course combining design of components of structures in steel and reinforced concrete. Basic stress calculations and design concepts are studied for use in either a simplified design, detailing, or inspection role. Three hours rec. and four hours lab a week. Pr.: CET 310 or 311.

**CET 314. Structural Steel Design.** (3) I, II, S. A course covering basic fundamentals of structural steel design. Stress calculations and design concepts are studied for use in either a design or inspection role. Two hours rec. and two hours lab a week. Pr.: CET 311.

**CET 315. Reinforced Concrete Design.** (3) I, II, S. A course covering basic fundamentals of reinforced concrete design. Stress calculations and design concepts are studied for use in either a design or inspection role. Two hours rec. and two hours lab a week. Pr.: CET 311.

**CET 340. Mechanical and Electrical Systems.** (3) II. A study of the way mechanical and electrical systems are used in the construction of a building by a contractor. Systems include plumbing, heating, ventilation, and air conditioning. Two hours rec. and two hours lab a week. Pr.: MATH 151, PHYS 113, and CET 241.

**CET 350. Advanced Issues in GIS.** (3) I. This course deals with GIS algorithms, data structures, advanced computational topics, analysis of error; ways in which traditional planning and management theories and techniques can be implemented in GIS; and evaluation of how GIS can be used to answer specific planning problems. Two hours rec. and two hours lab a week. Pr.: CET 150, MATH 100 and 151.

**CET 355. Projects in GIS.** (2) I, II, S. In this course the class will take an example real-world geographic information system project and complete the project, start to finish, using a GIS software package which they have learned to operate in a previous course. One hour rec. and two hours lab a week. Pr.: CET 251, 255, and 350.

## Computer engineering technology courses

### Undergraduate credit

**CMET 150. Digital Electronics and Microprocessors.** (3) I, II. Industrial applications of microprocessor operation and architecture are emphasized. Also studied is the use of microprocessor system development tools and hardware/software debugging techniques. Two hours rec. and three hours lab a week. Pr.: ELET 101 and CMST 101 or CMST 240.

**CMET 250. Digital System Design I.** (4) I, II. An extension of the material covered in CMET 150 Digital Electronics and Microprocessors. Covers techniques of sequential logic, analog-to-digital, and digital-to-analog conversion, display systems, and microprocessors as system elements. Two hours rec. and six hours lab a week. Pr.: CMET 150, ELET 110.

**CMET 251. Digital System Design II.** (4) II. An industry-related course used to acquaint the student with industrial project design and development. Small group research, design, and building of projects to implement computer-based tasks specified by instructor. Two hours rec. and six hours lab a week. Pr.: CMET 250, ELET 211.

**CMET 450. Advanced Data Communications.** (3) I. This course will cover material that provides an understanding of modern data communication. This will cover both hardware and software aspects of data communication including telephone systems, lasers fiber optics, and local area networking. Pr.: CMET 250.

**CMET 451. Digital Circuits and Systems.** (4) II. This course will cover material that gives the students an understanding of digital systems. This will include PAL, PLA, robotics, and programmable controllers. The student will design and build a project using computer software. Pr.: CMET 250.

## Computer science technology courses

### Undergraduate credit

**CMST 100. Operating Systems.** (3) I. This course introduces the fundamental concepts of standard operating system components, and is designed to give the student a working knowledge of the fundamentals of specific operating systems rather than operating systems theory. Three hours rec. a week.

**CMST 101. Applied BASIC Programming.** (2) I, II. Study of computer techniques and applications for the non-computer technology majors. Emphasis on problem solving using the BASIC programming language. Two hours rec. a week.

**CMST 103. Algorithmic Design.** (3) I, II. This course is designed as a language-independent introduction to the logic of data processing. Topics include an overview of information processing and computer architecture, overview of systems development, problem definition, and problem analysis. The student is also introduced to the various tools, techniques, and devices utilized in computer algorithmic design. Three hours rec. a week.

**CMST 111. Introduction to Computing.** (2) I. An entry-level course designed to introduce to the student the use of the PC type of microcomputer. Includes a familiarization with the use of MS-DOS, common terminology, computer hardware, and an introduction to software usage. Two hours rec. a week.

**CMST 130. PC Hardware.** (2) I, II, S. This course will cover material relating to personal computer hardware. Concepts of memory management and proper hardware configuration will be covered. Differences in hard disk drives will be discussed. One hour rec. and one hour lab a week. Pr.: none.

**CMST 210. Introduction to Enable.** (2) I, II. An intermediate-level course designed for students with prior experience with the PC type of microcomputer. The course is designed to expand the student's knowledge of computer terminology and the MS-DOS operating system. Two hours rec. a week in the lab. Pr.: CMST 111 or consent of instructor.

**CMST 215. Advanced Enable.** (2) I, II. Advanced-level course designed for students who have a working knowledge of computers and who have completed CMST 210 or equivalent work. Two hours rec. a week. Pr.: CMST 210 or consent of instructor.

**CMST 220. Cobol I.** (3) I, II. Study of the COBOL programming language will introduce students to algorithmic solutions using business applications. This initial programming class will stress not only the COBOL language but also concepts of modular designed structured programming and techniques. Three hours rec. a week. Pr.: CMST 100 and 103.

**CMST 221. Pascal.** (3) I, II. Students will be introduced to the highly structured language of Pascal through lecture and programming assignments. Assignments will emphasize the use of modularity in program design. Data structuring and manipulation will be developed during the program lab sequence. Two hours rec. and three hours lab a week. Pr.: CMST 100, 103, and 220 or 240.

**CMST 222. Applications in C for Engineering Technology.** (3) I. This course will introduce the student to structured program design and implementation. Students will learn to apply the C language in calculations, input, output, file handling. Students will use the C language as the control language with various interfaces. Students will write approximately ten programs. Each student will select, design, and implement an individual project at the end of the semester. Two hours rec. and one hour lab a week. Pr.: CMST 101.

**CMST 225. Commercial Software Analysis.** (3) I, II. Students will be given a thorough, in-depth introduction to currently popular software application packages. Such items as word processors, spread sheets, database management systems, and integrated packages will be examined in terms of direct business/industrial applications. The current literature on commercial software will be researched in terms of fitting specific software to specific types of business/industrial tasks. Concepts of each software package (including advantages, disadvantages, limitations, and hardware requirements) will be analyzed. Particular emphasis will be placed on needs-analysis versus specific software analysis. Two hours rec. a week. Pr.: CMST 100, 103.

**CMST 230. RPG II.** (3) II. This course is designed to introduce the Report Program Generator language. RPG II is used primarily for generation of business reports such as payroll, inventory, general ledger, and other business applications. The lab work includes writing several RPG II programs to solve business report problems. Three hours rec. a week. Pr.: CMST 100 and 103.

**CMST 240. FORTRAN.** (3) I, II. The student is introduced to the computer language FORTRAN and its application to scientific and engineering problem solution. Includes study of input/output techniques, arithmetic and logic processes, non-numeric data handling, arrays, and subprograms. Three hours rec. lab a week. Pr. or conc.: MATH 151.

**CMST 245. Applications in C Programming.** (3) I, II. The syntax of the C language will be covered and structured programming and modular design will be stressed. Writing functions and procedures will be discussed, as will the inclusion of standard library functions and calls to the operating system. The uses of C in writing application programs will be reflected in the laboratory program assignments. Three hours rec. a week. Pr.: CMST 100, 103, and 220 or 240.

**CMST 250. Networking I.** (3) I, II. This course will cover material that provides an understanding of data communications terms. The course will cover hardware, software, and wiring concepts required for personal computer communications. Two hours rec. and one hour lab a week. Pr.: CMST 130.

**CMST 300. Assembly Language Programming.** (3) II. This course covers programming of a mini digital computer at the assembly language level. Specific topics covered include an overview of the Harris operating system and assembly language. Three hours rec. a week. Pr.: CMST 100, 103, and 221 or 240.

**CMST 301. Computer Graphics.** (2) II. The course allows the students a chance to apply their knowledge of programming to computer graphics. The students will have the opportunity to use a commercial computer-aided design software package, a contouring software package, and a graphics-based mathematics software package on a Zenith microcomputer. This is a technical support course. Two hours rec. and two hours lab a week. Pr.: CMST 100, 103, and 240.

**CMST 315. Networking II.** (3) I, II. This course will cover material that leads to an understanding of local area networking of personal computers. This will include necessary hardware, software, user software, and the different topologies. Two hours rec. and one hour lab a week. Pr.: CMST 250.

**CMST 320. Cobol II.** (3) I, II. This course consists of an in-depth study of the COBOL language. More advanced topics will be covered including report writer, table processing, and the COBOL sort/merge feature. Lab work includes writing several business application programs using the COBOL language. Two hours rec. and two hours lab a week. Pr.: CMST 100, 103, and 220.

**CMST 321. Data Structures.** (2) I. An introduction to primitive and complex data structures will be accomplished via the programming language PASCAL. Students will investigate the theoretical usage of various data structures and apply this theory to actual programs. Two hour rec. a week. Pr.: CMST 100, 103, and 221 or 245.

**CMST 325. Data Base Concepts.** (3) II. This course deals with the role of the database administrator as well as the importance of the data dictionary, the database design process, data model comparisons, and the performance of a database. Laboratory work will include the design and implementation of individual databases. Three hours rec. a week. Pr.: CMST 103.

**CMST 330. Systems Analysis and Design.** (3) I. This course will study the steps in conducting a systems analysis, design, and development. Laboratory work includes a class project to analyze the computer needs of a local business and recommend possible system solutions to be implemented. Three hours rec. a week. Pr.: CMST 320.

**CMST 331. Statistics with Computer Applications.** (3) II. This course is an introduction to elementary statistics with emphasis on application using the computer. Topics include description and representation of sample data, probability, theoretical distributions, sampling, estimating, correlation, regression, and computer statistical packages. Three hours rec. a week. Pr.: CMST 221 or 240.

**CMST 335. Small Business Software Development.** (2) I. Using Microsoft BASIC as the vehicle language, this course introduces the student to business programming applications in the PC hardware environment. two hour rec. a week. Pr.: CMST 100, 103, and 225.

**CMST 340. Computer Science Technology Seminar.** (2) I, II. This course is designed to simulate the real-life development of a computer software project by covering the theoretical and practical applications of the software engineering process. Students will participate in group activities to produce a series of documents describing the top-down design of the software project. Two hour rec. a week. Pr.: CMST 100, 103, and 221 or 240.

**CMST 341. Advanced C++ Programming.** (3) II. This class is designed to expose the experienced C programmer to the object oriented programming (OOP) methodology using C++. Students will first learn the use of data abstraction to describe objects. These objects will be implemented using the C++ environment. Students will create several programs to demonstrate classes, operator overloading, conversion, inheritance, and polymorphism. Students will apply the OOP methods to develop a Microsoft Windows application. Each student will submit an individual C++ project at the end of the semester. Two hour rec. and one hour lab a week. Pr.: CMST 245.

**CMST 345. Networking III.** (3) I. This course will cover the topics of wide area networks, metropolitan area networks and their topologies. In addition packet switched, private branch exchange, integrated services data networks, and fiber distributed data interface will be covered. Three hours rec. a week. Pr.: CMST 315.

**CMST 350. UNIX Administration.** (3) II. The course will cover the essentials for becoming a UNIX administrator. Subjects included will be bring up a UNIX system, an in-depth look at the file system, handling troubles, security, modems, networking, and shell programming. Two hours rec. and one hour lab a week. Pr.: CMST 100 and 245.

**CMST 400. Problems in CMST.** (Var.) I, II, S. Opportunity for advanced study and practical experience with specific problems selected jointly by the instructor and student in the field of computer science technology. Pr.: Consent of instructor.

## Computer information systems technology courses

### Undergraduate credit

**CMIS 100. Introduction to MS-DOS.** (2) I, II, S. Provides fundamental concepts of the standard PC environment operating system (MS-DOS). Students will use the microcomputers in class to apply the operating system commands covered by the instructor. Lab assignments will be required in class. Eight-week course requiring four hours rec. a week in the lab.

**CMIS 101. Computer Fundamentals.** (2) I, II. This course is designed as an introduction for students seeking to develop a broad, basic familiarity with the use of the microcomputer. Two hours rec. a week.

**CMIS 105. Introduction to PC Software.** (2) I, II, S. Students will learn to use an integrated software package consisting of a word processor, spreadsheet with graphing capabilities, and a database manager. Fundamental operating system commands will be covered utilizing MS-DOS.

**CMIS 110. Word Processing.** (2) I, II. A hands-on course introducing fundamental concepts and applications of word processing. Covers editing and formatting commands as well as sophisticated commands of the word processor. The word processing commands covered in class will be applied on the classroom microcomputers. Eight-week course requiring four hours rec. a week in the lab.

**CMIS 120. Spreadsheets.** (2) I, II. Introduces fundamental concepts and applications of a spreadsheet for a business environment. The class will progress to more sophisticated applications of the spreadsheet during the course of the class. Students will apply the concepts covered to the microcomputers in the classroom. Eight-week course requiring four hours rec. a week in the lab.

**CMIS 130. Database Management.** (2) I, II. Introduces fundamental concepts of a database management system application. Students will begin with the elementary database commands and will progress to more sophisticated database applications. Students will be required to apply the concepts covered in class to project assignments on the microcomputer. Eight-week course requiring four hours rec. a week in the lab.

**CMIS 145. Advanced MS-DOS and Windows.** (2) I, II. Students will learn to configure IBM-compatible computers. Management of basic memory, expanded memory, and extended memory will be covered. Students will create and use batch files to automate processes. Students will learn to install and configure Microsoft Windows. Students will learn to install and use Windows' applications and utilities. The class will be taught in a computer laboratory environment. One hour rec. and one hour lab a week. Pr.: CMIS 100.

**CMIS 150. Advanced Spreadsheets** (2) I, II. This course will cover advanced topics in the use of spreadsheets. Major topics will include macro programming, @ functions, spreadsheet automation, linking spreadsheets, managing data, and importing/exporting data from the spreadsheet. Lecture will be in the computer lab to allow the student a hands-on experience. Students will be required to perform homework assignments outside of class time. One hour rec. and one hour lab a week. Pr.: CMIS 120.

**CMIS 200. Introduction to Desktop Publishing.** (2) I, II. Students will learn to use PageMaker 4.0, a page composition/layout software package, in the hands-on environment of a PC lab. Students will perform production tasks and will learn the use of a scanner and basic design and production tips. Eight-week course requiring four hours rec a week in the lab. Pr.: CMIS 100 and 110.

**CMIS 210. Advanced Desktop Publishing.** (2) I, II. Students are expected to have experience in the use of PageMaker. The course will cover proper design and layout of commonly produced publications. These layout techniques will be used by the student throughout the class to produce individual assignments. The class will primarily be taught in a computer laboratory. Each student will have access to a computer for their assignments. Each student will produce and present an individual project at the end of the class. Some homework and computer work will be required outside the class period. One hour rec. and one hour lab a week. Pr.: CMIS 200.

**CMIS 245. Design, Systems, and Software.** (3) I, II. This course will introduce the student to the fundamental concepts of algorithmic design and operating systems. The student will also be provided a brief introduction to a commercially available word processor, spreadsheet, and database software package. Three hours rec. a week. Pr.: MATH 100 and 151.

**CMIS 250. Introduction to UNIX.** (2) I, II. This course is designed to provide the student with the basic commands and knowledge to use the UNIX operating system. The student will learn proper sign-on and off procedures as well as how to manipulate files within the UNIX directory structure. The class is conducted in the hands-on environment of the computer lab. Eight-week course requiring four hours rec. a week in the lab. Pr.: Consent of instructor.

**CMIS 270. Integrated Office Systems.** (2) I, II. This course will utilize the case approach to teach the principles of software and hardware evaluation and selection, integration between applications, and implementation of effective office applications, software evaluation, hardware evaluation, concepts of telecommunications technologies, and developing procedural documentation. Employee supervision and training will also be covered. Two hours rec. a week. Pr.: CMIS 110, 150, and 130.

## Electronic engineering technology courses

### Undergraduate credit

**ELET 100. Basic Electricity.** (3) I. A survey course designed to provide the non-electronics major with an overview of basic direct current and alternating current circuits. Laboratory exercises reinforce circuit theory and provide skills in the use of common electrical instruments. Two hours rec. and three hours lab a week. Conc.: MATH 125.

**ELET 101. Direct Current Circuits.** (4) I. A beginning course in basic circuit theory. Concepts of voltage, current, resistance, and inductance are applied to various electric circuits to analyze their behavior. Laboratory exercises emphasize the use of basic measuring instruments, as well as the characteristics of passive circuits and components. Three hours rec. and three hours lab a week. Conc.: MATH 100.

**ELET 102. Alternating Current Circuits.** (4) II. A study of alternating current circuits. Includes an analysis of the sine wave, polar and rectangular algebra, inductive and capacitive reactance, impedance networks, power factor correction, resonant circuits, and transformer theory. Also includes an introduction to three phase power distribution. Laboratory exercises reinforce key concepts. Two hours rec. and six hours lab a week. Pr.: ELET 101. Conc.: MATH 151.

**ELET 104. Direct Current Circuits Review.** (1) II. Provides a coverage of DC circuits. Includes a review of current and voltage concepts, resistance, power, series and parallel circuit techniques, mesh and nodal analysis, delta-wye, Thevenin's and Norton's Theorems, capacitance, and inductance. One hour rec. a week. Pr.: ELET 100.

**ELET 110. Semiconductor Electronics.** (4) II. A survey of the family of active electronic devices. Analysis includes both graphic and mathematical models. Laboratory periods are devoted to the measurement of device characteristics in basic circuit configurations. Two hours rec. and six hours lab a week. Pr.: ELET 101.

**ELET 130. Fundamentals of Motors and Controls.** (2) I. Includes an introduction to basic electrical theory, series and parallel circuits, Fundamentals of AC, transformers, capacitors, and inductors. Also provides a coverage of basic electric motor theorems, single-phase and three-phase motors, DC motors, motor controls, electrical symbols, and basic troubleshooting. Two hours rec. a week.

**ELET 210. Linear Circuit Design.** (5) I. The application of electron devices to amplifiers. Emphasis is placed on analysis and design of RC-coupled, transformer-coupled, and direct-coupled amplifiers. Laboratory exercises emphasize principles of circuit design and analysis. Three hours rec. and six hours lab a week. Pr.: ELET 102 and 110.

**ELET 220. RF Communications Systems.** (4) II. A survey of electronic communication techniques and systems including amplitude modulation, frequency modulation, single-side band, and pulse modulation techniques. Transmission line, antenna theory, and the effects of noise are also included. Laboratory work involves design and measurement along with field trips to representative sites. Three hours rec. and three hours lab a week. Pr.: ELET 210 and 260.

**ELET 221. Communications Circuits I.** (4) I. A study of transmission lines, antennas, and the propagation of electromagnetic radio frequency waves. Laboratory work involves the design, construction, and testing of an antenna for the FM broadcast band. Other laboratory work is devoted to matching methods for transmission lines and alignment and testing procedures for typical transmitters and receivers. Three hours rec. and three hours lab a week. Pr.: ELET 102 and 110.

**ELET 223. Communications Circuits II.** (4) II. A study of RF circuit design, including resonant circuits, filter networks, matching networks, and transistor radio frequency amplifier design using both "Y" and "S" parameters. Laboratory work concentrates on the practical applications of design theory and the use of modern test equipment in the measurement, analysis, and optimization of circuits. Two hours rec. and six hours lab a week. Pr.: ELET 221.

**ELET 260. Electronic Measurements.** (4) I. A study of theory and operation of basic electronic instruments. Includes DC and AC ammeters, voltmeters, impedance bridges, attenuators, and filters. Also includes a study of amplifiers as related to sensitive AC electronic voltmeters, sensitive DC electronic voltmeters, and oscilloscopes. Laboratory exercises provide experience in the selection of proper equipment for making measurements in electrical and electronic systems as well as interpretation of these measurements. Two hours rec. and six hours lab a week. Pr.: ELET 102 and 110.

**ELET 290. Electronic Seminar I.** (1) I. An industry-related course in which students design an electronic circuit to a set of specifications. Includes techniques of electronic chassis construction and printed circuit board techniques. Three hours lab a week. Pr.: ELET 102 and 110.

**ELET 291. Electronics Seminar II.** (1) II. The report developed for ELET 290 Electronic Seminar I is used by the student to develop the electronic hardware to a finished model. The model is tested to the original specifications. Three hours lab a week. Pr.: ELET 290.

**ELET 292. Problems in ELET.** (Var.) I, II, S. A course in which outside study is performed in a specific area selected by the student under the supervision of the assigned faculty member. Consent of instructor.

**ELET 310. Industrial Electronics.** (3) II. The operational characteristics and design considerations relating to the use of power switching transistors, thyristers, and V-channel field effect devices in typical industrial applications. Includes uses of analog and digital transducers along with the applications of optoelectronics devices, sensors and detectors. Pr.: ELET 210.

**ELET 330. Electric Motors and Controls.** (4) I. A study of DC generators and DC motors. DC motors include series, shunt, compound, permanent-magnet, brushless, and stepper motors. AC motors include split-phase, capacitor start, permanent split capacitor, two-value capacitor, shaded-pole, reluctance, hysteresis, repulsion, repulsion-start, repulsion-induction, inductor, consequent pole and polyphase. Motor control fundamentals including variable frequency drives, PLC controllers, relay logic, and motor starter circuits. Field trips to industrial sites are included. Pr.: ELET 101 and 102.

**ELET 399. Industrial Topics in Electronics.** (Var. 1-6) I, II, S. Selected topics relating to industrial applications of electronic technology. Some fundamentals of electricity and electronics along with specific topics tailored to the requirements of the audience. The course is presented in a seminar setting. Pr.: Consent of instructor.

**ELET 400. Advanced Network Analysis.** (3) I. A study of various advanced network topics such as: Fourier series, Laplace transforms, signal flow graphs, feedback theory, responses of networks to various types of input signals, matching and attenuating networks, and filters. Computer programs such as PSpice, Mathcad, and Touchstone are used to predict the responses of networks. Pr.: ELET 210 and MATH 214.

**ELET 420. Electronics Communications Circuits.** (5) II. A study of design techniques used at radio frequencies for circuits, matching networks, filters, and amplifiers. Included are the characteristics of components at these frequencies and the modeling of transistors using scattering parameters. The characteristics of microstrip lines are introduced. Circuit performance is predicted using the Smith chart and the Touchstone program, and measured using network analyzer. Pr.: ELET 220.

**ELET 590. Electronic Design Laboratory.** (2) II. Applications of the principles of the design process in executing design projects. Project will be developed by the instructor. Four hours of lab a week. Pr.: ELET 330, 310, and 400.

## Environmental engineering technology courses

### Undergraduate credit

**EVET 230. Environmental Chemistry and Toxicology.** (2) Principles of environmental chemistry, pollution, and toxicology. The effect of chemicals in the environment will be presented, discussed and demonstrated in the microbiology laboratory. One hour lec., two hours lab per week. Pr.: CHM 230.

**EVET 250. Environmental Analysis.** (2) Chemical analysis using instrumental methods. Techniques of instrumental analysis will be applied to environmental samples using EPA methods for analysis of water and wastes. One hour lec., two hours lab per week. Pr.: CHM 230.

**EVET 260. Environmental Sample Collection.** (2) Demonstration and practice with environmental sampling techniques. Standard collection methods for soil, air, water, and waste will be reviewed for use in the field and in industry. Special emphasis will be placed on methods of documentation and location, quality assurance, sample handling and preservation, and safe operation of equipment. Four hours lab per week. Pr.: EVET 230.

**EVET 270. Hazardous Waste Management.** (2) Overview of hazardous waste issues. Topics include origins (generation) of hazardous waste, safe methods of handling, disposal and tracking, hazardous waste regulation, and waste minimization. Two hours rec. per week. Pr.: EVET 230.

## Industrial engineering technology courses

### Undergraduate credit

**IET 261. Internship.** (2) I, II, S. The student shall engage in an appropriate industrial activity and prepare a written report summarizing the internship job activities. Two hours rec. a week. Pr.: ENGL 100.

**IET 263. System Analysis and Quality Control.** (3) II. An introductory course in system analysis and statistical quality control, including work in the areas of control charts, control charts for attributes, acceptance sampling plan systems, and methods for determining necessary requirements for specific levels of finished product quality. Three hours rec. a week. Pr.: MATH 100.

**IET 264. Electric Power and Devices.** (3) I, II. An approach to technical understanding of the concepts and uses of alternating current power in industry. Strong alternating current theory with emphasis on motor speed controls, phase shifts, control systems, simpler forms of logic switching circuits, process systems with self-check, and servo loop principles. Various forms of transducers are examined. One hour rec. and six hours lab a week. Pr.: ELET 100 and MATH 151.

**IET 265. Top Quality Management for Technology.** (3) This course addresses the commitment of management and the organization as a whole to the cultural changes necessary to implement quality improvements throughout the organization. Topics include quality organization, Just in Time inventory management, integration of functional areas, team building, management principles, quality costs, and other associated interactive facets of Total Quality Management. The main concern is to provide the student with a working knowledge of conventional TQM tools. Three hours rec. a week.

**IET 293. Problems in IET.** (Var.) I, II, S. Opportunity for advanced study and practical experience with specific problems of the student's choice in the field of industrial engineering technology. Pr.: Consent of instructor.

## Mechanical engineering technology courses

### Undergraduate credit

**MET 111. Technical Drafting.** (2) I, II. Lettering, free-hand sketching, and use of drafting equipment. Theory and applications of orthographic projection and pictorial drawings. Standards for symbols, section views, and dimensioning included. The student is also introduced to the CAD system. Six hours lab a week.

**MET 115. Descriptive Geometry.** (1) I, II. Orthographic solution involving the point, line and plane projections, intersections as well as surface development of solids, bearings, slope, true length, and true size using descriptive geometry. Three hours lab a week. Conc.: MET 111.

**MET 117. Mechanical Detailing.** (2) II. Preparation of shop drawings for manufacturing, fabrication, or assembly. Specifications of size, shape, material, and manufacture are also studied. CAD is used in conjunction with this course. Six hours lab a week. Pr.: MET 111.

**MET 121. Manufacturing Methods I.** (2) I. Study and practice in gas, arc, TIG welding, spot weld, weld testing, and cost estimation. Introduction to welding metallurgy and special welding processes. One hour rec. and three hours lab a week.

**MET 123. Manufacturing Methods II.** (3) II. Recitation and laboratory practice in basic machine shop operations on lathes, milling machines, and drill presses. Use of hand tools, measuring tools, metal cutting machines, and grinders are studied, along with CNC machine processes and observation of foundry. One hour rec. and six hours lab a week.

**MET 125. Computer-Numerical-Controlled Machine Processes.** (2) I, II. This course is designed to give students exposure to basic CNC programming and machining operations. There are no prerequisites to this course although a background in fundamental metal machining processes as well as algebra and right-angle trigonometry would be helpful. Six hours lab a week.

**MET 200. Geometric Dimensioning and Tolerancing.** (1) I. This course will introduce the fundamental concepts of geometric dimensioning and tolerancing as interpreted in the American National Standards Institute document Dimensioning and Tolerancing, ANSI Y14.5M1982. One hour rec. a week. Pr.: Consent of instructor.

**MET 210. Computer-Aided Drafting.** (2) I, II. Applications and understanding of microcomputers in technical drafting and design are studied. Topics include generative graphics, hardware and software terminology, point plotting and line drafting, graphics, programming, geometric figures, dimensioning and annotating, and finished drawings. Six hours lab a week. Pr.: Knowledge of drafting.

**MET 212. Introduction to Computer-Aided Drafting.** (1) I, II. This course introduces the use of computers as an aid to solving technical drafting and design problems. Topics covered include generative graphics, hardware and software, point plotting and line drawing, graphics programming, equation programmed figures, dimensioning and annotations, and the production of finished drawings. Three hours lab a week. Pr.: CMST 101 and MET 111.

**MET 214. Computer Aided Solid Modeling.** (1) I, II. This course is designed to introduce the modeling of real-world 3-D objects, rather than merely a collection of lines, arcs, and curves. Activities include developing 3-D objects containing surfaces and edges. Uses micro-based technology. Three hours lab a week. Pr.: Consent of instructor.

**MET 230. Automated Manufacturing Systems I.** (3) I. A general survey of the various components and operations in an automated manufacturing system including material handling, robotics, tooling, inspection and quality control, CAD, CNC, and other production processes. Two hours rec. and three hours lab a week. Pr.: MET 123, 212, and ELET 100.

**MET 231. Physical Materials and Metallurgy.** (3) II. A broad view of materials used in industry, including structures of materials, how they react to stress and temperature, how the polyphase structures form, and how they are controlled to produce optimum properties. Students will examine through study and laboratory experimentation ferrous and nonferrous metals, polymers, composites, and ceramics. Two hours rec. and three hours lab a week. Pr. or conc.: MATH 100.

**MET 242. Elements of Mechanisms.** (3) I. Fundamental motion concepts of displacement, velocity, and acceleration are studied, as well as analytical and graphical analysis and synthesis of linkages, gear trains, cams, pulleys, and combinations of these elements. Three hours rec. a week. Pr.: PHYS 113 and MET 111.

**MET 252. Fluid Mechanics.** (3) I. Fundamental concepts of fluid mechanics. Study of buoyancy, energy equation, viscosity, and flow measurement. Selected applications of fluid mechanics to civil and mechanical fields. Basic language programming exercises are included in this course. Two hours rec. and three hours lab a week. Pr.: PHYS 113, CMST 101.

**MET 260. Design Technology I.** (2) I. A study of the design process using handbooks and industrial catalogs to select components. One hour rec. and three hours lab a week. Pr. or conc.: MET 242.

**MET 271. Thermodynamics I.** (2) I. This course emphasizes thermodynamic laws and equations and the use of tables and charts for properties of important fluids. Applications to systems used for producing, transforming, and applying heat and mechanical energy are also studied. Two hours rec. a week. Pr.: MATH 100.

**MET 282. Industrial Instrumentation and Controls.** (3) II. An introduction to process control systems for industrial applications. Course topics include concepts and terminology, first- and second-order systems, measurement of motion, gauges and transducers, signal processing, and measurement of properties. Two hours rec. and three hours lab a week. Pr.: ELET 100 and PHYS 100.

**MET 299. Problems in MET.** (Var.) I, II. Opportunity for advanced study and practical experience with specific problems of the students choice in the field of mechanical engineering technology. Pr.: Consent of instructor.

**MET 331. Mechanical Testing Laboratory.** (1) II. Principles of mechanical testing including instrumentation and measurement in the areas of loads, stresses, deformations, heat flow, and other qualities. Three hours lab a week. Pr.: CET 311.

**MET 333. Advanced Materials Science.** (2) I. A continuation of the study of metal and non-metal materials. Emphasis on properties, manufacturing techniques, and application of materials including plastics, ceramics, composites, electrical and optical materials. Laboratory experiments illustrating the modern concepts in testing of materials with emphasis on design and processing considerations for quality products. Pr.: CHEM 111, MET 131.

**MET 344. Dynamics of Machines.** (2) I. Velocities, accelerations, and forces in existing mechanisms; application to design of mechanisms to produce motions. The use of computer in analysis and solution is included. Pr.: MET 242.

**MET 353. Fluid Mechanics II.** (2) I. Fluid properties, compressible flow, analysis of power conveyance in hydraulic and pneumatic systems. Investigation of relationships between thermal and fluid power. Pr.: MET 252.

**MET 361. Design Technology II.** (4) II. Continued study of design process including investigation of theories of failure, stress analysis, stress concentration, deflections, materials, and costs relating to machine design. Two hours rec. and six hours lab a week. Pr.: CET 311 and MET 260.

**MET 364. Machine Design.** (2) II. Covers design of machine elements for structural integrity, reliability, and economy. Problems are assigned dealing with applications of advanced strength of materials to machine design as it relates to extensive design projects. Pr.: MET 361.

**MET 381. Automated Manufacturing Systems II.** (3) II. Provides the capstone for the MET automated manufacturing option. Covers systems of manufacturing operations including facilities, supplies, materials, procedures, and control. Topics include design, programming, and feedback for manufacturing, computer-integrated manufacturing, production set-up, automated work cell, advanced CAD/CAM, and decision issues. One hour rec. and six hours lab a week. Pr.: MET 230. Conc.: MET 282.

**MET 383. Advanced CAD/CAM.** (2) II. Continuation of computer-aided drafting and includes Advanced 3D solid modeling in the computer-aided design. This course will provide experience in linking CAD to computer-aided manufacturing (CAM) allowing to design the part using CAD, developing the CNC program using CAM, and then manufacturing the product using CNC machines under computer control. Pr.: MET 123 and 212.

**MET 460. Tool Design for Manufacturing.** (3) II. Principles and practices involved in tool drawing and design concepts necessary for the manufacture of products. Emphasis on design of jigs and fixtures, gauging devices, dies, case of operation, and methods of assembly. Production cost related to selection of parts and methods of production will be stressed. Applied laboratory exercises illustrated through specific case studies. Pr.: MET 123 and 242.

**MET 462. Senior Design Project I.** (1) I. Selection, definition, and analysis of a project supervised by faculty. Includes consideration of project parameters, trade-off studies, alternative solutions, and justification of selected solution. Completion and presentation of a written project proposal included. Pr.: MET 361 and senior standing.

**MET 464. Senior Design Project II.** (2) II. Development and implementation of project proposal submitted in MET 462. Construction, packaging, and testing of project culminating in a final senior design project report which may include full documentation and performance specifications, functional description, theoretical analysis, schematics, cost analysis, parts list, drawings, etc. Project results will be presented orally to a select committee at the end of the course. Pr.: MET 364, MET 462, and senior standing.

**MET 480. Computer Integrated Manufacturing.** (2) I. Topics include material handling, group technology, flexible manufacturing systems, concurrent engineering, implications of artificial intelligence, as well as the justification, development and implementation of CIM systems through laboratory experience. Pr.: MET 123 and 383.

**MET 490. Industrial Work Internship.** I, II, S. The student will work as an intern with business and industry in mechanical engineering technology field. A report detailing duties performed and tasks accomplished is required at the end of the internship period. Pr.: Sophomore standing and consent of section chairperson.

**MET 499. Selected Topics in MET.** (Var. 1-6) I, II, S. Group or individual study of a selected topic in mechanical engineering technology, title to be determined in advance of each time course is offered. Total credits limited to 6 credit hours, with a maximum of 3 credit hours per semester. Instruction is by lecture, laboratory, or a combination of both. Pr.: Permission of section chairperson.

# Veterinary Medicine

Ronald J. Marler, Dean  
Ronnie G. Elmore, Associate Dean  
Carolyn V. Roberts, Assistant Dean

101 Trotter Hall  
532-5660

## General Requirements

### Admission

Enrollment in the College of Veterinary Medicine is limited to well-qualified students who have completed the minimum 70 required hours of pre-professional courses (see pre-professional requirements). A student must have at least a 2.800 average over the pre-professional requirements and over the last 45 hours of undergraduate college work in order to be eligible for an interview. A grade below a C in a pre-professional requirement is not acceptable. Nonresidents must meet the same scholastic requirements 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 with the Admissions Committee. Applicants are evaluated on such items as motivation, maturity, communication skills, experience with and knowledge of animals, and experience with and knowledge of veterinary medicine. Therefore, all students interested in applying to the College of Veterinary Medicine are encouraged to have adequate animal exposure and to have work experience related to veterinary medicine to demonstrate to the admissions committee an understanding of the profession.

Selection for admission to the curriculum in veterinary medicine is based on individual merit of qualified applicants who are graduates of Kansas high schools and/or who have been residents for at least three years immediately prior to first semester enrollment of the year for which they are applying.

After Kansans are selected, nonresidents from states with which K-State has a contract to provide veterinary medical education and who are certified by their state will be selected. Since the contract status may change yearly, interested applicants should contact the assistant dean, College of Veterinary Medicine, for current information regarding contract states.

A limited number of at-large positions are available. Applicants for these positions may be considered after highly qualified Kansas residents and certified residents of contract

states are selected. In the selection of the at-large positions, priority will be given to residents/citizens of the United States.

On September 1, applications for admission to the professional curriculum may be obtained from the Office of the Assistant Dean of the College of Veterinary Medicine for consideration in the next class.

No applications are accepted after January 15.

### Pre-professional requirements

The pre-professional work may be pursued at K-State in the College of Arts and Sciences or the College of Agriculture or in other academically accredited institutions.

Listed below are required courses, with K-State course numbers listed at left.

#### Requirements

ENGL 100	Expository Writing I .....	3
ENGL 120	Expository Writing II .....	3
SPCH 105	Public Speaking IA .....	2
	or	
SPCH 106	Public Speaking I .....	3
CHM 210	Chemistry I .....	4
CHM 230	Chemistry II .....	4
CHM 350	General Organic Chemistry .....	3
CHM 351	General Organic Chemistry Laboratory .....	2
BIOCH 521	General Biochemistry .....	3
BIOCH 522	General Biochemistry Laboratory .....	2
PHYS 113	General Physics I .....	4
PHYS 114	General Physics II .....	4
BIOL 198	Principles of Biology .....	4
BIOL 510	Embryology .....	3
BIOL 511	Embryology Laboratory .....	1
BIOL 455	Microbiology (with lab) .....	4
ASI 500	Genetics .....	3
	Social sciences and/or humanities .....	12
	Electives .....	9
		<b>70</b>

All science courses (chemistry, physics, biology, and genetics) must have been taken within six years of the date of application. All pre-professional requirements must be graded.

A bachelor of science degree may be granted by the College of Agriculture or the College of Arts and Sciences upon completion of residency and academic requirements. Detailed information should be obtained from the dean's office of the appropriate college.

### Fees for veterinary medical students

See the Fees section in this catalog.

### Doctor of veterinary medicine curriculum

The curriculum in veterinary medicine was established to give Kansas residents preparation for entry into a variety of veterinary medical careers. While the professional curriculum in veterinary medicine is balanced and comprehensive with consideration given to all

species, emphasis is placed on food animal diseases.

The academic standards of the College of Veterinary Medicine govern honors, progression, probation, and dismissal. Students will be informed of their academic status by the dean's office based on information supplied by the university registrar. The scholastic record of each student will be reviewed following each period of required registration in the veterinary curriculum.

Studies must be taken as prescribed. Elective courses may be taken with permission only.

For admission to the curriculum in veterinary medicine, consult the previously listed pre-professional requirements.

Completion of the professional curriculum leads to the degree of doctor of veterinary medicine. (Hours required for graduation: pre-professional—70; professional—164; total—234.)

### First professional year

Fall semester		
AP 700	Gross Anatomy I .....	6
AP 710	Microanatomy .....	5
AP 737	Veterinary Physiology I .....	5
AP 740	Veterinary Orientation .....	1
AP 702	Nutritional Physiology and Metabolism .....	3
		<b>20</b>
Spring semester		
AP 705	Gross Anatomy II .....	6
AP 720	Veterinary Neuroscience .....	2
AP 747	Veterinary Physiology II .....	6
AP 801	Clinical Skills I .....	1
PM 705	Veterinary Immunology .....	2
PM 755	Principles of Epidemiology .....	2
CS 741	Ethics and Jurisprudence .....	1
		<b>20</b>

### Second professional year

Fall semester		
AP 770	Pharmacology .....	5
PM 712	Veterinary Bacteriology and Mycology ..	5
PM 715	Veterinary Parasitology .....	5
PM 703	General Pathology .....	5
		<b>20</b>
Spring semester		
LM 722	Veterinary Virology .....	3
LM 775	Clinical Pathology .....	3
PA 710	Systemic Pathology .....	5
PA 859	Laboratory Animal Science .....	2
CS 830	Medicine I .....	4
CS 802	Clinical Skills II .....	1
CS 840	Radiology .....	3
		<b>21</b>

### Third professional year

Fall semester		
LM 777	Laboratory Diagnosis .....	1
PA 847	Avian Diseases .....	3
CS 729	Surgery I .....	5
CS 820	Theriogenology .....	3
CS 824	Food Animal Medicine .....	4
CS 850	Medicine II .....	4
CS 895	Toxicology .....	3
		<b>23</b>

Spring semester		
LM 753	Zoonosis and Preventative Medicine .....	3

CS 730	Surgery II .....	5
CS 875	Production Medicine .....	2
CS 803	Clinical Skills III .....	1
CS 821	Companion Animal Medicine .....	4
CS 886	Clinical Nutrition .....	3

18

### Fourth professional year

#### Summer, fall, and spring semesters

33 hours required core rotations:

Small Animal Medicine  
Small Animal Surgery  
Equine Medicine and Surgery  
Agricultural Practice  
Radiology/Anesthesiology  
Necropsy-Toxicology-Public Health-MARC/Elective

Plus minimum 9 hours of mini-electives and/or rotational electives.

## Veterinary medical library

The college's library, which is a part of the Kansas State University libraries system, consists of approximately 40,000 volumes that deal with all phases of veterinary medical literature and many allied fields. It subscribes to more than 800 journals and has medical/veterinary CD-ROM data bases.

## Anatomy and Physiology

Jon D. Dunn, Head

Professors Blecha,\* Dunn,\* Erickson,\* Fedde,\* Frey,\* Quadri,\* Upson,\* and Westfall;\* Associate Professors Cash,\* Hartke,\* Musch, and Troyer;\* Assistant Professors Foster, Freeman, Kenney,\* Pickar, Ross,\* Sharp,\* and Weiss; Emeriti Professors: Klemm and Weinman; Adjunct Professor Hand.

The Department of Anatomy and Physiology presents courses in cell and systemic physiology, gross and microscopic anatomy, nutrition and metabolism, and pharmacology, and neuroscience for students enrolled in either the veterinary medicine curriculum or graduate school.

A combined anatomy and physiology course and a course in pharmacology of farm animals are offered for undergraduate and graduate students outside veterinary medicine.

Cardiopulmonary physiology, immunophysiology and neuroscience, major research themes within the department, are supported with modern research facilities and state-of-the-art research equipment.

### Anatomy and physiology courses

#### Undergraduate and graduate credit in minor field

**AP 530. Anatomy and Physiology.** (4) II. General anatomy and physiology of the domestic animals. Three hours lec. and three hours lab a week. Same as ASI 533.

**AP 531. Introduction to Pharmacology of Farm Animals.** (2) II, in even years. The study of the basic principles of pharmacology as related to the proper and safe use of drugs and chemicals by the livestock industry. Same as ASI 534. Pr.: AP 530, ASI 533 or equiv.

## Clinical Sciences

J. R. Gillespie,\* Head

Professors Anderson,\* Brightman,\* DeBowes, Elmore, Frey, Gillespie,\* Lorenz, Oehme,\* Schoneweis,\* Spire,\* and Vestweber;\* Associate Professors Beeman, Carpenter,\* Cox, Fingland, Hodgson, Layton, and Pickrell;\* Assistant Professors Brandt, Bruyette, Cowan, L. DeBowes, Fortney, Gaines, Galland,\* E. Gaughan, Hoskinson, Kraft, Leedle, Lewis, McLaughlin, McMurphy, Moore, Roush,\* Saint Jean,\* Stokka, and Yvorchuk; Emeriti: Professors Blauch, Butler, Carnahan, Edwards, Guffy, Leith, Noordsy, Railsback, and Taussig; Instructor K. Gaughan; Adjunct Professors Davenport, Richardson, Crane, Allen, and Roudebush.

The KSU-Veterinary Medical Teaching Hospital is equipped for diagnosis and treatment of animal disease and for instruction of veterinary students, house officers, and post-graduate veterinarians.

The hospital has a capacity of 82 large animal patients and 150 small animal patients. Clinical faculty accompanied by students provide clinical veterinary service to clients in the local community, clients of referring veterinarians from a six-state region, and local and regional livestock farms. In addition to caring for sick animals, they provide preventative medical services and consultation on production medicine and management.

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 on the clinical and veterinary diagnosis staffs.

The department presents courses in medicine, surgery, toxicology, obstetrics, theriogenology, and other clinical specialties to veterinary students and post-DVM trainees.

### Clinical sciences courses

#### Undergraduate credit

**CS 540. 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. Same as ASI 235. Pr.: ASI 101 or equiv., AP 530, and sophomore standing.

## Pathology and Microbiology

J. E. Smith,\* Head

Professors Bailie,\* Chengappa,\* Iandolo,\* Keeton,\* Kruckenberg,\* Leipold,\* Minocha,\* Moore,\* Ridley,\* and Smith;\* Associate Professors Brown,\* Fenwick,\* McVey,\* Mosier,\* Schoning,\* and Seedle;\* Assistant Professors Chowdhury,\* Dryden,\* Leedle,\* and Oberst;\* Emeritus: Professors Cook and Dennis; Associate Professor Burroughs.

Courses in pathology, parasitology, bacteriology, virology, immunology, public health, and clinical pathology are offered only for students enrolled in the veterinary medicine curriculum. Third- and fourth-year veterinary medical students receive practical instruction in clinical laboratory procedures and the interpretation of results of laboratory tests.

Courses in diseases of laboratory animals, wildlife, and fish are offered for non-veterinary undergraduate and graduate students.

### Pathology courses

#### Undergraduate and graduate credit in minor field

**PA 500. Topics in Comparative Pathology.** (1-3) I, II, S. Selected topics in diseases of laboratory animals, wildlife, and fish for nonveterinary students. Same as ASI 503. Pr.: BIOL 198 or equiv.

**PA 501. Diseases of Wildlife.** (3) I. Infectious and noninfectious diseases of birds, furbearing animals, zoological animals, and fish with reference to methods of prevention and control. Three hours lec. a week. Pr.: BIOL 198 or equiv.

## Veterinary Diagnostic Investigation

M. W. Vorhies, Head

Professors Kennedy,\* Phillips,\* and Vorhies; Assistant Professors Basaraba, Briggs, Nietfeld, and Veatch; Emeriti: Professors Anthony and Strafuss; Associate Professors Gray and Milleret.

The department's academic responsibilities include teaching diagnostic necropsy and laboratory procedures to fourth-year professional students and graduate students.

The department serves the livestock and companion animal industry by conducting investigational procedures to identify animal disease problems, by developing research projects related to disease pathogenesis and diagnosis.

The department's diagnostic laboratory is nationally recognized as fully accredited with capabilities in all areas of diagnostic medicine by A.A.V.L.D.

# Graduate School

Timothy R. Donoghue, Dean of the Graduate School and Vice Provost for Research  
 Elizabeth A. Unger, Associate Dean  
 Leland E. Warren, Associate Dean  
 James C. Shanteau, Interim Associate Vice Provost for Research  
 K. Bobette McGaughey, Assistant to the Dean  
 102 Fairchild Hall  
 532-6191  
 1-800-232-0133, ext. 6194 (in Kansas)

## Graduate study

Kansas State University offers 60 master's level programs and 42 doctoral level programs, offered either by departments or by interdepartmental graduate programs. Graduate programs extend the undergraduate experience into advanced areas of concentration in chosen fields of specialization.

While graduate study has major components of study in specialized course work at the advanced level, graduate students must also develop a capacity for independent research and scholarly activity to enable them to carry out original research under the direction of faculty members who are experts in the discipline. Independent research normally results in the preparation and publication of the research study as a thesis or dissertation, and the student must satisfactorily defend that research before a faculty committee appointed by the dean of the Graduate School.

In several professional disciplines, the master's degree curriculum is structured more in course work to place stronger emphasis on preparation for professional practice. While such professional programs also incorporate research methodologies in their graduate curriculum, the formal requirement of a thesis requiring independent research may be waived.

Students interested in pursuing graduate studies should consult the graduate catalog for descriptions of graduate programs and financial assistance opportunities.

## Admission

All students desiring to pursue graduate studies must first be formally admitted to the Graduate School. Students submit applications for admission directly to departments. After reviewing a student's qualifications to pursue advanced study, academic departments forward a recommendation on admission to the dean of the Graduate School for review and action.

All students admitted to the Graduate School are required to adhere to the university policies established by the graduate faculty through the Graduate Council. They are advised to familiarize themselves with these policies as early in their graduate careers as

possible. Students are also advised that departments or interdepartmental graduate programs may have additional policies particular to those programs above and beyond these university policies.

## Financial assistance

Financial assistance is available to graduate students in many disciplines to enable them to pursue an advanced degree. Such support is typically extended as fellowships, traineeships, graduate teaching assistantships, or graduate research assistantships, supported by university, state, federal, corporate, or private funding sources. Students interested in financial support are advised to contact the academic department or graduate program directly to obtain current information. Because many of these stipends are offered by March 15 for the following academic year, prospective students should make their inquiry upon first intent to pursue graduate studies.

## Graduate studies by seniors and undergraduate special students

Seniors at Kansas State University who have a minimum GPA of 3.0 on prior undergraduate work are within two semesters of receiving a bachelor's degree may take up to 9 hours for graduate credit in courses numbered in the 500, 600, and 700 sequences.

Enrollment in courses in the 800 level and above is normally restricted to students admitted to the Graduate School. In exceptional circumstances, highly qualified students may enroll in courses numbered 800 and above after obtaining permission from the instructor of the course, the head of the department offering the course, and the Graduate Dean.

Those wishing to take more than 9 semester hours may apply for admission to, and be accepted by, the Graduate School. Following the award of a bachelor's degree, courses taken for undergraduate credit may not be changed to graduate credit.

A student enrolled as an undergraduate special student may not take courses for graduate credit.

# Graduate Degrees

## Master's degrees

### Master of science

Agricultural economics  
 Agronomy  
 Anatomy and physiology  
 Animal sciences

Architectural engineering

Biochemistry

Biological and agricultural engineering

Biology

Chemical engineering

Chemistry

Civil engineering

Clinical Sciences

Clothing, textiles, and interior design

Computer and information sciences

Education

Adult, occupational, and continuing education

Educational administration

Elementary education

Secondary education

Special education

Student counseling and personnel services

Electrical and computer engineering

Entomology

Food science

Foods and nutrition

Genetics

Geology

Grain science

Horticulture

Human development and family studies

Industrial engineering

Institution management

Kinesiology

Laboratory Medicine

Mass communications

Mathematics

Mechanical engineering

Microbiology

Nuclear engineering

Operations research

Pathology

Physics

Plant pathology

Psychology

Statistics

### Master of arts

Economics

English

Geography

History

Modern languages

Political science

Sociology

Speech

### Master of accountancy

### Master of architecture

### Master of business administration

### Master of fine arts

### Master of landscape architecture

### Master of music

### Master of public administration

### Master of regional and community planning

## Doctoral degrees

### Doctor of education

Adult, occupational, and continuing education  
Curriculum and instruction  
Educational administration  
Educational psychology  
Special education  
Student counseling and personnel services

### Doctor of philosophy

Agronomy  
Animal sciences  
Biochemistry  
Biology  
Chemistry  
Computer science  
Economics  
    Agricultural  
    Arts and sciences  
Education  
    Adult, occupational, and continuing education  
    Curriculum and instruction  
    Student counseling and personnel services  
Engineering  
    Agricultural engineering  
    Chemical engineering  
    Civil engineering  
    Electrical and computer engineering  
    Industrial engineering  
    Mechanical engineering  
    Nuclear engineering  
Entomology  
Food science  
Foods and nutrition  
Genetics  
Geology (Cooperative with University of Kansas)  
Grain science  
History  
Human ecology  
Horticulture  
Mathematics  
Microbiology  
Physics  
Physiology  
Plant pathology  
Psychology  
Sociology  
Statistics  
Veterinary pathology

# Intercollegiate Athletics

Max Urick, Head and Athletic Director

Coaches Agler, Asbury, Bietau, Clark, Elliott, Rovelto, and Snyder; Assistant Coaches Campbell, Dimel, Drake, Griffith, Kramer, Lancaster, Latimore, Leavitt, Mangino, Matsakis, Medley, Miller, Romstad, B. Stoops, and M. Stoops; Sports Information Director Boyle; Sports Information Assistants Ballou and Scheibler; Video Director Burge; Trainers Dovenmuehler and Thomas; Administrative Staff Adolph, Andrews, Bonjour, Epps, Harper, Johnson, Key, McMillan, Switzer, and Van De Velde.

K-State is a member of the Big Eight Conference and through that affiliation competes with the University of Colorado, Iowa State University, the University of Kansas, the University of Nebraska, the University of Missouri, the University of Oklahoma, and Oklahoma State University.

Intercollegiate competition is open to all students and is coached by staff members who are specialists in their fields.

The men's intercollegiate program competes in football, basketball, baseball, track (indoor and outdoor), cross country, and golf. The women's program offers competition in cross country, volleyball, basketball, track (indoor and outdoor), tennis, and golf.

## Athletics courses

**ATHM 101. Varsity Baseball.** (1) I, II. Pr.: Consent of instructor.

**ATHM 102. Varsity Basketball.** (1) I, II. Pr.: Consent of instructor.

**ATHM 103. Varsity Track.** (1) I, II. Pr.: Consent of instructor.

**ATHM 104. Varsity Football.** (1) I, II. Pr.: Consent of instructor.

**ATHM 105. Varsity Golf.** (1) I, II. Pr.: Consent of instructor.

**ATHW 150. Intercollegiate Basketball.** (1) I, II. Pr.: Consent of instructor.

**ATHW 152. Intercollegiate Track.** (1) I, II. Pr.: Consent of instructor.

**ATHW 154. Intercollegiate Tennis.** (1) II. Pr.: Consent of instructor.

**ATHW 155. Intercollegiate Volleyball.** (1) I. Pr.: Consent of instructor.

**ATHW 157. Intercollegiate Golf.** (1) I, II. Pr.: Consent of instructor.

# Agricultural Experiment Station

Marc A. Johnson, Director  
George E. Ham, Associate Director  
Barbara S. Stowe, Assistant Director

113 Waters Hall  
532-6147

The Kansas Agricultural Experiment Station is supported by both federal and state funds. Annual sessions of the Kansas legislature and U.S. Congress provide funds to operate the experiment station. Grants and contracts also provide some support, as do sales of experimental crops and animals.

The KAES conducts original research to ensure a plentiful, nutritious, safe, and acceptable food supply; promote a desirable quality of life for the people of Kansas now and in the future; and preserve the natural resource base.

Research is performed both on and off campus (on state-owned and leased land), and researchers have access to laboratories and scientific equipment. Twenty-four departments in five colleges are involved. The station is also strongly allied with the Graduate School; interested graduate students are encouraged to seek research assistantships.

Off-campus research is centered at two research-extension centers, two research centers, and 11 experiment fields in various parts of the state.

Research is organized into more than 600 projects in the following scientific program areas: agricultural product development and utilization; animal systems; economic and social issues; environment and natural resources; food, nutrition, and health; and plant systems.

Results of research are published in scientific journals; in station bulletins, pamphlets, reports of progress, research papers, and reports at field days and other special events; and in popular journals and news releases to the press and radio and television stations. Requests for station publications should be sent to the Distribution Center, Umberger Hall.

**KSU Agricultural Research Center—Hays**  
Patrick I. Coyne, Head and Professor

Professors Brethour, Harvey, and Martin; Associate Professors Kofoid, Seifers, Stahlman, and Stegmeier; Assistant Professors Thompson and Vanzant.

The Fort Hays Branch Station, south of Hays in Ellis County, owns 5,635 acres, and 465 acres are leased from Fort Hays State University. Some research is cooperative with that university. Investigations are primarily related to problems specific to western Kansas, where rainfall is limited. They include beef grazing, feeding, and breeding studies; crop improvement, with special emphasis on

wheat, sorghum, pearl millet, and specialty crops; soil management; weed control; plant diseases; and insects.

**Northwest Research—Extension Center**  
Richard S. White, Head and Professor  
Reba B. White, Associate Head

Associate Professors Schwulst, and Sunderman; Assistant Professor Lamm.

The Northwest Research-Extension Center occupies 727 acres. Major areas of research are crop improvement, soil and water management, sheep production, and horticulture.

**Southwest Research—Extension Center**  
James A. Schaffer, Head and Associate Professor  
Paul Hartman, Associate Head

Professor Greene; Associate Professors Buschman, Norwood, Schlegel, and Witt; Assistant Professors Currie, Eck, Spurgeon, and Thompson.

The Southwest Research-Extension Center provides more than 1,150 acres for research. Current investigations involve irrigation research, dryland soil and crop management, crop improvement, weed control, insect and other pest control in crops and livestock, soil and fertilizer relationships, beef cattle nutrition, and management studies. Many research projects are conducted jointly between the research center and on-campus scientists.

**KSU Southeast Agricultural Research Center**

Lyle W. Lomas, Head and Associate Professor

Associate Professors Coffey, Moyer, and Sweeney; Assistant Professors Kelley and Long.

The Southeast Kansas Branch Experiment Station in Labette County operates approximately 1,100 acres. Soil studies in relation to water conservation, yield and quality of crops, weed control research, field crop investigations, beef cattle grazing investigations, and extensive forage research are being conducted at this research center.

**Experiment fields and irrigation development farms**

The Kansas Agricultural Experiment Station includes 11 experiment fields of 20 to 320 acres each. Fields, most of which are leased, are Cornbelt (Powhattan), North Central Kansas (Belleville), Irrigation (Scandia), Sandyland Irrigation and Dryland (St. John), South Central Kansas (Hutchinson), Harvey County (Hesston), East Central (Ottawa), and Kansas River Valley Irrigation (Topeka, Rossville, and Silver Lake).

Experimental work is devoted to horticultural and forest crops at three fields: Horticulture Research Center (Wichita), Pecan Experiment Field (Chetopa), and East Central Horticulture Field (DeSoto).

**Affiliated agencies**

**Kansas Water Resources Research Institute**  
Cooperating with the Water Resources Institute, University of Kansas  
Hyde S. Jacobs, Director

The Kansas Water Resources Research Institute conducts basic and applied research on water use and to train scientists in water resources. Representatives of K-State and the University of Kansas participate in institute policy making and research. Research is focused on finding the most effective ways of conserving, using, and distributing available water.

**Food and Feed Grain Institute**  
Roe Bordsdorf, Acting Director

The Food and Feed Grain Institute has these goals: to develop effective methods of milling and processing grains; to evaluate and improve the quality and nutritional properties of food grains; to find new uses for grains; and to improve the handling, transporting, storing, and domestic and international use of grains and grain food products. Institute scientists are faculty members of the Departments of Grain Science and Industry, Agricultural Economics, Agricultural Engineering, and personnel of agencies such as the U.S. Grain Marketing Research Center.

**Statistical Laboratory**  
James J. Higgins, Director

The Statistical Laboratory serves scientists associated with the Agricultural Experiment Station. Both consulting and computational services are available.

# Outreach

## Division of Continuing Education

R. F. Kruh, Vice Provost and Dean of Continuing Education

Sue Maes, Associate Director, Continuing Education, and Director, Academic Outreach

Douglas W. King, Director, Administrative Systems

Lynda Spire, Director, Conferences

William Cashin, Director, Center for Faculty Evaluation and Development

Tim Peterson, Director, Kansas Regents Network (TELENET)

Linda Teener, Director, UFM

College Court Building  
532-5566

The Division of Continuing Education brings together K-State's teaching resources with learners throughout Kansas who are unable to come to the campus. Classes and programs are provided in many communities by face-to-face instruction or by electronic means. In the latter case, the university makes use of both the Regents Network, an audio teleconferencing system, and the Regents Educational Communications Center, a video production facility. Credit and non-credit programs are offered for those seeking degrees, professional updates, or personal enrichment. For detailed information on offerings contact Academic Outreach at 532-5687 or 1-800-432-8222.

### K-State summer session

The summer session is designed to meet the needs of the following groups, among others:

Undergraduate and graduate students who wish to accelerate their programs of study and those who wish to make up courses missed during fall or spring semesters.

Teachers and other professionals who are unable to attend the university during the regular terms.

High school graduates seeking an early start on college. Regular introductory courses and special programs designed for high school students are available. These students find it valuable to establish study habits, become acquainted with the campus and faculty, and adjust to university life.

All facilities and services of the university available in the regular semesters are available in the summer, including housing, food service, counseling and testing services, Lafene Health Center, and K-State Union recreational programs.

The *Summer Session Bulletin* gives complete and detailed information about summer school. It is available in April each year. A free copy may be obtained from the Division of Continuing Education.

### Intersession

K-State conducts its intersession program during major breaks in the standard academic calendar. There are two intersessions each year: one in early January, the other in late May and early June. During intersession, 40 to 60 courses are offered, including both regular and new or experimental courses.

Many students use intersession as an opportunity to examine academic areas not scheduled in their current curricula. The faculty uses intersession as an opportunity to experiment with new ideas and formats for teaching.

Intersession courses are considered part of the regular K-State course offerings and can fulfill degree requirements. Students are encouraged to consult with their advisors to determine if a particular intersession course will meet requirements.

### Fort Riley courses

K-State works in cooperation with the Army Education Center to provide the Fort Riley community the opportunity to take university courses. Courses are scheduled at convenient times to assist military personnel and their dependents.

The courses are taught by regular K-State faculty members and allow the pursuit of associate, bachelor's, and master's degrees in several academic disciplines. Areas of study in highest demand include general social sciences, business administration, and education. K-State courses offered at Fort Riley are open to all area residents, although military personnel have priority.

K-State maintains an office at Fort Riley staffed by K-State personnel familiar with degree requirements and procedures on acceptance of transfer work. Students are encouraged to meet with these advisors to pursue their academic goals. For additional information contact the K-State coordinator at Fort Riley, (913) 784-5930.

### Regents Network (TELENET)

Many courses and educational programs offered on the K-State campus are available to the people of Kansas by means of the Regents Network (TELENET). The network is a teleconferencing system of educational centers located throughout Kansas and linked together

via telephone lines. The locations include Abilene, Arkansas City, Atchison, Belleville, Beloit, Chanute, Colby, Concordia, Dodge City, El Dorado, Emporia, Garden City, Goodland, Great Bend, Hays, Howard, Hutchinson, Independence, Kansas City, Lawrence, Liberal, Manhattan, Marysville, Newton, Norton, Oakley, Ottawa, Overland Park, Paola, Pittsburg, Pratt, Sabetha, Salina, Stockton, Topeka, Wellington, and Wichita.

A TELEbridge has been added to the Regents Network to allow additional temporary teleconferencing classrooms to be established anywhere in Kansas for university courses, in-service training, meetings, or conferences.

### Non-Traditional Study Program

The Non-Traditional Study Program is designed for undergraduate students who have encountered obstacles to traditional college attendance, helping them surmount barriers created by distance, physical handicap, employment, or family need. Staff may be able to assist returning K-State students in finding remedies for past academic deficiencies.

NTS advisors assist students in planning individual programs of study and serve as guides to faculty and media resources. The advisors help students select options such as evening or off-campus classes, correspondence study, credit by examination, audio and video courses, telecourses, TELENET courses, internships, or independent study.

Students may earn baccalaureate degrees in traditional academic areas.

### Conference Office

The Conference Office makes university facilities and resources available to individuals and organizations through the design and management of conferences, short courses, workshops, special interest programs, and non-credit programs. For further information, contact the Conference Office at 532-5575.

### Center for Faculty Evaluation and Development

The Center for Faculty Evaluation and Development was created in 1975 by a grant from the W. K. Kellogg Foundation. The center is now supported by fees received for its services. For additional information contact the Center for Faculty Evaluation and Development at 532-5970.

## UFM

UFM is a community learning center that develops and conducts informal educational opportunities that do not involve prerequisites, grades, or credits. More than 500 programs are available during the three sessions a year. Classes, symposia, forums, and unstructured learning experiences covering a range of human interests, activities, and concerns are offered.

## International Agricultural Programs

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William J. Jorns, Acting Director  
108 Waters Hall  
532-5714

Since 1956, K-State has extended its outreach mandate to include people around the world through multi-million dollar USAID funded projects in developing countries; individual faculty research, consulting, and sabbatical activities; and hundreds of educational programs for international participants.

The first major projects helped establish land-grant type agricultural universities in India and Nigeria. Recent projects have provided specialized assistance for universities and ministries of agriculture in the Philippines, Botswana, Honduras, and Pakistan. As a partner in the MidAmerica International Agriculture Consortium faculty have been involved in projects in Peru, Morocco, Liberia, Tunisia, and Kenya. Through these projects, faculty members and their families have experienced other cultures and have brought these experiences back to K-State students and the community.

The International Meat and Livestock Program and the International Grains Program have helped hundreds of international participants develop new skills and knowledge. The Food and Feed Grain Institute has provided training in more than 50 countries to help solve postharvest problems of grain storage, transportation, processing, and marketing.

## Kansas Regents Educational Communications Center

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Melvin Chastain, Director  
Bob Dole Hall  
532-7041

The Educational Communications Center houses instructional television and related telecommunications studios, and production, editing, and distribution facilities, including Ku-Band satellite uplinks, fiber optics, Low Power TV, and compressed video. The center also houses studio and control room facilities for instructional use by journalism and mass communications faculty and students, as well as offices and studios for both Cooperative Extension and TELENET.

The ECC provides electronic access to and interconnection between each of the Kansas Regents' institutions. The center not only produces and distributes university-level instructional material, but also develops course work and in-service content for public schools, as well as credit and non-credit continuing education material.

# Division of Cooperative Extension

123 Umberger Hall  
532-5820

The basic mission of extension is to deliver informal, out-of-school, noncredit educational programs that help people solve their problems. These programs are based on up-to-date research and practical applications of knowledge conducted by this and other institutions.

The Cooperative Extension Service provides an important learning bridge between the university and the people of the state. It takes scientific knowledge, principles, and practices that bear directly on the grass roots problems of Kansans. At the same time, this unique information delivery system brings back requests for new knowledge to the research staff at the university.

The Cooperative Extension Service staffs five area offices and helps maintain County Extension Offices, operated by off-campus K-State faculty members, in all 105 Kansas counties.

County extension agents, as official representatives of the United States Department of Agriculture and K-State, are responsible for making people aware of educational programs affecting agriculture, family living, youth, community development, and related areas. The agents serve as a local source of information regarding programs of many state and federal agencies, such as the Soil Conservation Service.

## Extension Agriculture, Natural Resources, and Community Development Programs

Daryl D. Buchholz, Assistant Director,  
Professor

Specialists in several departments of the Colleges of Agriculture, Engineering, and Veterinary Medicine offer direct educational and technical assistance to citizens throughout the state.

In addition, interdisciplinary programs in water quality; resource use and conservation; value-added processing and production; food, feed, and forage production; animal production and utilization; and farm business and financial management are offered.

### Extension agricultural economics

Orlan Buller, Acting Head  
Barry L. Flinchbaugh, State Leader

#### Farm management

Professors Barnaby, Buller, Fausett, Flinchbaugh, and L. Langemeier; Associate Professor Nelson; Assistant Professors M. Langemeier and McEowen; Administrator DeLano; Farm Management Association Fieldmen Allen, J. Dawson, R. Dawson, Everson, Freeze, Herod, Huschka, Manny, McCorkle, Miller, Rempe, Roddy, Rowell, Schwarzentraub, Smith, D. Stucky, T. Stucky, Tarrant, Thompson, Wahl, Wilken, Witt, Wood, and van der Hoeven; Emeriti: Professors Schlender, Thomas, and Whitehair; Associate Professors McReynolds and Parker; Assistant Professor Overlay; Farm Management Association Fieldmen Collins, Dickson, Faidley, Germann, Greene, Hackler, Hageman, Mullen, Sturdevant.

The extension educational program in farm management is divided into two areas: Kansas Farm Management Association programs and area and state farm management programs.

In the Kansas Farm Management Association program, the 24 farm management fieldmen conduct an intensive educational program with approximately 2,600 Kansas farm families in the six farm management associations.

The extension farm management program is conducted by state specialists and area 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.

#### Agricultural policy

The public affairs extension educational program provides educational information on policy issues of current interest. Problems are analyzed, alternatives and consequences examined, and the people are challenged to reach decisions.

The economic information program provides current data on factors affecting farming, business and industrial operations, labor supply and demand, and family living costs.

#### Extension marketing

Professors Barton and Erickson; Associate Professors Mintert and Tierney; Emeriti: Professor Walker.

The main projects of marketing include marketing information, agri-business, and commodity marketing activities. News releases, monthly teleconferences, publications directed to the general public, and special information

directed toward specific agricultural audiences are used to disseminate information.

### Extension economic development

Associate Professor Darling.

Extension economic development assists communities in development efforts. News releases, publications, and seminars are offered through county extension agents and area community development specialists.

### Extension local government and rural health systems

Assistant Professor Young.

The extension local government and rural health systems programs provide direct educational assistance in the areas of structure, management, finance, and policy.

### Extension agricultural engineering

Stanley J. Clark, Head  
James P. Murphy, State Leader

Professors Clark, Harner, Kuhlman, Murphy, and Powell; Associate Professors Black and Rogers; Assistant Professor Taylor; Emeriti: Professors Holmes, Jepsen, and Wendling; Associate Professor Schindler.

Extension agricultural engineering carries on an educational program dealing with application of engineering principles to agricultural concerns including examples like water management, water quality, waste management equipment, and facilities.

### Extension agronomy

Gerry Posler, Head  
David A. Whitney, State Leader

Professors Kilgore, Lamond, Posler, Regehr, Shroyer, Welch, and Whitney; Associate Professors Devlin, Eberle, Mikesell, Ohlenbusch, Hickman, and Fjell; Assistant Professors Duncan, Kok, and Peterson; Emeriti: Professors Bieberly, Bohannon, Dicken, and Edelblute.

Extension agronomy conducts a statewide educational program in agricultural crop production and natural resource conservation. The program is focused to conservation and protection of natural resources through education and technology transfer that results in improved, stable crop production efficiency. The breadth of the program is in understanding the dynamics of crops, weeds, soils, and water on crop production.

## Extension animal sciences and industry

Jack G. Riley, Head  
Larry R. Corah, State Leader

Professors Brazle, Call, Corah, Dunham, Henderson, Kuhl, Riley, Schafer, Simms, Spaeth, and Zoellner; Associate Professor Nelssen; Assistant Professors Blasi, Bolze, Boyle, Eck, Goodband, and Tokach; Extension Assistant Olson; Emeriti: Professors Adams, Francis, Good, Moyer, and Westmeyer; Assistant Professor Orwig.

Extension specialists in animal sciences and industry provide leadership for state programs in beef cattle, dairy cattle, horses, poultry, sheep, swine, meats, dairy products, and wildlife damage control.

## Extension community development programs

Assistant Professor Albright; Emeritus: Professors Frazier and Norby; Associate Professors Albright, Halazon, and Utermoeklen.

Extension community development programs help Kansans arrive at group decisions and take actions to enhance their communities as economic, social, service, and living centers. Faculty and major programs in economic development, local government, and land resources are identified in agricultural economics and agronomy programs.

### Kansas PRIDE program

Associate Specialist McAdoo.

The Kansas PRIDE Community Improvement Program is a cooperative effort between government, education, and private industry to develop an organizational and leadership structure for community-wide volunteer action. The Kansas PRIDE program is jointly administered by the Kansas State University Cooperative Extension Service and the Kansas Department of Commerce.

### Kansas DIRECT program

Associate Professor Sisk; Associate Specialists Hobson and Williams.

The Kansas DIRECT Program is a referral and information service providing a single point of contact for individuals needing information or assistance in economic, rural, or business development.

## Extension entomology

C. Michael Smith, Head  
Randall A. Higgins, State Leader

Professors Bauernfeind, Brooks, Cress, Mock, Sloderbeck, and Smith; Associate Professors Higgins and Lippert; Emeritus: Professor Gates.

Extension entomology is concerned with integrated insect management or control for Kansas citizens. Pilot pest management projects are used to introduce and validate integrated approaches to managing pest populations.

## State and extension forestry

Raymond G. Aslin, State Forester  
Thomas D. Warner, Head, Department of Horticulture, Forestry, and Recreation Resources  
John K. Strickler, Extension Forester

Professors Aslin, Loucks, Naughton, Nighswonger, Pinkerton, and Strickler; Associate Professors Lynch, and Rowland; Assistant Professors Bruckerhoff, Kunkel, and Strine; Emeritus: Gould.

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.

## Extension grain science and industry

Richard R. Hahn, Head  
Timothy J. Herrman, State Leader

Professors Curran, Pederson, and Ponte; Assistant Professor Herrman; Instructors Bequette and Pudden; Emeritus: Balding, Schoeff, and Wilcox.

This extension program assists personnel in the formula feed and allied industries in: (1) the adoption and use of the latest manufacturing techniques, safety equipment, and practices; and 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.

## Extension horticulture, forestry, and recreation resources

Thomas D. Warner, Head  
Frank D. Morrison, State Leader

Professors Leuthold, Marr, Morrison, and van der Hoeven; Assistant Professors Gast and Stevens.

Programs in extension horticulture and landscaping serve persons interested in horticultural plants, including fruits, nuts, vegetables, flowers, turf, shrubs, and ornamental and shade trees.

## Extension plant pathology

Fred W. Schwenk, Head  
Douglas J. Jardine, State Leader

Professor Schwenk; Assistant Professor Bowden; Associate Professors Jardine and Tisserat; Instructor O'Mara; Emeritus: Professor King and Willis.

Plant pathology extension specialists provides information about the occurrence and nature of plant diseases and the economic means for their control.

## Extension veterinary medicine

Associate Professor Breedon; Emeritus: Professor Caley.

Extension veterinary medicine serves all facets of companion animals and the livestock industry, including veterinarians as a source of scientific material pertaining to the most recent information on disease prevention and control and proper drug use.

# Extension Home Economics Programs

## College of Human Ecology

Katey Walker, Acting Assistant Director of Extension, Home Economics Programs

Professors Bowers, Clarke, Murray, Penner, Peterson, and Smith; Associate Professors Bradshaw, Jones, Mark, Phillips, and Walker; Assistant Professors Aramouni, Munson, Peters, Price, Wilken, and Young; Instructor Curry; Emeriti: Professors Allen, Anderson, Carlson, Ellithorpe, Neufeld, Slinkman, and Tucker; Associate Professors Appleby, Atkinson, Clonts, Howe, Johnson, Schroeder, Wells, H. B. Wiggins, and M. C. Wiggins; Assistant Professors Crist, Guthrie, Miller, and Starkey.

Educational programs designed to improve the quality of living for individuals, families, and communities are conducted through extension home economics programming. Specialists serve as faculty members in three departments (Clothing, Textiles, and Interior Design; Foods and Nutrition; and Human Development and Family Studies) within the College of Human Ecology.

Program emphases include family and consumer economics, family resource management; human development, parenting education, and family life; clothing management and textiles; nutrition, diet, and health; food quality and safety; health and wellness; value-added, home-based, and small business development; understanding public issues; public policy education; and leadership and volunteer development.

## Extension expanded food and nutrition education program

Assistant Professor Pearson.

EFNEP is a nutrition education program for limited-resource families. Paraprofessionals, under the supervision of extension home economists, conduct individual and small group lessons to help families improve dietary quality. The program is available in designated counties.

## 4-H Youth Programs

C. R. Salmon, Department Head and State 4-H Leader

Professor Apel; Associate Professors Adams, Fultz, McFarland, and Salmon; Instructor White-Huling; Associate Specialist Lindquist; Emeriti: Professors Bates, Busset, Eyestone, Johnson, Redman, and Regnier; Associate Professors Borst and Whipps; Assistant Professor Weaver.

Kansas 4-H, Kansas' largest youth education apart from the public schools, is the pre-college-level education program of the university, conducted in cooperation with County Extension Councils and the United States Department of Agriculture.

4-H specialists staff and county extension agents interpret, extend, and encourage the application of relevant and current information to concerned adults, parents, and community leaders on techniques of working with children and youth so that the children and youth will become self-directing, contributing members of society. Programs help children and youth build self-confidence, develop inquiring minds, learn to make decisions, relate to others, and develop a concern for the community and those in it.

## Extension Energy Service

Richard B. Hayter, Assistant Director

Associate Professor Hayter; Assistant Professor Nelson; Instructors Dorsey, Feenstra, Gardner, Logan, Matteson, Meyer, Nelson, Snead, and Walter.

Extension Energy Service provides educational programs for small energy consumers in Kansas. This outreach is directed toward residential, institutional, commercial, and industrial buildings through services ranging from educational programs individual assistance.

Educational programs cover such topics as energy and the environment, residential construction and retrofit for energy efficiency, maintenance techniques in commercial and institutional buildings, building environmental control systems, and system design for energy efficiency.

Engineering extension also assists in expanding the use and knowledge of renewable biomass energy sources through full-scale demonstration programs.

## Services and Facilities

### Communications

R. R. Furbee, Head

Professors Sullins and Titus; Associate Professors Atkinson, Baker, Buchanan, Daly, Frank, Jorgensen, McGlashon, Ward, and Wright; Instructor Ballou; Emeriti Professors Burke, Graham, Medlin, Thomas, Unruh, and Warner; Associate Professors Dexter and Peck; Assistant Professors Kuehn, Nelson, and Tennant.

The Department of Extension Communications supports the Cooperative Extension Service, with emphasis on the media.

Information is channeled through newspapers, magazines, publications, circulars and posters, printed annual reports, exhibits, slides, radio, and television. Editing, printing, graphics, and media services are available.

Extension communications administers and programs KKSU, an institution-owned, public radio station on the air on 580 Hz. The K-State Radio Network is both a live and audiotape service to Kansas commercial radio stations.

Television programs are presented on cooperating television stations, provided for extension agents and specialists, and delivered via satellite videoconferences.

### Extension Computer Systems Office and Weather Data Library

Roger Terry, Acting Coordinator

Professor Brandsberg; Associate Professor Terry.

The Computer Systems Office supports all extension professionals in their use of computer-based information technology to deliver educational programs. Included in CSO is the Weather Data Library, which is jointly sponsored by the Cooperative Extension Service and the Agricultural Experiment Station.

## Extension field operations

### Southwest Research-Extension Center, Garden City

James A. Schaffer, Head

Paul Hartman, Area Extension Director and Associate Head

Professor Sloderbeck; Associate Professors Dhuyvetter and Young; Assistant Professors Eck and Thompson; Emeriti: Professor Mann; Assistant Professor Blankenhagen.

### Northwest Research-Extension Center, Colby

Richard S. White, Head

Reba B. White, Area Extension Director and Associate Head

Professor R. S. White; Associate Professors Mikesell and Nelson; Assistant Professors Albright and Bolze; Instructor Curry; Emeritus: Assistant Professor Overlay.

### South Central Area Extension Office, Hutchinson

Earl L. Van Meter, Area Extension Director

Professor Van Meter; Associate Professor Phillips; Assistant Professors Blasi, Duncan, and Warmann; District Forester Atchison; Emeriti: Professor Cox; Associate Professors Albright, McReynolds, and Wiggins; Assistant Professor Orwig.

### Northeast Area Extension Office, Manhattan

Bob W. Newsome, Area Extension Director

Professor Newsome; Associate Professors Devlin and Mark; Assistant Professors Tokach and Vandever; District Forester Braton; Emeriti: Professors Figurski and Francis; Associate Professor Utermohlen; Instructors Burkhardt and Marlow.

### Southeast Area Extension Office, Chanute

Benny S. Robbins, Area Extension Director

Professors Brazle, Fausett, Kilgore, and Robbins; Associate Professors Lippert, and Rowland; Assistant Professors Bruckerhoff and Price; Emeriti: Associate Professor Appleby.

## County extension offices

There are county extension offices in each of the 105 counties.

# University Faculty

**ABBOTT, JAMES W.**, Instr., Education (1983). BA 1956, Drury Col.; MA 1959, U. of Missouri; LHD 1980, Concordia Teachers' Col.

**ABMEYER, ERWIN**, Asst. Prof. Emeritus of Horticulture (1934). BS 1933, Kansas St. U.

**ACASIO, ULYSSES A.**, Asst. Prof. of Grain Science and Industry (1978). MS 1972, U. of Philippines; PhD 1979, Kansas St. U.

**ACEVEDO, EDMUND**, Asst. Prof. of Kinesiology (1990). BS 1983, Springfield College; MS 1985, U. of Maryland; PhD 1989, U. of North Carolina at Greensboro. (\*)

**ACKLEY, R. DOUGLAS**, Asst. Controller, Cashiers and Loans (1978). BS 1971, Kansas St. U.

**ADAMCHAK, DONALD J.**, Prof. of Sociology (1978). BA 1973, Ohio U.; MA 1975, Western Kentucky U.; PhD 1978, Bowling Green St. U. (\*)

**ADAMO, SAM C.**, Asst. Prof. of History (1994). BA 1975, Lock Haven St. Col.; MA 1978, PhD 1983, U. of New Mexico.

**ADAMS, ALBERT W.**, Prof. Emeritus of Animal Sciences and Industry; Extension Specialist, Poultry Sciences (1962). BS 1951, MS 1955, Kansas St. U.; PhD 1964, S. Dakota St. U. (\*)

**ADAMS, JAMES P.**, Assoc. Prof.; Extension Specialist, 4-H Youth, (1976). BA 1969, Kansas St. U.; MS 1971, Oklahoma St. U.

**ADAMS, MARJORIE**, Assoc. Prof. Emerita of English (1954). BA 1941, Louisiana Polytechnic; MA 1948, PhD 1951, U. of Texas. (\*)

**ADAMS, WILLIAM J.**, Asst. Prof. Emeritus of Journalism and Mass Communications (1985). BA 1976, Brigham Young U.; MA 1980, Ball St. U.; PhD 1988, Indiana U. (\*)

**ADDISON, CONALL E.**, Co. Extension Agent, Stafford Co., St. John (1974). BS 1966, Tulsa U.; BS 1970, MS 1972, Oklahoma St. U.

**ADOLPH, CAROL**, Ticket Manager, Intercollegiate Athletics (1955).

**AGLER, BRIAN**, Head Women's Basketball Coach (1993). BA 1980, Wittenberg U.; MEd 1985, Pittsburg St. U.

**AHERN, MICHAEL**, Instr. of Marketing (1981). BS 1979, MBA 1981, Kansas St. U.

**AHLVERS, DAVID A.**, Prof. of General Tech. (1982), AA 1970, Cloud County Comm. Col.; BS 1972, MS 1974, Fort Hays St. U.; CPA.

**AINSWORTH, PENNE L.**, Assoc. Prof. of Accounting (1987). BS 1983, MAcc 1984, Kansas St. U.; CPA 1985, Kansas; PhD 1988, U. of Nebraska; CMA 1990. (\*)

**AKIN, JAMES N.**, Dir., Career and Employment Services (1966). BS 1960, MS 1964, Kansas St. U.

**AKINS, RICHARD GLENN**, Prof. of Chemical Engineering (1963). BS 1957, MS 1958, U. of Louisville; PhD 1962, Northwestern U. (\*)

**AKKINA, KRISHNA RAO**, Assoc. Prof. of Economics (1972). BA 1963, U. of Andhra; MA 1965, Delhi School of Economics; PhD 1972, U. of Minnesota. (\*)

**ALBERS, LEISA A.**, Research Asst. of Grain Science and Industry; USDA Grain Marketing Research Lab (1983). BS 1979, Kansas St. U.

**ALBRECHT, MARY L.**, Prof. of Horticulture; Research Horticulturist, Floricultural Crops, Agr. Exp. Sta. (1980). BS 1975, Rutgers U.; MS 1977, PhD 1980, Ohio St. U. (\*)

**ALBRIGHT, MARTHA L.**, Asst. Prof.; Extension Spec., Community Dev., Northwest (1990). BS 1971, MS 1974, U. of Nebraska.

**ALBRIGHT, KENNETH B.**, Assoc. Prof. Emeritus; Extension Specialist, Community Dev., South Central (1955). BS 1952, Kansas St. U.; MEd 1967, Colorado St. U.

**ALEXANDER, LOREN R.**, Assoc. Prof. of Modern Languages and Education (1965). BM 1951, Southwestern Col.; MA 1954, Colorado St. Col. of Educ.; MA 1965, PhD 1971, Michigan St. U. (\*)

**ALGER, JEFF**, Asst. Prof., Science Ref. Librarian (1993). MLS 1993, U. of Michigan; BS 1990, U. of Alaska.

**ALFANO, KIM**, Staff Assistant, Housing and Dining Services (1994). BS 1991, MS 1993, Texas Tech.

**ALGRIM, EUGENE E.**, Co. Extension Agent, Agr., Rush Co., LaCrosse (1976). BS 1965, MS 1972, Kansas St. U.

**ALLARD, JOHN W.**, Project Manager, Ft. Riley Program (1991). BA 1968, Colorado State U.; MEd 1979, N.W. Oklahoma State U.

**ALLEN, BARBARA J.**, Business Admin. Advisor (1993). BA 1977, Western St. Co.; MS 1990, Central Michigan U.

**ALLEN, DAVID**, Assoc. Prof. of Libraries (1987). BA 1978, MLS 1982, Brigham Young U.

**ALLEN, ERIC B.**, Farm Management Association Fieldman (1973). BS 1971, MS 1972, Kansas St. U.

**ALLEN, GERTRUDE E.**, Prof. Emerita; Extension Specialist, Foods and Nutrition (1929). BS 1923, U. of Minnesota; MS 1936, Kansas St. U.

**ALLEN, SUSAN L.**, Asst. Dir., Women's Resource Ctr. (1993). BA 1970, Wichita St. U.; MS 1975, Kansas St. U.; PhD 1980, U. of Kansas.

**ALLISON, MAX**, Asst. Prof. of Horticulture; Research Horticulturist (1985). BS 1961, U. of Illinois; MS 1976, Kansas St. U.; PhD 1984, Mississippi St. U.

**ALLOWAY, JAY E.**, Assoc. Operating Systems Specialist, Computing and Telecommunications Activities (1970). BS 1970, Kansas St. U.

**ALVAREZ, VINCENT L.**, Adjunct Assoc. Prof. of Anatomy (1991). MD 1972, Loyola U.

**AMBROSIOUS, MARGERY**, Assoc. Prof. of Political Science (1986). BA 1964, MA 1967, U. of Illinois; MA 1984, PhD 1986, U. of Nebraska. (\*)

**AMBURGEY, VICTOR**, Research Asst. of Plant Pathology (1983). BS 1983, Kansas St. U.

**AMOS, JOHN M.**, Adjunct Prof., Industrial Engineering (1987). BS 1956, MS 1957, Kansas St. U.; PhD 1960, Ohio St. U.

**AMSTEIN, DEANNA K.**, Math Specialist, Academic Assistance Ctr. (1987). BS 1962, Kansas St. U.

**AMSTEIN, WILLIAM G., JR.**, Agr. Alumni and Dev. Coord. (1986). BS 1952, MS 1957, Kansas St. U.

**ANDEREGG, MARVIN K.**, Co. Extension Agent, 4-H, Labette Co., Altamont (1969). BS 1969, Kansas St. U.

**ANDERSON, BARBARA G.**, Instr. of Arch. and Planning (1993). BArch 1983, Kansas St. U.

**ANDERSON, CATHY L.**, Assoc. Prof. of Speech (1980). BA 1974, Lyndon St. Col.; MFA 1980, U. of Connecticut. (\*)

**ANDERSON, ELINOR A.**, Prof. Emerita; Extension Specialist, Family Economics (1963). BS 1939, MS 1952, Kansas St. U.

**ANDERSON, NEIL V.**, Prof. of Food Animal Medicine, Dept. of Clinical Sciences; Clinical Research Scientist (1967). BS 1953, Mankato St. Col.; BS 1959, DVM 1961, PhD 1968, U. of Minnesota; Diplomate 1972, American Col. of Vet. Internal Medicine. (\*)

**ANDERSON, PHILLIP D.**, Instr. of Speech (1980). MA 1966, Indiana U.

**ANDERSON, RODNEY L.**, Assoc. Prof. of Electronic Engineering Tech. (1984). BSEE 1958, Kansas St. U.; Professional Engineer.

**ANDERSSON, LAURA**, Asst. Prof. of Biochemistry (1990). BS 1978, Auburn U.; PhD 1982, U. of Southern California. (\*)

**ANDREWS, GORDON**, Asst. Prof. of Pathology (1992). BS 1975, Cornell; DVM 1984, Oklahoma St. U. (\*)

**ANDREWS, MARY ANNE**, Administrative Asst., Athletics (1989). BSE 1980, MS 1984, Oklahoma St. U.

**ANDRUS, DAVID M.**, Prof. of Marketing (1983). BS 1976, Oklahoma St. U.; MA 1978, U. of Hawaii; PhD 1981, U. of Iowa. (\*)

**ANDRUS, LYNDA E.**, Asst. Prof. of Art (1983). BFA 1978, U. of Hawaii; MA 1979, MFA 1981, U. of Iowa.

**ANGLE, DENNIS R.**, Asst. Prof., Education (1979). BA 1968, MS 1974, Emporia St. U.; PhD 1984, Kansas St. U.

**ANNIS, PATTY SMITH**, Asst. Prof. of Clothing, Textiles, and Interior Design; Agr. Exp. Sta. (1958). BS 1955, Mississippi St. Col. for Women; MS 1957, U. of Tennessee. (\*)

**ANSDALL, ORA JOYE**, Assoc. Prof. Emerita of English (1946). BS 1932, Kansas St. U.; MA 1939, U. of Michigan; BLS 1946, U. of Chicago; PhD 1956, U. of Colorado. (\*)

**ANTHONY, HARRY D.**, Prof. Emeritus of Diagnostic Lab (1955). DVM 1952, MS 1957, Kansas St. U. (\*)

**APEL, J. DALE**, Prof.; Extension 4-H Youth Specialist (1962). BS 1950, Kansas St. U.; MS 1961, The American U.; PhD 1966, U. of Chicago. (\*)

**APPEL, JON A.**, Adjunct Asst. Prof. of Plant Pathology (1989). BS 1979, Fort Hays St. U.; MS 1982, Clemson U.

**APPL, FREDRIC CARL**, Prof. of Mechanical Engineering (1960). BS 1954, MS 1955, PhD 1958, Carnegie-Mellon U. (\*)

**APPLEBY, MARIELLEN J.**, Assoc. Prof. Emerita; Extension Home Economist, Southeast (1955). BS 1955, Kansas St. U.; MS 1965, U. of Maryland.

**ARAMOUNI, FADI M.**, Asst. Prof. of Foods and Nutrition; Extension Specialist, Foods and Nutrition (1989). BS 1977, MS 1980, American U. of Beirut, PhD 1986, Louisiana St. U. (\*)

**ARCHER, ALLEN W.**, Assoc. Prof. of Geology (1989). BS 1975, Oregon St. U.; AM 1979, PhD 1983, U. of Indiana. (\*)

**ARCHER, DWAIN E.**, Asst. Parking Manager (1991).

**ARCK, WILLIAM**, Dir. of Alcohol and Other Drug Education Service (1982). BS 1978, MS 1979, Kansas St. U.

**ARENS, ROBERT M.**, Asst. Prof. of Arch. (1992). BSArch 1981, MArch 1984, U. of Michigan.

**ARHANGEL'SKII, ALEXANDER V.**, Adjunct Prof. of Mathematics, D.Sci. 1966, Moscow St. U. (\*)

**ARGANBRIGHT, MAHALA M.**, Co. Extension Home Economist Emerita, McPherson Co., McPherson (1949). BS 1931, Kansas St. U.

**ARMAGOST, JAMES L.**, Assoc. Prof. of Speech (1973). BA 1963, U. of California, Santa Barbara; MA 1972, PhD 1973, U. of Washington, Seattle. (\*)

**ARMBRUST, DEAN V.**, Assoc. Prof. of Agronomy; Research Soil Scientist, Wind Erosion Research Unit, USDA, ARS (1968). BS 1960, MS 1961, PhD 1973, Kansas St. U. Adjunct appt. (\*)

**ARNOLD, JO ELLEN**, Co. Extension Agent, 4-H, Franklin Co., Ottawa (1977). BS 1977, Kansas St. U.

**ARNS, MARK J.**, Asst. Prof. of Animal Sciences and Industry; Extension Specialist, Horses (1989). BS 1983, U. of Wisconsin; MS 1986, PhD 1989, Texas A&M. (\*)

**ARTHUR, CHARLES S.**, Instr. of Accounting (1971). BS 1967, Kansas St. U.; MLL 1970, New York U.

**ASBURY, TOM**, Head Basketball Coach (1994). BS 1968, Wyoming; MS 1974, Colorado U.

**ASENETA, LYDIA**, Assoc. Prof. Emerita of Speech (1967). BS 1949, MA 1958, The National Teachers' Col. of the Philippines; MA 1968, Kansas St. U.

**ASHBURN, MADISON H.**, Prof. of Mechanical Engineering Tech. (1975). ME 1975, Kansas U.

**ASLIN, RAYMOND G.**, Prof. of Forestry; St. Forester (1975). BS 1972, MS 1975, U. of Missouri.

**ATCHISON, FRED D.**, Assoc. Prof. Emeritus; Extension Forester, Northeast (1964). BS 1954, U. of Georgia; MS 1972, Fort Hays St. U.

**ATCHISON, ROBERT L.**, Asst. Forester; District Forester, South Central (1990). BS 1981, U. of Missouri.

**ATKINSON, C. HARRY**, Assoc. Prof. Emeritus of Agronomy (1949). BS 1931, MS 1933, Pennsylvania St. U.

**ATKINSON, DAISY E.**, Assoc. Prof. Emerita of Foods and Nutrition; Extension Specialist, Human Nutrition (1959). BA 1938, MS 1953, Iowa St. U.

**ATKINSON, ERIC J.**, Assoc. Prof.; Extension Specialist, Radio and TV (1983). BS 1978, MS 1982, Kansas St. U.

**AVERELL, ROBERT B.**, Adjunct Asst. Prof. of Clothing, Textiles, and Interior Design (1981). BA 1964, U. of Pennsylvania; MS 1969, Rutgers.

**AYOTTE, ROXANNE R.**, Asst. Dir. of Alcohol and Other Drug Education Service (1992). BA 1992, Kansas St. U.

**AZADIVAR, FARHAD**, Prof. of Industrial Engineering (1990). Dir. of Advanced Manufacturing Inst. (1991). BS 1970, Tehran U., Iran; MS 1972, Asian Inst. of Tech.; PhD 1980, Purdue U. (\*)

**AZER, NAIM ZAKI**, Prof. Emeritus of Mechanical Engineering (1958). BS 1950, MS 1954, U. of Alexandria, Egypt; PhD 1959, U. of Illinois. (\*)

**BABBAR, SUNIL**, Asst. Prof. (1990). MA 1979, Meerut University, India; MBA 1983, PhD 1988, Kent St. U. (\*)

**BABCOCK, MICHAEL W.**, Prof. of Economics (1972). BS, BA 1967, Drake U.; MA 1969, PhD 1973, U. of Illinois. (\*)

**BAER, MAURICE (BUZ)**, Faculty Emeritus (1969). AT 1973, Kansas Tech. Inst.

**BAGBY, LAURIE**, Asst. Prof. of Political Science (1991). BA 1985, MA 1987, PhD 1990, Northern Illinois U. (\*)

**BAGLEY, EDGAR SIDNEY**, Prof. Emeritus of Economics (1940). BA 1935, MA 1936, U. of California at Los Angeles; PhD 1950, St. U. of Iowa. (\*)

**BAILEY, GERALD D.**, Prof., Education (1972). BS 1966, MEd 1969, EdD 1972, U. of Nebraska. (\*)

**BAILEY, GWEN**, Project Coord. of Rural Clearinghouse (1985). BS 1969, U. of Nebraska; MS 1973, PhD 1985, Kansas St. U.

**BAILIE, WAYNE E.**, Prof. Emeritus of Microbiology, Dept. of Pathology and Microbiology; Research Bacteriologist (1972). BS 1957, DVM 1957, PhD 1969, Kansas St. U.; Diplomate 1980, American Col. of Vet. Microbiologists. (\*)

**BAIRD-OLSON, P. KARREN**, Asst. Prof. of Sociology (1990). BS 1962, Montana St. U.; MA 1983, U. of Montana.

**BAKER, JON CHRIS**, Co. Extension Agent, Agr., Cowley Co., Winfield (1985). BS 1982, Kansas St. U.; MS 1985, Oklahoma St. U.

**BAKER, LYMAN A., JR.**, Instr. of English (1972). BA 1964, U. of Missouri; MA 1968, Stanford U.

**BAKER, RICHARD P.**, Assoc. Prof.; Extension Specialist, Radio and TV (1977). BS 1972, MS 1983, Kansas St. U.

**BALDING, JAMES L.**, Prof. Emeritus of Grain Science and Industry; Extension Specialist, Formula Feeds Manufacturing (1965). BS 1960, MS 1971, Kansas St. U.

**BALDWIN, WILL G.**, Manager, Microsystems and Networks, Arch. and Design (1993).

**BALK, DAVID E.**, Assoc. Prof. of Human Dev. and Family Studies (1987). BA 1965, Immaculate Conception Seminary; MA 1970, Marquette U.; PhD 1981, U. of Illinois. (\*)

**BALL, HERBERT DEAN**, Prof. Emeritus of Mechanical Engineering (1958). BS 1952, MS 1958, U. of Nebraska; PhD 1972, Kansas St. U. (\*)

**BALLOU, DAN**, Asst. Sports Information Dir. (1991). BS 1986, Emporia St. U.

**BALLOU, RUSSELL S.**, Instr.; Motion Picture Producer (1973). BS 1971, Kansas St. U.

**BANNER, CHRIS**, Asst. Instr. of Music. MM 1983, Kansas St. U. (\*)

**BANBURY, EVANS E.**, Prof. Emeritus, Colby Branch Agr. Exp. Sta. (1946). BS 1940, Kansas St. U.

**BANKS, M. KATHERINE**, Assoc. Prof. of Civil Engineering (1989). BS 1982, U. of Florida; MS 1985, U. of North Carolina; PhD 1989, Duke U. (\*)

**BAPTISTA, JOHN**, Asst. Baseball Coach (1993). BA 1976, Cal St.—Sacramento; MA 1989, St. Mary's College.

**BAPTISTE, H. PRENTICE**, Prof. of Education and Assoc. Dir. of Science Education Center (1994). BS 1961, Lamar St. College of Tech.; MAT 1966, EdD, 1968, Indiana U.

**BARBER, ARNOLD V.**, Co. Extension Agricultural Agent Emeritus, Atchison Co., Effingham (1955). BS 1934, U. of Missouri.

**BARK, LAURENCE DEAN**, Prof. Emeritus of Physics; Climatologist, Agr. Exp. Sta. (1956). BS 1948, MS 1950, U. of Chicago; PhD 1954, Rutgers U. (\*)

**BARKER, DIANE**, Asst. (Transcript) Specialist (1986). BA 1974, MA 1986, Kansas St. U.

**BARKLEY, ANDREW P.**, Assoc. Prof. of Agricultural Economics, Agr. and Public Policy (1988). BA 1984, Whitman Col., Wash.; MA 1986, PhD 1988, U. of Chicago. (\*)

**BARKLEY, L. ANN**, Co. Extension Agent, Home Economics, Shawnee Co., Topeka (1974). BS 1969, Kansas St. U.

**BARKLEY, THEODORE M.**, Prof., Division of Biology; Curator of the Herbarium; Taxonomist, Agr. Exp. Sta. (1961). BS 1955, Kansas St. U.; MS 1957, Oregon St. U.; PhD 1960, Columbia U. (\*)

**BARNABY, G. A. (ART), JR.**, Prof. of Agricultural Economics; Extension Agricultural Economist, Farm Management (1979). BS 1973, Fort Hays St. U.; MS 1976, New Mexico St. U.; PhD 1979, Texas A&M. (\*)

**BARNARD, KENNETH**, Prof. and Head of Aeronautical Studies (1977). AA 1967, Riverside City Col.; AT 1977, Kansas Tech. Inst.; BS 1977, Kansas St. U.; MS 1980, Pittsburg St. U.; Licenses: Airframe and Powerplant, All flight ratings, airplane and helicopter.

**BARNES, ALTON A., JR.**, Prof. and Head of Landscape Arch./Regional and Community Planning (1967). BLA 1965, U. of Georgia; MLA 1968, U. of Illinois. Registered Landscape Architect. (\*)

**BARNES, HELEN L.**, Co. Extension Home Economist Emerita, Linn Co., Mound City (1964). BS 1949, U. of Missouri.

**BARNES, JOHN F.**, Asst. Prof. and Section Head of Mechanical Engineering Technology (1993). BS 1977, Kansas St. U.; MS 1988, Colorado U.

**BARNES, JOHN H.**, Co. Extension Agricultural Agent Emeritus, Harvey Co., Newton (1953). BS 1951, Kansas St. U.

**BARNES, PHILIP L.**, Asst. Prof. of Agricultural Engineering (1980). BS 1974, U. of Wyoming; MS 1977, PhD 1980, Texas A&M.

**BARNES, SIDNEY M.**, Asst. Prof. of General Engineering Tech. (1981). BA 1973, MA 1973, MA 1975, Loyola U.

**BARNETT, CAMILIA**, Asst. Prof., Education (1990). BS 1975, U. of California—Berkeley; MS 1977, U. of Alabama—Birmingham; PhD 1980, Kansas State U.

**BARNETT, FRANCIS L.**, Prof. Emeritus of Agronomy (1956). BS 1952, McGill U., Canada; MS 1954, PhD 1956, Pennsylvania St. U. (\*)

**BARNETT, LARRY D.**, Co. Extension Agent, Agr.; Chautauqua Co., Sedan (1991). BS 1970, BS 1988, Kansas St. U.

**BARNETT, MARK A.**, Prof. of Psychology (1975). BA 1971, PhD 1975, Northwestern U. (\*)

**BARNHILL, CLAUDE A.**, Adjunct Asst. Prof. of Foods and Nutrition (1989). BS 1953, MD 1956, U. of North Carolina.

**BARNUM, WILLIAM D.**, Dir. of Facilities (1984). BS 1956, Kansas U.

**BARR, MICHAEL G.**, Adjunct Instr. of Dietetics (1987). BS 1978, U. of Texas at Austin; MS 1981, Southwest Texas St. U.

**BARRETT, ELIZABETH B.**, Asst. Prof. of Hotel, Restaurant, Institution Management and Dietetics (1991). BA 1971, Stephen F. Austin St. U.; MS 1983, U. of Southern Mississippi; PhD 1993, Kansas St. U.

**BARRETT, ERNIE**, Dir. of Dev. (1990). MS 1956, Kansas St. U.

**BARROWS, R. SCOTT**, Co. Extension Agent, Agr., Ness Co., Ness City (1990). BS 1984, Kansas St. U.

**BARRY, CATHERINE C.**, Assoc. Clinical Dir., Lafene Health Ctr. (1980). BS 1968, Ohio St. U.

**BARTEL, ROY A.**, Assoc. Prof. Emeritus, Education (1963). AB 1942, Bethel Col.; MSE 1949, EdD 1959, U. of Kansas.

**BARTLETT, CLARENCE E.**, Instr. Emeritus; Extension Economist, Farm Management (1947). BS 1929, U. of Nebraska.

**BARTON, DAVID G.**, Prof. of Agricultural Economics; Agricultural Economist, Business Management (1976). BS 1967, Utah St. U.; MS 1970, PhD 1974, Purdue U. (\*)

**BARTON, SUSAN**, Telecommunications Administrator, TELENET (1988). BA 1988, Kansas St. U.

**BARTON-DOBINEN, JOSEPH**, Prof. Emeritus of Management (1958). BS 1956, MA 1958, PhD 1966, U. of Nebraska. (\*)

**BARTZ, JACQUELYN**, Adjunct Instr. of Dietetics (1975). BS 1965, MS 1967, Ohio St. U.

**BARUCCHIERI, PAOLO**, Adjunct Prof. of Landscape Architecture and Interior Architecture (1991). BArch 1959, U. of Florence, Italy; MFA 1970, U. of Northern Colorado.

**BASARABA, RANDALL J.**, Asst. Prof. of Vet. Diagnosis (1991). BS 1981, DVM 1985, PhD 1991, Washington St. U. (\*)

**BASHAM, EDWIN**, Instr., Computing and Information Sciences (1976). BS 1946, U.S. Military Academy; MS 1959, Georgia Inst. of Tech.

**BASSETTE, RICHARD**, Prof. Emeritus of Animal Sciences and Industry; Dairy Foods Research Chemist, Agr. Exp. Sta. (1958). BS 1952, MS 1955, PhD 1958, U. of Maryland.

**BATES, CHARLES T.**, Prof. Emeritus; Extension Specialist, 4-H Programs (1956). BS 1951, Oklahoma A&M; MS 1960, U. of Wisconsin.

**BATES, DOUGLAS**, Chair, Access Services (1988). BS 1983, MLS 1987, Brigham Young U.

**BATES, HERBERT TEMPLETON**, Prof. Emeritus of Chemical Engineering (1958). BS 1935, Iowa St. U.; MS 1938, Virginia Poly. Inst.; PhD 1941, Iowa St. U.; Professional Engineer, 1959.

**BATES, LYNN S.**, Adjunct Prof. of Foods and Nutrition (1991). BS 1962, Heidelberg College; MS 1966, Purdue U.; PhD 1972, Kansas St. U. (\*)

**BAUERLE, CAROL A.**, Co. Extension Agent, Brown Co., Hiawatha (1979). BS 1979, Kansas St. U.

**BAUERNFEIND, ROBERT J.**, Prof. of Entomology, Extension Specialist, Entomology (1978). BS 1967, MS 1976, PhD 1978, U. of Wisconsin. (\*)

**BAUGHAN, KIRK**, Constit. Dev. Officer, KSU Foundation (1990). BA 1974, Kansas St. U.

**BAUGHER, EARL EUGENE**, Assoc. Prof. Emeritus of Agricultural Engineering (1967). BS 1958, MS 1964, Kansas St. U.

**BEATTY, DANIEL D.**, Prof. and VP Emeritus for Business Affairs (1956). AB 1947, Hope Col.; MBA 1949, U. of Michigan.

**BECHTEL, DONALD B.**, Adjunct Asst. Prof. of Biology; Research Biologist, Grain Marketing Research Cntr. (1983). BS 1971, MS 1974, Iowa St. U.; PhD 1982, Kansas St. U. (\*)

**BECK, B. TERRY**, Assoc. Prof. of Mechanical Engineering (1979). BS 1971, MS 1974, PhD 1978, Oakland U. (\*)

**BECK, GLENN H.**, VP Emeritus for Agr. (1936). BS 1936, U. of Idaho; MS 1938, Kansas St. U.; PhD 1950, Cornell U.

**BECKER-SUTTLE, CHERI**, Asst. Prof. of Hotel, Restaurant, Institution Management and Dietetics (1992). BS 1984, PhD 1992, VA Polytechnic Inst. and St. U.

**BECKMAN, JOHN H.**, Co. Ext. Agent, Agr.; Scott County, Scott City (1992). BS 1982, Panhandle St. U.

**BEEMAN, RICHARD W.**, Prof. of Entomology; USDA Grain Marketing Research Cntr. (1980). BS 1970, MS 1974, PhD 1977, U. of Wisconsin. Adjunct appt. (\*)

**BEEMAN, KEITH B.**, Assoc. Prof. of Food Animal Medicine (1977). BS 1958, DVM 1958, Kansas St. U.; Diplomate 1981, American Col. of Theriogenology.

**BEESON, MARGARET E.**, Assoc. Prof. Emerita of Modern Languages (1960). AB 1948, Wesleyan Col.; MA 1949, Emory U.; PhD 1954, U. of Texas. (\*)

**BEHNKE, KEITH C.**, Prof. of Grain Science and Industry; Feed Tech. Research Scientist, Agr. Exp. Sta. (1977). BS 1968, MS 1973, PhD 1975, Kansas St. U. (\*)

**BEJOT, DENNIS D.**, Co. Extension Dir., Douglas Co., Lawrence (1989). BS 1966, MS 1968, U. of Nebraska; PhD 1981, Iowa St. U.

**BELL, K. O.**, Adjunct Assoc. Prof. of Entomology; Entomologist II of Entomology Div., KSBA, Survey Entomologist (1977). BS 1961, MS 1965, U. of Arkansas; PhD 1971, Kansas St. U. (\*)

**BELL, WARREN E.**, Co. Extension Agent, Agr., Coffey Co., Burlington (1974). BS 1974, Kansas St. U.

**BELSHE, DANA J.**, Co. Extension Agent, Agr., Sherman Co., Goodland (1982). BS 1979, Kansas St. U.

**BEN-ARIEH, DAVID**, Assoc. Prof. of Industrial Engineering (1990). BS 1980, MS 1982, Ben-Gurion U.; PhD 1985, Purdue U. (\*)

**BEN-ITZHAK, ITZHAK**, Assoc. Prof. of Physics (1988). PhD 1986, Technion, Israel. (\*)

**BENNETT, A. G.**, Assoc. Prof. of Mathematics (1988). BS 1981, Colorado St. U.; MA 1982, PhD 1985, Princeton U. (\*)

**BENNETT, DINA**, Counseling Asst., Academic Assistance Ctr. (1993). BA 1990, Washburn U.; MA 1992, Kansas St. U.

**BENNETT, ROBERT E.**, Adjunct Asst. Prof. of Grain Science and Industry; Amer. Inst. of Baking (1978). BS 1967, MS 1969, PhD 1976, Kansas St. U.

**BENSON, DOUGLAS K.**, Assoc. Prof. of Modern Languages (1980). BA 1966, New Mexico St. U.; MA 1968, PhD 1973, U. of New Mexico. (\*)

**BENSON, JANET**, Assoc. Prof. of Anthropology (1972). BA 1964, Arizona St.; MA 1969, PhD 1974, Brandeis U. (\*)

**BENTON, SHERRY**, Psychologist, U. Counseling Services (1990). MS 1985, PhD 1991, U. of Kansas.

**BENTON, STEPHEN L.**, Prof., Education (1983). BA 1977, MA 1980, PhD 1983, U. of Nebraska. (\*)

**BEQUETTE, ROBERT**, Research Asst., Grain Science and Industry (1987). BS 1956, Montana St. Col.; MS 1957, Kansas St. U.

**BERG, MICHELL**, Adjunct Asst. Prof. of Human Dev. and Family Studies (1990). BA 1969, U. of Kansas; MS 1979, PhD 1985, Kansas St. U.

**BERGEN, LORI**, Asst. Prof. of Journalism and Mass Communications (1994). BS 1981, MS 1983, Kansas St. U.; PhD 1991, Indiana U.

**BERGEN, M. BETSY**, Assoc. Prof. of Human Dev. and Family Studies (1966). AB 1949, Ottawa U.; MS 1964, PhD 1972, Kansas St. U. (\*)

**BERKOW, DANIEL N.**, Counselor, U. Counseling Services (1993). MA 1989, U. of Georgia.

**BESTHORN, JODI L.**, Co. Extension Agent, Home Economics, Smith Co., Smith Cntr. (1980). BS 1978, Sterling Col.

**BETTON, MATTHEW T.**, Teaching Assoc. of Music (1978). BA 1938, Kansas St. U.

**BEYER, R. SCOTT**, Asst. Prof. of Animal Science, Ext. Poultry Science Spec. (1993). BS 1983, Texas A & M; MS 1988, PhD 1992, U. of Georgia.

**BHALLA, CHANDER P.**, Prof. of Physics (1966). BS 1952, BSc 1954, MS 1955, Punjab U.; PhD 1960, U. of Tennessee. (\*)

**BIBY, VIRGIL H.**, Co. Extension Agent, Agr., Butler Co., El Dorado (1966). BS 1957, Oklahoma St. U.

**BICKNELL, GENE**, Adjunct Prof. of Hotel, Restaurant, Institution Management and Dietetics (1991). MBA 1991, Pittsburg St. U.

**BIDWELL, ORVILLE W.**, Prof. Emeritus of Agronomy (1950). AB 1940, Oberlin Col.; BS 1942, PhD 1949, Ohio St. U. (\*)

**BIEBERLY, FRANK G.**, Prof. Emeritus; Section Leader and Extension Specialist, Crops and Soils (1941). BS 1938, MS 1949, Kansas St. U.

**BIEHL, FLORENCE F.**, Co. Extension Agent, Home Economics, Johnson Co., Olathe (1962). BS 1951, Kansas St. U.

**BIERE, ARLO W.**, Prof. of Agricultural Economics; Natural Resources; Regional and Community Dev., Agr. Exp. Sta. (1968). BS 1963, U. of Nebraska; MA 1967, PhD 1968, U. of California. (\*)

**BIETAU, STEVE**, Head Tennis Coach (1984). BS 1979, Doane Col.

**BILES, BERTRAM R.**, Program Dev. Officer, Research and Sponsored Programs (1972). BA 1963, PhD 1976, Kansas St. U.

**BINGHAM, ROBERT**, Prof. of General Engineering Tech. (1973). BS 1957, Northeast Missouri St. U.; MS 1965, St. Louis U.

**BINKOWSKI, DONNA**, Asst. Prof. of Modern Languages (1992). BA 1986, DePauw U.; MA 1989, PhD 1992, U. of Illinois.

**BISSEY, CHARLES R.**, Prof. of Architectural Engineering and Construction Science (1969). BS 1957, Colorado St. U.; MArch 1961, Kansas St. U.; Professional Engineer, 1979. (\*)

**BISWELL, CLIFFORD R.**, Prof. Emeritus; Extension Forester, Fire Control Leader (1957). BS 1954, MS 1965, U. of Missouri.

**BLACK, MICHELLE J.**, Hall Dir., Housing and Dining Services (1993). BS 1988, BFA 1989, MS 1993, U. of North Dakota.

**BLACK, RICHARD D.**, Assoc. Prof. of Agricultural Engineering, Extension Irrigation Engineer (1982). BS 1952, MS 1953, PhD 1961, U. of Illinois; Professional Engineer, Illinois, 1957.

**BLACKMAN, MERRILL E.**, Assoc. Prof. Emeritus of Architectural Engineering and Construction Science (1965). BS 1949, Kansas St. U.; Registered Architect, 1955; Professional Engineer, 1949.

**BLACKWILL, CORA A.**, Co. Extension Home Economist Emerita, Ottawa Co., Minneapolis (1948). BS 1931, Fort Hays St. U.

**BLAIR, JOHN M.**, Asst. Prof. of Biology; Soil Ecologist Agr. Exp. Sta. (1992). BS 1980, MS 1983, Kent St. U.; PhD 1987, U. of Georgia. (\*)

**BLAIR, ANDREA**, Learning Disability Specialist (1994). MEd 1987, U. of Georgia.

**BLAIR, W. LAWRENCE**, Co. Extension Agent Emeritus, Agr., Linn Co., Mound City (1960). BS 1954, Oklahoma St. U.

**BLAKESLEE, JULIE D.**, Co. Extension Agent, Home Economics, Ness Co., Ness City (1981). BS 1965, Kansas St. U.

**BLANKENHAGEN, ELMER W.**, Asst. Prof. Emeritus; Coord., Schedules and Reports (1950). BS 1948, Kansas St. U.

**BLASI, DALE A.**, Asst. Prof. of Animal Sciences and Industry, Extension Specialist, Livestock Production, South Central (1990). BS 1984, MS 1986, Colorado U.; PhD, U. of Nebraska. (\*)

**BLAUCH, BRUCE S.**, Assoc. Prof. Emeritus of Small Animal Medicine (1965). BS 1949, Pennsylvania St. U.; VMD 1956, U. of Pennsylvania; MS 1969, Kansas St. U. (\*)

**BLECHA, FRANK**, Prof. of Immunophysiology; Research Stress Physiologist (1981). BS 1971, MS 1977, U. of Idaho; PhD 1981, Washington St. U. (\*)

**BLEVINS, OLETHA L.**, Co. Extension Home Economist Emerita, Douglas Co., Lawrence (1959). BS 1939, Iowa St. U.

**BLOCKER, H. DERRICK**, Prof. of Entomology; Research Entomologist, Taxonomy of Leafhoppers and Grassland Insects, Agr. Exp. Sta. (1965). BS 1954, MS 1958, Clemson U.; PhD 1965, North Carolina St. U. (\*)

**BLOOMQUIST, LEONARD E.**, Asst. Prof. of Sociology (1989). BA 1976, Creighton U.; MS 1979, PhD 1986, U. of Wisconsin Madison. (\*)

**BLOOMQUIST, MARGARET CHRISTINE**, Instr. Emerita, Education (1967). AB 1941, Bethany Col.; MBA 1949, U. of Denver.

**BLUHM, MICHAEL D.**, Instr. of Architectural Engineering and Construction Science (1991). BS 1981, MS 1988, U. of Kansas.

**BLUME, WILLIS L.**, Co. Extension Agricultural Agent Emeritus, Haskell, Sublette (1948). BS 1942, Texas A&M.

**BOCKUS, WILLIAM W.**, Prof. of Plant Pathology; Research Cereal Crop Pathologist, Agr. Exp. Sta. (1978). BS 1972, U. of California; MA 1974, California St. U.; PhD 1978, U. of California. (\*)

**BOLLMAN, DAVID L.**, Network Admin., Libraries (1993). BS 1985, Kansas St. U.

**BOLLMAN, STEPHAN RAY**, Prof. of Human Dev. and Family Studies; Agr. Exp. Sta.; Dir. of Family Center (1966). BS 1957, MS 1963, PhD 1966, Iowa St. U. (\*)

**BOLSEN, KEITH K.**, Prof. of Animal Sciences and Industry; Beef Cattle Research Nutritionist, Agr. Exp. Sta. (1971). BS 1966, MS 1967, U. of Illinois; PhD 1971, U. of Nebraska. (\*)

**BOLSEN, NANCY F.**, Dir., Adult Student Services (1987). BS 1969, Nebraska Wesleyan U.; MS 1981, PhD 1985, Kansas St. U.

**BOLTE, L. C.**, Adjunct Assoc. Prof. of Grain Science and Industry; USDA (1971). BS 1958, Kansas St. U.

**BOLZE, RONALD P., JR.**, Asst. Prof. of Animal Sciences and Industry; Extension Specialist, Livestock Production, Northwest; BS 1976, Penn St. U.; PhD 1985, Kansas St. U.

**BOND, CANDACE M.**, Instr., Education (1984). BA 1968, Michigan St. U.; MS 1988, Kansas St. U.

**BONJOUR, MARK J.**, Dir. of Athletic Facilities (1988). BA 1975, Washburn U.

**BONSER, CURTIS S.**, Adjunct Clinical Assoc. (1984). BS 1963, Pennsylvania St. U.; DMD 1967, U. of Pennsylvania.

**BORCHERS, CAROL A.**, Staff Assistant, Education (1986). BS 1974, U. of Wisconsin–Eau Claire; MEd 1983, U. of Arizona; PhD 1990, Kansas St. U.

**BORDER, MARY E.**, Assoc. Prof. Emerita, Asst. St. Club Leader (1927). BS 1926, Ohio St. U.; MA 1938, Columbia Teachers Col.; PhD 1948, Cornell U.

**BOREL, DAVID M.**, Adjunct Clinical Assoc. of Medical Tech. (1991). BA 1967, MD 1971, U. of Kansas.

**BORGES, ROBERT B.**, Asst. Prof. in Animal Sciences and Industry (1994). PhD 1994, N.C. St. U.

**BOROVIK, ANDREW S.**, Asst. Prof. of Chemistry (1993). BS 1981, Humboldt St. U.; PhD 1986, U. North Carolina, Chapel Hill. (\*)

**BORSODORF, ROE E.**, Assoc. Dir. of Food and Feed Grains Inst.; Senior Agricultural Economist, Agricultural Economics (1984). BS 1957, MS 1971, PhD 1975, Kansas St. U.

**BORST, WILLIAM H.**, Assoc. Prof. Emeritus; Extension Specialist, 4-H Youth, Northeast (1953). BS 1950, Kansas St. U.; MS 1962, Colorado St. U.

**BOSCO, PAT J.**, Assoc. VP for Institutional Advancement/Dean of Student Life (1971). BS 1971, MS 1973, Kansas St. U.; PhD 1982, U. of Nebraska.

**BOSTWICH, DIANE J.**, Co. Extension Agent, Home Economics, Rush Co., LaCrosse (1988). BS 1987, Ft. Hays St. U.

**BOWDEN, ROBERT L.**, Asst. Prof. of Plant Pathology; Extension Specialist, Plant Pathology, (1989). BS 1978, Michigan St. U.; MS 1981, U. of Minnesota; PhD 1989, U. of Wisconsin–Madison. (\*)

**BOWER, MERRY D.**, Nonbook Cataloger, Libraries (1980). BA 1976, U. of Kansas; MLS 1980, U. of Illinois.

**BOWERS, JANE RAYMOND**, Head and Prof. of Foods and Nutrition; Agr. Exp. Sta. (1966). BS 1962, MS 1963, PhD 1967, Kansas St. U. (\*)

**BOYD, RHONDA R.**, Asst. Dir., Student Financial Assistance (1993). BS 1989, MBA 1991, Pittsburg St. U.

**BOYER, JAMES BUCHANAN**, Prof., Education (1971). BS 1956, Bethune-Cookman Col., Florida; MEd 1964, Florida A&M U.; PhD 1969, Ohio St. U. (\*)

**BOYER, JOHN E., JR.**, Assoc. Prof. of Statistics; Statistical Consultant, Agr. Exp. Sta. (1981). BS 1969, U. of Nebraska; MS 1972, PhD 1976, Michigan St. U. (\*)

**BOYER, LORA J.**, Academic Services Coord., Upward Bound Program (1989). BA 1969, Culver-Stockton Col.; MS 1974, Michigan St. U.

**BOYLE, BENJAMIN A.**, Sports Information Dir. (1989). BS 1989, U. of Nebraska–Lincoln.

**BOYLE, ELIZABETH ERNST**, Asst. Prof. of Animal Sciences and Industry; Extension Specialist, Meats (1992). BS 1980, U. of Minnesota; MS 1987, PhD 1991, Colorado St. U. (\*)

**BOZWORTH, ROBERT W.**, Co. Extension Agent Agr. Emeritus, Franklin Co., Ottawa (1960). BS 1957, MS 1971, Kansas St. U.

**BRACKHAHN, AMY**, Admissions Representative (1993). BS 1993, Kansas St. U.

**BRADLEY, FRED O.**, Prof., Education (1972). BA 1962, Colorado St. Col.; MEd 1970, PhD 1972, U. of Wyoming. (\*)

**BRADSHAW, MICHAEL H.**, Assoc. Prof. of Human Dev. and Family Studies; Extension Specialist, Health and Safety (1978). BS 1968, MS 1971, Brigham Young U.; PhD 1978, Kansas St. U.

**BRAMEL-COX, PAULA J.**, Assoc. Prof. of Agronomy; Research Sorghum Geneticist, Agr. Exp. Sta. (1985). BS 1974, MS 1980, PhD 1985, Iowa St. U. (\*)

**BRANDEN, ELSIE P.**, Co. Extension Home Economist Emerita, Finney Co., Garden City (1955). BS 1955, Kansas St. U.

**BRANDNER, LOWELL**, Prof. Emeritus (1947). AB 1937, BS 1937, Emporia St. U.; MS 1951, Kansas St. U.; PhD 1960, U. of Wisconsin. (\*)

**BRANDSBERG, GEORGE T.**, Prof.; Extension Communications Specialist, (1977). BS 1959, U. of S. Dakota; MS 1967, Iowa St. U.

**BRANDT, GARY W.**, Asst. Prof. of Equine Medicine (1969). BS 1964, DVM 1966, MS 1971, U. of Illinois; Diplomate 1984, American Col. of Theriogenology.

**BRANDT, PATRICIA D.**, Academic Counselor, Athletics (1988). BS 1978, U. of Missouri–Columbia, MEd 1984, U. of Nebraska.

**BRANDT, ROBERT T., JR.**, Assoc. Prof., Animal Sciences and Industry; Ruminant Nutrition and Beef Cattle Management (1988). BS 1978, MS 1981, U. of Missouri; PhD 1984, U. of Nebraska. (\*)

**BRATSBERG, BERNT**, Asst. Prof. of Economics (1991). Cand. Mag. 1984, U. of Bergen, Norway; MA 1987, PhD 1991, U. of California–Santa Barbara. (\*)

**BRAUN, JAMES S.**, Asst. Spec; Software Dev. Mgr (1989). BS 1985, Kansas St. U.

**BRAZLE, FRANK K.**, Prof. of Animal Sciences and Industry; Extension Specialist, Livestock Production, Southeast (1976). BS 1970, MS 1976, Kansas St. U.; PhD 1984, U. of Tennessee. (\*)

**BREDE, RICHARD M.**, Asst. Prof. of Sociology (1971). BA 1962, MS 1964, U. of Oregon; PhD 1971, U. of Illinois. (\*)

**BREEDEN, LOWELL D.**, Assoc. Prof. Emeritus of Vet. Medicine; Extension Specialist, Vet. Medicine (1971). BS, DVM, 1953, Kansas St. U.

**BREEN, LOUISE A.**, Asst. Prof. of History (1993). BA 1983, MA 1986, PhD 1993, U. of Connecticut.

**BRENT, BENNY E.**, Prof. of Animal Sciences and Industry; Animal Research Nutritionist, Agr. Exp. Sta. (1966). BS 1959, MS 1960, Kansas St. U.; PhD 1966, Michigan St. U. (\*)

**BRESTER, GARY W.**, Asst. Prof. of Agricultural Economics. PhD 1990, North Carolina St. Univ. (\*)

**BRETHOUR, JOHN R.**, Prof.; Beef Research Scientist, Fort Hays Branch Agr. Exp. Sta. (1957). BS 1955, Kansas St. U.; MS 1956, Oklahoma St. U. (\*)

**BRETZ, CONNIS M.**, Co. Extension Agent, Home Economics, Lane Co., Dighton (1973). BS 1973, Fort Hays St. U.

**BRIDGES, RONALD**, Asst. Radiation Officer (1990). BS 1969, PhD 1990, Kansas St. U.

**BRIGGS, DEBORAH J.**, Asst. Prof. of Vet. Diagnosis (1989). BS 1979, Pittsburg St. U.; MS 1983, U. of Arkansas; PhD 1989, Kansas St. U. (\*)

**BRIGHAM, LINDA C.**, Asst. Prof. of English (1991). BA 1977, Georgetown U.; MA 1987, U. of Maryland; PhD 1991, U. of Maryland. (\*)

**BRIGHTMAN, ALAN H.**, Prof. of Ophthalmology (1987). DVM 1974, Kansas St. U.; MS 1977, U. of Illinois; Diplomate 1978, American Col. of Vet. Ophthalmologists. (\*)

**BRITT, RIMA J.**, Admin. Asst., Biology (1993). BS 1964, Wayne St. U.

**BROCE, ALBERTO B.**, Prof. of Entomology; Research Entomologist, Vet. Entomology, Agr. Exp. Sta. (1979). BS 1965, MS 1967, PhD 1971, U. of Florida. (\*)

**BROCKMAN, HELEN L.**, Prof. Emerita of Clothing, Textiles, and Interior Design (1967). BA 1926, U. of Iowa. (\*)

**BRONDELL, WILLIAM JOHN**, Assoc. Prof. of English (1964). AB 1959, MA 1964, PhD 1964, U. of Missouri. (\*)

**BROOKHART, CHARLES EDWARD**, Prof. Emeritus of Education and Music (1975). BM 1949, MM 1950, PhD 1960, Geo. Peabody Col. (\*)

**BROOKS, BARBARA L.**, Unit Dietitian, Housing and Dining Services (1987). BS 1982, MS 1992, Kansas St. U.

**BROOKS, H. LEROY**, Prof. of Entomology; Extension Specialist, Insecticides (1965). BS 1960, MS 1963, U. of Arkansas; PhD 1967, Kansas St. U. (\*)

**BROOKS, KENNETH R.**, Prof. of Landscape Arch (1982). BS 1974, Colorado St. U.; MLA 1977, Utah St. U.; Registered Landscape Architect. (\*)

**BROWDER, LEWIS E.**, Adjunct Assoc. Prof. Emeritus of Plant Pathology; Research Cereal Rust Plant Pathologist, USDA SEA-AR (1958). AS 1952, Cameron St. Agric. Col.; BS 1954, MS 1956, Oklahoma St. U.; PhD 1965, Kansas St. U. (\*)

**BROWN, ALAN R.**, Assoc. Prof. of Immunology (1991). BA 1972, Kansas Wesleyan; PhD 1977, U. of Florida. (\*)

**BROWN, AMY J.**, Co. Extension Agent, Home Economics, Wilson Co., Fredonia (1985). BS 1980, MS 1985, U. of Nebraska.

**BROWN, ANNA MAE**, Co. Extension Agent, Home Economics; Crawford Co., Girard (1990). BS 1973, Kansas St. U.; MS 1976, Pittsburg St. U.

**BROWN, CRAIG E.**, Inst. of Speech (1986). BA 1982, MA 1985, Kansas St. U.

**BROWN, DAVID A.**, Asst. Prof. of Interior Arch. (1988). BIA 1984, Kansas St. U. MPD 1988, North Carolina St. U.

**BROWN, RONALD K.**, Asst. Registrar (1991). BS 1985, MS 1992, Kansas St. U.

**BRUCKERHOFF, DAVID N.**, Asst. Prof. of Forestry; District Forester, Southeast (1978). BS 1971, MS 1975, U. of Missouri.

**BRUMBELOE, JOSEPH**, Asst. Prof. of Music (1993). BM 1978, Fort Wayne U.; MM 1981, PhD 1991, Indiana U.

**BRUNKNOW, GLENN E.**, Co. Ext. Agent, Ag.; Wallace Co., Sharon Springs (1993). BS 1993, Kansas St. U.

**BRUTON, DAVID L.**, Asst. Forester; District Forester, Northeast (1992). BS 1988, U. of Missouri–Columbia.

**BRUYETTE, DAVID S.**, Asst. Prof. of Small Animal Medicine (1989). BA 1980, St. Louis U.; DVM 1984, U. of Missouri; Diplomate 1987, American Col. of Vet. Internal Medicine. (\*)

**BRZCHALSKI, BEVERLY A.**, Co. Extension Agent, Home Economics, Riley Co., Manhattan (1986). BS 1976, Kansas St. U.

**BUCHANAN, CHRISTINE L.**, Assoc. Prof., Extension Publications Editor (1982). BA 1950, Sterling Col.; MA 1974, Kansas St. U.

**BUCHHEISTER, JAMES**, Asst. Controller, KSU Foundation (1984). BS, MBA 1984, Kansas St. U.

**BUCHHOLZ, DARYL D.**, Prof. of Agronomy; Asst. Dir., Ext. Ag., Natural Resources and Community Dev. (1992). BS 1975, So. Dakota St. U.; MS 1977, Oklahoma St. U.; PhD 1980, Kansas St. U. (\*)

**BUCHWALD, DONALD L.**, Prof. of Mechanical Engineering Tech. (1966). AA 1962, Cameron St. U.; BS 1964, Oklahoma St. U.; MS 1971, Kansas St. U.

**BULK, HERBERT W.**, Co. Extension Dir., Emeritus, Shawnee Co., Topeka (1949). BS 1949, Kansas St. U.

**BULLER, ORLAN H.**, Interim Dept. Head and Prof. of Agricultural Economics; Research Agr. Econ. Farm Management; Production Economics, Agr. Exp. Sta. (1963). BS 1958, Kansas St. U.; MS 1959, PhD 1965, Michigan St. U. (\*)

**BULLOCK, ROBERT A.**, Asst. Prof. of Interior Arch. (1982). BFA 1970, MFA 1975, Michigan St. U.

**BUNCH, JOHN F.S.**, Asst. Prof. (1990). BA 1977, U. of Michigan; PhD 1989, U. of North Carolina.

**BURCHETT, LOWELL A.**, Asst. Prof. of Agronomy; Crop Scientist, Kansas Crop Improvement Association, Agr. Exp. Sta. (1965). BS 1956, Oklahoma St. U.; MS 1969, Kansas St. U.

**BURCKEL, ROBERT B.**, Prof. of Mathematics (1971). BS 1961, U. of Notre Dame; MA 1963, PhD 1968, Yale U. (\*)

**BURDEN, PAUL R.**, Asst. Dean and Prof. of Education (1980). BS 1970, MS 1973, Buffalo St. Col.; PhD 1979, Ohio St. U. (\*)

**BURGE, NORMAN D.**, Television Specialist, Athletics (1989). BS 1977, Kansas St. U.

**BURGESS, ROBERT G.**, Asst. Dir. of Housing and Dining Services (1989). BS 1983, Northern Michigan U.; MBA 1986, Northwest Missouri St. U.

**BURKE, CINDY**, Health Educator, Lafene Health Cntr. (1981). BSN 1978, U. of Virginia; MS 1981, Kansas St. U.

**BURKE, JACK M.**, Prof. Emeritus of Extension Communications (1958). BA 1953, ME 1958, N. Dakota St. U.

**BURKHARD, KENNETH**, Prof. Emeritus of Biochemistry (1950); AB 1947, Arizona St. Col.; PhD 1950, Northwestern U. (\*)

**BURKHART, PEYTON H.**, Instr. Emeritus, Area Extension Specialist, Soldier Creek Water Quality and Conservation Project (1962). BS 1949, MS 1963, Oklahoma St. U.

**BURNETT, DIANE L.**, Co. Extension Agent, Home Economics; Linn Co., Mound City (1990). BS 1973, Emporia St. U.

**BURNS, ROBERT E.**, Asst. Prof. of Planning (1989). BS 1975, U. of Nebraska–Lincoln; MRCP 1978, Kansas St. U.; PhD 1992, Michigan St. U.; Certified Planner. (\*)

**BURROUGHS, ALBERT L.**, Assoc. Prof. Emeritus of Virology; Research Virologist (1960). BS 1938, U. of Wyoming; DVM 1958, Texas A&M; MS 1941, Montana St. Col.; PhD 1946, U. of California. (\*)

**BURTIS, JOHN O.**, Assoc. Prof. of Speech (1991). BA 1977, Kansas St. U.; MA 1979, Kansas St. U.; PhD 1987, U. of Minnesota. (\*)

**BURTON, CHARLES L.**, Head and Prof. of Architectural Engineering, Construction Science (1970). BS 1963, Kansas St. U.; MS 1975, U. of Kansas; Professional Engineer, Kansas, 1970. (\*)

**BURTON, JANA J.**, Co. Ext. Agent, Home Economics, Pawnee Co., Larned (1992). BS 1992, Panhandle St. U.

**BURTON, ROBERT O.**, Assoc. Prof. of Agricultural Economics, Farm Management, Production Economics, Farm Finance (1984). BS 1969, MS 1977, Virginia Poly. Inst.; PhD 1982, Purdue U. (\*)

**BUSCH, RICHARD M.**, Asst. Prof. of Geology (1984). BA 1978, Franklin and Marshall Col.; MA 1981, Temple U.; PhD 1984, U. of Pittsburgh. (\*)

**BUSCHMAN, LAWRENT L.**, Assoc. Prof. of Entomology; Research Entomologist, Corn Insects, SW Research–Extension Cntr. (1981). BA 1964, Tabor Col.; MS 1968, Emporia St. U.; PhD 1977, U. of Florida. (\*)

**BUSSET, GLENN M.**, Prof. Emeritus; Asst. Dir., 4–H Youth Programs (1941). BS 1941, Kansas St. U.; MS 1957, Cornell U.; PhD 1965, U. of Wisconsin. (\*)

**BUSSING, CHARLES E.**, Assoc. Prof. of Geography (1964). BA 1959, Colorado St. Col.; MA 1961, U. of Colorado; PhD 1968, U. of Nebraska. (\*)

**BUSSING, SANDRA I.**, 1 Instr. of English (1974). BA 1957, U. of Colorado.

**BUSSMAN, DERINDA G.**, Co. Extension Agent, Home Economics, Barton Co., Great Bend (1971). BS 1971, Panhandle St. Col.

**BUSZEK, KEITH R.**, Asst. Prof. of Chemistry (1990). BS 1980, U. of California–Irvine; PhD 1987, U. of California–Los Angeles. (\*)

**BUTH, DENNIS K.**, Adjunct Asst. Prof. of Dietetics (1976). BS 1968, Wichita St. U.; MD 1972, U. of Kansas.

**BUTLER, ANNE**, Asst. Prof. of Education, Dir. of Women's Studies (1979). BA 1970, Eastern Kentucky University; MA 1979, PhD 1993, Kansas St. U.

**BUTLER, HUGH C.**, Prof. Emeritus of Surgery (1968). BS 1950, DVM 1954, Washington St. U.; Diplomate 1965, American Col. of Vet. Surgeons; MS 1968, Washington St. U. (\*)

**BUYLE, KENNETH R.**, Business Manager, Biology (1979). BS 1972, Monmouth Col., NJ; MS 1985, Kansas St. U.

**BUZENBERG, MILDRED E.**, Asst. Prof. Emerita of Management (1964). BA 1938, Michigan St. U.; MS 1951, Kansas St. U.

**BYARS, JACKSON A.**, Asst. Prof., Education (1969). BA 1959, Municipal U. of Omaha; MA 1964, Colorado St. Col.; PhD 1970, U. of Nebraska. (\*)

**BYRNE, DAVID R.**, Prof., Education (1984). BA 1959, Idaho St. U.; PhD 1971, U. of Utah. (\*)

**BYRNS, WILLIAM G.**, Colonel, US Air Force, Prof. of Aerospace Studies (1993). BA 1967, William Jewell Col.; MS 1978, Troy St. U.

**CABLE, TED T.**, Assoc. Prof. of Forestry (1984). BS 1974, U. of Illinois–Chicago; MS 1980, PhD 1984, Purdue U. (\*)

**CAINE, HOMER DODGE.**, Asst. Prof. Emeritus of Music (1966). BM 1940, Drake U.; MS 1957, Kansas St. U. (\*)

**CALDWELL, DEBRA A.**, Admin. Asst. to the President (1989). BS 1992, Kansas St. U.

**CALDWELL, THOMAS**, Temp. Asst. Prof. of Practice Mgmt. (1992). BS 1969, MS 1970, N. Arizona U.; PhD 1974, U. of Michigan.

**CALENTINE, MARY**, Coord. of Development (1992). BA 1992, Kansas Wesleyan U.

**CALEY, HOMER K.**, Prof. Emeritus of Vet. Medicine; St. Leader, Vet. Medicine (1965). DVM 1952, Kansas St. U.

**CALHOUN, MYRON AMMON**, Assoc. Prof. of Computing and Information Sciences (1971). AA 1961, Graceland Col.; BS 1963, U. of Kansas; MS 1964, Colorado St. U.; PhD 1967, Arizona St. U. (\*)

**CALL, CHARLES L.**, Co. Extension Agent, Brown Co., Hiawatha (1989). BS 1974, Kansas St. U.

**CALL, EDWARD P.**, Prof. of Animal Sciences and Industry; Extension Specialist, Dairy Science (1980). BS 1951, Ohio St. U.; PhD 1967, Kansas St. U.

**CALLAWAY, LAWRENCE A.**, Adjunct Clinical Assoc. of Medical technology (1988). BA 1963, MD 1967, U. of Missouri.

**CAMPBELL, DAVID**, Asst. Basketball Coach (1994). BA 1980, St. Marys College, California.

**CAMPBELL, JOSEPH K.**, Instr. of Computing and Information Sciences (1983). MS 1976, Kansas St. U.

**CAMPBELL, ROBERT E.**, Research Asst. of Animal Sciences and Industry (1989). BS 1978, U. of Connecticut; MS 1980, Ohio St. U.

**CAMPBELL, RONALD W.**, Prof. Emeritus of Horticulture; Research Horticulturist, Agr. Exp. Sta. (1946). BS 1943, MS 1946, Kansas St. U.; PhD 1955, Michigan St. U. (\*)

**CAMPBELL, TRUDY**, Asst. Prof., Education (1992). BS 1975, Greenville Co.; MS 1981, Western Illinois U.; PhD 1989, U. of Illinois.

**CANNON, BARBARA**, Instr. of Clothing, Textiles, and Interior Design (1981). BS 1971, MS 1981, Kansas St. U.

**CANTER, DEBORAH D.**, Assoc. Prof., Hotel, Restaurant, Institution Management and Dietetics (1977). BS 1972, MS 1974, PhD 1977, U. of Tennessee. (\*)

**CANTRELL, JOYCE A.**, Instr. of Human Dev. and Family Studies (1986). BS 1983, MS 1986, Kansas St. U.

**CAREY, JAMES CHARLES**, Prof. Emeritus of History (1948). BA 1937, Nebraska St. Teachers Col. (Wayne); MA 1940, PhD 1948, U. of Colorado. (\*)

**CARLSON, JEAN K.**, Prof. Emerita; Extension Specialist, Household Equipment and Management (1950). BS 1950, Kansas St. U.; MS 1965, Oklahoma St. U.

**CARLSON, LOIS O.**, Co. Extension Agent, Home Economics, Neosho Co., Erie (1964). BS 1964, Pittsburg St. U.; MS 1982, Kansas St. U.

**CARLSON, VIRGIL P.**, Co. Extension Agricultural Agent Emeritus, Ellsworth Co., Ellsworth (1957). BS 1949, MS 1966, Kansas St. U.

**CARLSON, GLENNIS**, Dir. of Administrative Services, KSU Foundation (1969).

**CARNAHAN, DAVID L.**, Assoc. Prof. Emeritus of Obstetrics and Gynecology (1961). BS 1959, DVM 1959, MS 1964, Kansas St. U.; Diplomate 1976, American Col. of Theriogenology.

**CARNES, KEVIN**, Asst. Research Prof. of Physics (1984). PhD 1984, Purdue U. (\*)

**CARPENTER, FRANK R.**, Assoc. Prof. Emeritus, Education; Assoc. Dean and Assoc. Dir. of Resident Instruction, Agr. (1961). BS 1948, MS 1951, Kansas St. U.; PhD 1967, U. of Missouri. (\*)

**CARPENTER, JAMES W.**, Assoc. Prof. of Exotic Animal Medicine (1989). DVM 1974, MS 1970, Oklahoma St. U. (\*)

**CARPENTER, JOSEPH D.**, Research Asst. of Animal Sciences and Industry (1987). BS 1987, Kansas St. U.

**CARPENTER, KENNETH H.**, Prof. of Electrical and Computer Engineering (1986). BS 1961, MS 1962, Kansas St. U.; PhD 1966, Texas Christian U. (\*)

**CARR, LINDA L.**, Co. Extension Agent, Home Economics, Montgomery Co., Independence (1963). BS 1962, MS 1978, Kansas St. U.

**CARRIKER, GORDON L.**, Asst. Prof. of Agricultural Economics (1988). BS 1981, MS 1984, U. of Nebraska; PhD 1988, Clemson U. (\*)

**CARTER, GERALD**, Dir./Univ. Architect of Facilities Planning (1992). BA 1976, Kansas St. U.

**CARTER, PHILLIP D.**, Assoc. Prof., Education (1980). BS 1962, Central Missouri St. U.; MEd 1966, Ed. Spec. 1969, PhD 1976, U. of Missouri. (\*)

**CARTER, ANN L.**, Instr., English Language Program (1986). BA 1975, Kansas St. U.; MA 1980, U. of Kansas.

**CASH, WALTER C.**, Assoc. Prof. of Anatomy (1974). DVM 1971, PhD 1982, Kansas St. U. (\*)

**CASHIN, WILLIAM E.**, Dir. of Cntr. for Faculty Evaluation and Dev. (1975). BA 1958, MA 1961, PhD 1969, Catholic U. of America. (\*)

**CAUBLE, A. ELIZABETH**, Asst. Prof. of Social Work (1993). BA 1972, U. of Colorado–Boulder; MA 1980, PhD 1988, U. of Minnesota.

**CAUL, JEAN FRANCES**, Prof. Emerita of Foods and Nutrition (1967). AB 1937, Lake Erie Col.; MA 1938, PhD 1942, Ohio St. U. (\*)

**CENTER, MELVIN S.**, Prof. of Biology (1970). BS 1962, U. of Georgia; MS 1964, PhD 1967, Medical Col. of Georgia. (\*)

**CENTERS, DAVID A.**, Asst. Prof. of Theatre (1993). BFA 1986, U. of Cincinnati; MFA 1990, New York U.

**CHADD, DAVID**, Asst. Baseball Coach (1991). BA 1989, Wichita St. U.

**CHAKRABARTI, AMITABHA**, Assoc. Prof. of Physics (1990). BS 1979, MS 1982, U. of Calcutta, India; PhD 1987, U. of Minnesota. (\*)

**CHALMERS, JOHN**, Prof. Emeritus of Finance and Economics; VP for Academic Affairs (1963). AB 1938, Middlebury Col.; PhD 1943, Cornell U. (\*)

**CHAMBERS, EDGAR, IV.**, Prof. of Foods and Nutrition; Dir. of Sensory Analysis Center (1988). BS 1977, U. of Tennessee; MS 1979, PhD 1980, Kansas St. U. (\*)

**CHANDLER, LAURIE R.**, Co. Ext. Agent, 4–H and Human Dev., Shawnee Co., Topeka (1993). BS 1982, MS 1984, Kansas St. U.

**CHANDRA, D.V. SATISH**, Assoc. Prof. of Electrical and Computer Engineering (1984). BE 1970, Bangalore U., India; ME, Indian Inst. of Sci., India; MS 1980, PhD 1984, Auburn U. (\*)

**CHANG, AMOS I. T.**, Prof. Emeritus of Arch. (1966). BS Civil Engg. 1939, National Chung King U.; MFA 1949, PhD 1951, Princeton U.; Registered Architect. (\*)

**CHANG, CHENG S.**, Adjunct Assoc. Prof. of Agricultural Engineering (1979). BS 1960, National Taiwan U.; MS 1966, Mississippi St. U.; PhD 1970, North Carolina St. U. (\*)

**CHANG, SHING I.**, Asst. Prof. of Industrial Engineering (1991). BS 1983, Tsing Hua U.; MS 1987, Arizona St. U.; PhD 1991, Ohio St. U. (\*)

**CHANG, YANG-MING**, Assoc. Prof. of Economics (1984). MA 1978, Nat. Taiwan U., Taipei; PhD 1984, SUNY, Buffalo. (\*)

**CHAPES, STEPHEN K.**, Assoc. Prof. of Biology; Immunologist, Agr. Exp. Sta. (1984). BS 1975, MS 1978, PhD 1981, U. of Illinois. (\*)

**CHAPIN, ERNEST KNIGHT**, Assoc. Prof. Emeritus of Physics (1923). AB 1918, MS 1923, U. of Michigan. (\*)

**CHAPMAN, KIRBY S.**, Asst. Prof. of Mechanical Engineering (1990). BS 1980, Purdue U.; MS 1987, Michigan Technological U.; PhD 1990, Purdue U. (\*)

**CHARLTON, RALPH E.**, Asst. Prof. of Entomology. PhD 1988. Univ. of Massachusetts. (\*)

**CHARNEY, WAYNE**, Assoc. Prof. of Arch. (1987). BS 1973, MArch 1975, U. of Illinois; PhD 1985, Northwestern U. (\*)

**CHASTAIN, MELVIN L.**, Dir. of Kansas Regents Educational Communications Cntr.; Assoc. Prof. of Journalism and Mass Communications (1987). BA 1961, MA 1962, U. of Denver; PhD 1970, Texas A&M.

**CHAUDHURI, SAMBHUDAS**, Prof. of Geology (1966). BS 1956, Calcutta U., India; MS 1958, Jadavpur U., India; MS 1961, Indiana U.; PhD 1966, Ohio St. U. (\*)

**CHELIKOWSKY, JOSEPH RUDOLPH**, Prof. Emeritus of Geology (1937). BA 1931, MA 1932, PhD 1935, Cornell U. (\*)

**CHELZ, ANTHONY W.**, Assoc. Prof. of Landscape Arch. (1975). BArch 1966, Sch. Art Inst., Chicago; MFA 1970, Syracuse U.

**CHENGAPPA, M. M.**, Prof. of Pathology and Microbiology (1988). BVSc 1970, MS 1973, U. of Agricultural Science, India; PhD 1981, Michigan St. U.; Diplomate 1981, American Col. of Vet. Microbiology. (\*)

**CHERMAK, ANDREW**, Assoc. Prof. of Mathematics (1982). AB 1971, PhD 1975, Rutgers U. (\*)

**CHERRY, CYNTHIA S.**, Co. Extension Agent, Home Economics, Wyandotte Co., Kansas City (1985). BS 1981, MS 1985, Kansas St. U.

**CHITNIS, PARAG R.**, Asst. Prof. of Biology; Microbial Geneticist, Agr. Exp. Sta. (1991). BS 1981, Dapoli, India; MS 1983, New Delhi, India; PhD 1987, U. of California–Los Angeles. (\*)

**CHOI, HYUNG-MIN**, Assoc. Prof. of Clothing, Textiles, and Interior Design (1993). BS 1982, Soong Jun U., Seoul; MS 1986, SE Massachusetts U.; PhD 1990, U. of Maryland at College Park (\*)

**CHOMICKI, JAN**, Asst. Prof. of Computing and Information Sciences (1990). MS 1979, Warsaw U.; PhD 1990, Rutgers U. (\*)

**CHOWDHURY, SHAFIQU L.**, Asst. Prof. of Microbiology (1990). DVM 1978, MSc 1980, Bangladesh Agricultural U.; PhD 1987, Free University of Berlin. (\*)

**CHRISTENSEN, KEITH H.**, Assoc. Prof. Emeritus of Arch. (1966). BArch 1950, U. of Nebraska; MArch 1957, U. of Michigan; Registered Architect. (\*)

**CHRISTIAN, MICHAEL L.**, Co. Extension Agent, Riley Co., Manhattan (1979). BS 1973, Oklahoma St. U.

**CHRISTIE, DWIGHT D.**, Assoc. Dir., Student Financial Assistance (1993). BS 1983, MS 1987, Kansas St. U.

**CHUNG, DO SUP**, Prof. of Agricultural Engineering (1965). BS 1958, Purdue U.; MS 1960, PhD 1966, Kansas St. U. (\*)

**CHUNG, OKKYUNG**, Adjunct Prof. of Grain Science and Industry; USDA Grain Marketing Research Cntr. (1976). BS 1959, EWA Women's U., Korea; MS 1965, PhD 1973, Kansas St. U. (\*)

**CICCATELL, PAUL S.**, Asst. Prof. of Sociology (1994). BA 1987, Trinity U., MS 1991; PhD 1994, U. of Wisconsin–Madison.

**CLAASSEN, MARK M.**, Assoc. Prof. of Agronomy; Research Agronomist in charge, Harvey Co. Experimental Field (P.O. Hesston) Agr. Exp. Sta. (1977). BS 1965, U. of Nebraska; MS 1968, PhD 1971, Iowa St. U.

**CLAFLIN, LARRY E.**, Prof. of Plant Pathology; Research Phytobacteriologist, Agr. Exp. Sta. (1975). BS 1963, NW Oklahoma St. U.; MS 1969, East Texas St. U.; PhD 1972, Kansas St. U. (\*)

**CLARK, GEORGE R., II**, Prof. of Geology (1977). AB 1961, Cornell U.; MS 1966, PhD 1969, Caltech. (\*)

**CLARK, JANE C.**, Instr. of English (1974). BS 1951, Kansas St. U.

**CLARK, MARCELLA P.**, Instr. Emerita of English (1985). BA 1982, Union Col.; MA 1985, Kansas St. U.

**CLARK, MICHAEL R.**, Baseball Coach (1986). BS 1975, Missouri Western St. Col.; MS 1977, Northwest Missouri St. U.

**CLARK, PAUL B.**, Asst. Prof. of Arch. (1989). BArch 1985, MArch 1989, U. of Cincinnati.

**CLARK, ROBERT L. A.**, Asst. Prof. of Modern Languages (1992). BA 1973, Carlton Col.; MA 1976, Indiana U.

**CLARK, STANLEY JOE**, Head and Prof. of Agricultural Engineering; Ag. Exp. Sta. (1966). BS 1954, MS 1959, Kansas St. U.; PhD 1966, Purdue U.; Professional Engineer, 1969. (\*)

**CLARKE, MARY P.**, Prof. of Foods and Nutrition; Extension Specialist, Nutrition Education (1973). BS 1950, Indiana U.; MS 1970, Indiana St. U.; PhD 1973, Kansas St. U.

**CLARKE, DAVID W.**, Asst. Prof. of Architecture (1990). BArch 1984, U of Oregon; MArch 1990, U. of California–Los Angeles. Registered Architect. (\*)

**CLARKSON-FRISBIE, JEAN K.**, Co. Extension Home Economist, Pratt Co., Pratt (1970). BS 1970, Kansas St. U.

**CLAUSSEN, ANN**, Asst. Dir. and Program Dir., K-State Union (1991). BS 1974, Moravian College; MS 1979, Hood College.

**CLAUSSEN, JERRY**, Instr. of Aviation Maintenance Tech. (1990). AA 1989, AT 1989, AM 1989, Kansas Col. of Tech.; A&P Licenses 1989; Certificate, America West Boeing 737 Systems School.

**CLAUSSEN, RICHARD J.**, Conf. Coord. (1988). BS 1965, Brooklyn Col.; MS 1967, Indiana U.

**CLAUSSEN, SANDRA L.**, Adjunct Clinical Instr. of Medical Tech. (1988). BS 1975, Valparaiso U.; MT (ASCP) 1975.

**CLAWSON, ELDON L.**, Co. Extension 4–H Agent Emeritus, Shawnee Co., Topeka (1965). BS 1965, Kansas St. U.

**CLAYBERG, CARL D.**, Prof. Emeritus of Horticulture; Research Horticulturist, Vegetable Crop Geneticist, Agr. Exp. Sta. (1974). BS 1954, U. of Washington; PhD 1958, U. of California. (\*)

**CLAYDON, THOMAS J.**, Prof. Emeritus of Animal Sciences and Industry (1946). BSA 1934, U. of Saskatchewan (Canada); MS 1936, PhD 1939, Iowa St. U.

**CLEGG, ROBERT E.**, Prof. Emeritus of Biochemistry (1948). BS 1936, Rhode Island St. Col.; MS 1939, North Carolina St. Col.; PhD 1948, Iowa St. U. (\*)

**CLEGG, VICTORIA L.**, Dir., Educational Advancement; Asst. Prof., Education (1982). BS 1965, Kansas St. U.; MA 1972, Wichita St. U.; PhD 1979, Kansas St. U.

**CLELAND, MARJORIE V.**, Inst. Emerita, Dean's Office (1970). BA 1968, MS 1970, Kansas St. U.

**CLEMENT, LAURENCE A., JR.**, Assoc. Prof. of Landscape Arch. (1981). BS 1978, BLA 1980, SUNY, Col. of Environmental Science and Forestry; MLA 1985, Kansas St. U.; JD 1991, U. of Kansas. Registered Landscape Architect; Licensed Attorney. (\*)

**CLIFT, GARY W.**, Instr. of English (1983). BA 1974; MA 1980, Kansas St. U.

**CLIMENHAGA, JOEL R.**, Assoc. Prof. Emeritus of Theatre (1968). AA 1949, Chaffey Col.; BA 1953, MA 1958, U. of California at Los Angeles. (\*)

**CLINE, LUCILLE G.**, Co. Extension Home Economist Emerita, Pawnee Co., Larned (1951). BS 1948, Kansas St. U.

**CLINTON, WILLIAM D.**, Asst. Prof. of Political Science (1983). MA 1978, U. of Virginia.

**CLONTS, HALLIE L.**, Prof. Emerita; Extension Specialist, Programs (1973). BS 1943, U. of Missouri; EdM 1964, Boston U.; EdD 1972, Arizona St. U.

**CLORE, ROBERT ALVIN**, Assoc. Prof. of Art (1970). AA 1966, Casper Col.; BA 1968, MA 1970, U. of Northern Colorado; MFA 1977, U. of Kansas.

**CLOSET', CATHERINE M.**, Asst. Prof. of Arch. (1989). Prof. Degree 1983, National Inst. of Applied Sciences–Lyon, France; MArch 1986, U. of New Mexico.

**COATES, GARY J.**, Prof. of Arch. (1977). BED 1969, MArch 1971, North Carolina St. U. (\*)

**COCHRAN, ALFRED W.**, Assoc. Prof. of Music (1979). BME 1972, Memphis St. U.; MM 1975, PhD 1986, Catholic U. (\*)

**COCHRAN, MARY LEE**, Asst. Prof. of Music (1984). BME 1977, MM 1979, DMA 1984, Catholic U. (\*)

**COCHRAN, ROBERT C.**, Assoc. Prof. of Animal Sciences and Industry; Beef Cattle Range Management (1985). BS 1980, MS 1980, Ohio St. U.; PhD 1985, New Mexico St. U. (\*)

**COCHRANE, TODD E.**, Assoc. Prof. of Mathematics (1984). BS 1978, Harvey Mudd Col.; PhD 1984, U. of Michigan. (\*)

**COCKE, CHARLES L.**, Prof. of Physics (1969). AB 1962, Haverford Col.; PhD 1967, California Inst. of Tech. (\*)

**COCKE, ENID O.**, Dir., English Language Program (1986). BA 1967, Scripps Col., California; MA 1982, Kansas St. U.

**COFFEE, E. GUY**, Asst. Prof., Info. and Doc. Service, Vet. Medicine (1970). AB 1958, U. of Missouri; ML 1970, Emporia St. U.

**COFFEY, KENNETH P.**, Assoc. Prof., Research Animal Scientist, SE Kansas Branch Agr. Exp. Sta. (1987). BS 1980, U. of Tennessee, Knoxville; MS 1983, U. of Kentucky; PhD 1986, U. of Missouri.

**COFFMAN, CRYSTAL R.**, Co. Extension Agent, 4–H, Miami Co., Paola (1972). BS 1971, Kansas St. U.

**COFFMAN, JAMES R.**, Provost; Prof. of Clinical Sciences (1981). BS 1960, DVM 1962, MS 1969, Kansas St. U. (\*)

**COGLEY, ALLEN**, Prof., Mechanical Engineering (1987). BS 1962, Iowa St.; MS 1964, U. of Virginia; PhD 1968, Stanford U. (\*)

**COGLEY, KAY**, Dir. of Pre Award Services; Research and Sponsored Programs (1990). BS 1985, U. of Alabama–Huntsville.

**COHEN, PETER Z.**, Assoc. Prof. Emeriti of English (1961). BS 1953, MA 1961, U. of Wyoming.

**COLE, GEORGE**, Adjunct Asst. Prof. Emeritus of Agronomy; Research Agricultural Engineer, Wind Erosion Research Unit, USDA ARS (1981). BS 1953, Polytech Rensselaer; PhD 1973, Cornell U.

**COLE, KAREN S.**, Assoc. Dean of Libraries (1992). EdD 1992, Kansas St. U.; MLS 1977, Emporia St. U.; AB 1972, Ft. Hays St. U.

**COLE, MICHAEL W.**, Instr. of Computing and Information Sciences (1984). BS 1965, Utah St. U.

**COLE, ROD**, Strength and Conditioning Coach (1993). 1984, Bethany College; MEd 1988, Wichita St. U.

**COLEMAN, RAYMOND J.**, Prof. Emeritus of Marketing (1965). BS 1948, U. of Kansas; MA 1963, Central Missouri St. U.; PhD 1967, U. of Arkansas. (\*)

**COLEMAN, RICHARD P.**, Prof. of Marketing (1981). BS 1948, U. of Tulsa; MA 1949, U. of Iowa; PhD 1959, U. of Chicago. (\*)

**COLLINS, BILL D.**, Farm Management Association Fieldman Emeritus (1954). BS 1951, Kansas St. U.; MS 1962, U. of Wisconsin.

**COLLINS, JIMMY D.**, Co. Extension Agent, Trego Co., WaKeeney (1988). BS 1986, Panhandle St. U.

**COLLINSON, MARYANNE M.**, Asst. Prof. of Chemistry (1994). BS 1987, U. of Central Florida; PhD 1993, North Carolina St. U.

**CONDIA, ROBERT J.**, Assoc. Prof. of Arch. (1989). BArch 1980, Cal. Poly–San Luis Obispo; MArch 1983, Columbia U.; Registered Architect. (\*)

**CONDRAY, MARY M.**, Co. Extension Agent; Ottawa Co., Minneapolis (1991). BS 1968, Sterling Co.

**CONLEY, JOSEPHINE**, Co. Extension Home Economist Emerita, Johnson Co., Olathe (1955). BS 1933, Oklahoma St. U.

**CONNAUGHTON, JACK**, Assoc. Dir., K-St. Union (1980). BS 1968, MS 1971, U. of Wisconsin–LaCrosse.

**CONRAD, GARY W.**, Prof. of Biology (1970). BS 1963, Union Col.; MS 1965, PhD 1968, Yale U. (\*)

**CONRAD, WILLIAM A.**, Co. Extension Agent; Seward Co., Liberal (1990). BS 1971, Kansas St. U.; MBA 1989, Fort Hays St. U.

**CONROW, KENNETH**, Assoc. Prof. of Computing and Information Sciences; Assoc. Dir. of Computing and Telecommunications Activities (1961). BA 1954, Swarthmore Col.; PhD 1957, U. of Illinois. (\*)

**CONROW, MARGARET E.**, Assoc. Prof. of English (1964). BA 1954, Swarthmore Col.; MA 1955, PhD 1962, U. of Illinois. (\*)

**CONSIGLI, RICHARD ALBERT**, Dist. Prof. of Biology; Virologist, Agr. Exp. Sta. (1963). BS 1954, Brooklyn Col.; MA 1956, PhD 1960, U. of Kansas. (\*)

**CONVERSE, HARRY**, Adjunct Assoc. Prof. of Agricultural Engineering (1971). BS 1946, MS 1947, Kansas St. U.

**COOK, JAMES E.**, Prof. Emeritus of Pathology (1969). DVM 1951, Oklahoma St. U.; Diplomate 1956, American Col. of Vet. Pathologists; PhD 1970, Kansas St. U. (\*)

**COOL, VINCENT**, Assoc. Dir. Emeritus of Facilities Arch. and Engg. Services (1950). BArch 1951, Kansas St. U.

**COOPER, CORA**, Asst. Prof. of Music (1990). BM 1978, U. of Vermont; MM 1982, Eastman School of Music; DM 1992, Florida St. U. (\*)

**COOPER, JEAN**, Adjunct Clinical Instr. of Medical Tech. (1984). BS 1969, Central Missouri St. U.; MPA 1979, U. of Missouri, K.C.

**COOPER, PETER B.**, Prof. of Civil Engineering (1966). BS 1957, MS 1960, PhD 1965, Lehigh U.; Professional Engineer, 1969. (\*)

**COOPER, HELEN**, Asst. Dir. of Facilities Planning (1992). BS 1978, MS 1986, Kansas St. U.

**COPE, ROBERT D.**, Asst. Football Coach (1988). BS 1961, Carson-Newman; MEd 1965, George Peabody Col.

**COPELAND, JAMES L.**, Prof. and Assoc. Head of Chemistry (1962). BS 1952, U. of Illinois; PhD 1962, Indiana U. (\*)

**CORAH, LARRY R.**, Prof. of Animal Sciences and Industry; Extension State Leader, Animal Sciences and Industry (1974). BS 1964, N. Dakota St. U.; MS 1967, Michigan St. U.; PhD 1974, U. of Wyoming. (\*)

**CORRALES, RAMON**, Adjunct Assoc. Prof. of Human Dev. and Family Studies (1981). BA 1966, DeLaSalle Col., Manila; MA 1968, Xavier U., Philippines; PhD 1974, U. of Minnesota.

**CORTEZ, ANITA**, Asst. Language Arts/Learning Skills Specialist, Educational Supportive Services (1987). BA 1983, Kansas St. U.; MA 1985, U. of Wyoming.

**CORUM, ROBERT T.**, Prof. of Modern Languages (1977). BA 1969, Old Dominion Col.; MA 1971, PhD 1975, U. of Virginia. (\*)

**COTT, KENNETH**, Visiting Prof. (1992). BA 1964, Ft. Hays St. Col.; MA 1967, PhD 1978, U. of New Mexico.

**COTTOM, MELVIN CLYDE**, Asst. Prof. Emeritus of Electrical and Computer Engineering (1955). BS 1945, MS 1948, U. of Kansas; Professional Engineer in Kansas, 1947; in Missouri, 1952. (\*)

**COUCH, TRICIA R.**, Co. Ext. Agent, Home Economics, Woodson Co., Yates Center (1992). BS 1982, Kansas St. U.

**COUGHLIN, COLLEEN M.**, Research Asst., KABSU (1979). BS 1979, U. of Minnesota.

**COULSON, STEPHEN J.**, Dir., Engineering Computer Cntr. (1985). BS 1965, Kansas St. U.

**COULSON, L. ANN**, Asst. Prof. of Human Dev. and Family Studies; Agr. Exp. Sta. (1987). BS 1974, U. of Missouri; MS 1981, U. of Arkansas; PhD 1987, U. of Missouri.

**COWAN, LAINE A.**, Asst. Prof. of Small Animal Medicine (1988). DVM 1984, U. of California; MS 1989, U. of Georgia; Diplomate 1988, American Col. of Vet. Internal Medicine.

**COWAN, THADDEUS M.**, Prof. of Psychology (1970). BA 1957, Centre Col. of Kentucky; MS 1959, PhD 1964, U. of Connecticut. (\*)

**COX, JUDY H.**, Assoc. Prof. of Equine Medicine (1981). DVM 1968, MS 1984, Kansas St. U.; Diplomate 1987, American Col. of Vet. Internal Medicine.

**COX, KELLINE S.**, Statistical and Information Officer, Planning and Evaluation Services (1989). BS 1986, MS 1988, Kansas St. U.

**COX, LAWRENCE J.**, Prof. Emeritus; Area Extension Dir. (1952). BS 1948, Oklahoma St. U.; MS 1960, Kansas St. U.; EdD 1970, North Carolina St. U.

**COX, THOMAS S.**, Adjunct Assoc. Prof. of Agronomy; Research Wheat Geneticist (1984). BSA 1976, U. of Georgia; MS 1979, PhD 1983, Iowa St. U. (\*)

**COX, WILLIAM E.**, Co. Extension Dir., Sedgwick Co., Wichita (1958). BS 1955, Kansas St. U.

**COYNE, PATRICK I.**, Prof. and Head, Fort Hays Branch Station, Agronomist (1985). BS 1966, Kansas St. U.; PhD 1969, Utah St. U. (\*)

**COYNER, SANDRA J.**, Assoc. Prof.; Dir. of Women's Studies (1978). BA 1967, Rice U.; MA 1969, Bryn Mawr Col.; PhD 1975, Rutgers U. (\*)

**COZZARELLI, CATHERINE**, Asst. Prof. of Psychology (1991). BA 1983, MA 1987, PhD 1991, SUNY at Buffalo. (\*)

**CRAGHEAD, DEWAYNE E.**, Co. Extension Agent; Hodgeman Co., Jetmore (1991). BS 1981, Kansas St. U.

**CRAIG, JAMES V.**, Prof. Emeritus of Animal Sciences and Industry; Poultry Research Geneticist, Agr. Exp. Sta. (1955). BS 1948, MS 1949, U. of Illinois; PhD 1952, U. of Wisconsin. (\*)

**CRAIG, M. DOROTHY**, Asst. Prof. Emerita of Education (1959). BS 1931, Bethany Col.; BS 1941, Emporia St. U.; MA 1944, Columbia U.

**CRAIGIE, BARBARA**, Asst. Prof. Emerita of Clothing, Textiles, and Interior Design (1954). BA 1932, U. of Minnesota; MA 1942, U. of Missouri. (\*)

**CRANE, LOUIS**, Asst. Prof. of Mathematics (1992). PhD 1985, Univ. of Chicago. (\*)

**CRANDALL, LESTER L.**, Co. Extension Agricultural Agent Emeritus, Miami Co., Paola (1978). BS 1949, BS 1966, Kansas St. U.

**CRANK, ROBERT EUGENE**, Prof. Emeritus of Mechanical Engineering (1947). BS 1947, MS 1950, Kansas St. U.; Professional Engineer, 1949.

**CRAWFORD, ANTHONY R.**, Archivist, Libraries (1983). BS 1967, Oklahoma St. U.; MLS 1973, U. of Oklahoma.

**CRAWFORD, FRANCIS W.**, Assoc. Prof. Emeritus of Physics (1960). AB 1924, Phillips U.; MS 1929, U. of Oklahoma. (\*)

**CRAWFORD, GOLDA M.**, Assoc. Prof. Emerita of History (1946). BS 1928, MS 1940, Kansas St. U.; PhD 1963, Syracuse U. (\*)

**CRAWFORD, PATRICIA L.**, Asst. Prof. of Arch. (1989). BS 1986, U. of Missouri–Columbia; MLA 1989, Kansas St. U.

**CREECH, TOM**, Prof. of General Engineering Tech. (1976). BSME 1957, MS 1961, Kansas St. U.

**CREIGHTON, BARBARA J.**, Staff Asst., TELENET (1987). BS 1983, Kansas St. U.

**CRESS, DONALD C.**, Prof. of Entomology; Extension Pesticide Coord. (1977). BS 1964, Colorado St. U.; MS 1966, U. of Wyoming; PhD 1969, Oklahoma St. U. (\*)

**CRESS, JEANICE A.**, Co. Extension Agent, Home Economics, Allen Co., Iola (1956). BS 1956, Kansas St. U.

**CRIST, ROSEMARY A.**, Asst. Prof. Emerita; Area Extension Home Economist (1950). BS 1947, Kansas St. U.; MA 1967, U. of Nebraska.

**CROSSLEY, GAY LYNN**, Asst. Prof. of English. BA 1987, U. of Southern Alabama; MA 1989, PhD 1993, Florida St. U.

**CROUSE, LARRY E.**, Co. Ext. Agent, Hort., Butler County, Eldorado (1993). BS 1984, Arizona St. U.

**CULLERS, ROBERT L.**, Prof. of Geology (1971). BS 1959, MA in Chemistry 1962, Indiana U.; PhD 1971, U. of Wisconsin. (\*)

**CULLEY, LOUANN F.**, Assoc. Prof. of Art (1971). BFA 1957, MA 1967, U. of New Mexico; PhD 1975, Stanford U. (\*)

**CUNNINGHAM, FRANKLIN E.**, Prof. of Animal Sciences and Industry; Poultry Foods Research Scientist, Agr. Exp. Sta. (1969). BS 1957, Kansas St. U.; MS 1959, PhD 1963, U. of Missouri. (\*)

**CURNUTTE, BASIL, JR.**, Prof. Emeritus of Physics (1954). BS 1945, U.S. Naval Academy; PhD 1953, Ohio St. U. (\*)

**CURRAN, STEVEN P.**, Asst. Prof. of Grain Science and Industry (1978). BS 1974, MS 1982, Kansas St. U.

**CURRIE, RANDALL S.**, Asst. Prof. of SW Research Extension Cntr. (1991). BS 1980, Kansas St. U.; MS 1987, Oklahoma St. U.; PhD 1990, Texas A&M U.

**CURRY, ELIZABETH A.**, Instr.; Area Ext. Home Economist, Northwest (1993). BS 1974, Texas Tech.; MS 1993, Ft. Hays St. U.

**CURTIS, W. D.**, Prof. of Mathematics (1970). BA 1966, U. of Florida; PhD 1970, U. of Massachusetts. (\*)

**DAHL, HARVEY O.**, Dir., K-State Printing Services (1987). BA 1970, U. of N. Dakota.

**DAHL, ROBERT E.**, Prof. Emeritus of Architectural Engineering and Construction Science (1976). BS 1951, MS 1954, Kansas St. U.; Professional Engineer. (\*)

**DAHLSTEN, KIMBERLY D.**, Coord. of Alumni and Campus Relations (1991). BS 1990, Kansas St. U.

**DALE, BETTIE M.**, Arts and Sciences Advisor Emeritus (1964). BS 1946, Baylor; MS 1951, PhD 1954, Ohio St. U.

**DALE, E. BROCK**, Prof. Emeritus of Physics (1957). BS 1940, MS 1944, U. of Oklahoma; PhD 1953, Ohio St. U. (\*)

**DALIDA, JOHN W.**, Assoc. Prof., Education (1988). AB 1970, MA 1971, U. of Detroit; PhD 1988, U. of Chicago. (\*)

**DALY, ROBERT K.**, Assoc. Prof. of Journalism and Mass Communications (1973). AB 1967, Marquette U.; MA 1973, Sangamon St. U. (\*)

**DALY, JOHN C. K.**, Assoc. Prof. of History (1987). BA 1973, Northwestern U.; MPhil 1975, DPhil 1986, London U. (\*)

**DAMKROGER, WILLIAM**, Dir. of Telecommunications (1990). BS 1982, U. of Texas.

**DANBY, JOHN HERBERT**, Adjunct Asst. Prof. of Dietetics (1984). MD 1956, U. of Leeds, England.

**DANIELS, MARK R.**, Assoc. Prof. of Political Science (1985). BA 1973, Valparaiso U.; MA 1975, So. Illinois U. at Carbondale; PhD 1979, U. of Georgia. (\*)

**DANNELLS, MICHAEL**, Assoc. Prof., Education (1986). BS 1971, Bradley U.; PhD 1978, U. of Iowa. (\*)

**DANVY, OLIVER**, Asst. Prof. of Computing and Information Sciences (1989). MS 1983, PhD 1986, U. of Paris Six. (\*)

**DARLING, DAVID L.**, Assoc. Prof. of Agricultural Economics; Extension Specialist, Community Economic Dev. (1983). BS 1970, MS 1974, U. of Massachusetts; PhD 1983, Ohio U. (\*)

**DAUBER, DONALD D.**, Co. Extension Agent Emeritus, Hodgeman Co., Jetmore (1960). BS 1953, MS 1958, Kansas St. U.

**DAVENPORT, JOYCE M.**, Co. Extension Agent, Home Economics, Bourbon Co., Fort Scott (1983). BS 1983, U. of Nebraska.

**DAVIDSON, HARRIET**, Asst. Prof. of Clinical Sciences (1992). DVM 1985, MS 1990, Michigan St. U.; Diplomate 1991, Amer. Col. of Vet. Ophthal. (\*)

**DAVIDSON, JEFFREY L.**, Co. Extension Agent, Agr., Greenwood Co., Eureka (1977). BS 1973, MS 1975, Colorado St. U.

**DAVIED, MARK A.**, Co. Extension Agent, Agr.; Neosho Co., Erie (1990). BS 1990, Kansas St. U.

**DAVIS, DEAN L.**, Co. Extension Agent, Agr., Shawnee Co., Topeka (1989). BS 1966, Kansas St. U.

**DAVIS, DONNA J.**, Dir. of International Student Cntr. (1981). BS 1971, MS 1974, PhD 1982, Kansas St. U.

**DAVIS, DUANE L.**, Prof. of Animal Sciences and Industry; Swine Research Physiologist, Agr. Exp. Sta. (1977). BS 1970, MS 1974, Kansas St. U.; PhD 1976, U. of Missouri. (\*)

**DAVIS, JAMES L.**, Asst. Prof. of Finance (1994). BS 1978, Oklahoma St. U.; MBA 1983, DePaul U.; PhD 1994, U. of Illinois.

**DAVIS, JUDY**, Dir., Women's Cntr. (1988). BS 1981; MA 1988, Kansas St. U.

**DAVIS, LAWRENCE CLARK**, Prof. of Biochemistry; Biochemist, Agr. Exp. Sta. (1975). BS 1966, Haverford Col.; PhD 1970, Yeshiva U. (\*)

**DAVIS, LINDA W.**, Instr. of Biology (1989). BA 1967, Swarthmore Col.; MS 1988, Kansas St. U.

**DAVIS, MARK A.**, Research Asst. of Plant Pathology (1987). BS 1986, Kansas St. U.

**DAVIS, OLIVE L.**, Co. Extension Home Economist Emerita, Morton Co., Elkhart (1960). BS 1937, Northwestern St. Col., Oklahoma.

**DAWES, BARBARA E.**, Assoc. Dir. of Admissions (1979). BS 1961, St. Mary Col., Leavenworth; MS 1979, Kansas St. U.

**DAWES, WILLIAM H.**, Assoc. Prof. of Electrical and Computer Engineering (1978). BS 1969, MS 1972, PhD 1974, Kansas St. U.

**DAWSON, JAMES R.**, Farm Mgmt. Assn. Fieldman (1992). BS 1975, Oklahoma St. U.

**DAWSON, RITA T.**, Co. Extension Agent, Home Economics, Coffey Co., Burlington (1971). BS 1971, Kansas St. U.

**DAWSON, ROBERT E.**, Farm Management Association Fieldman (1976). BS 1973, MS 1974, Kansas St. U.

**DAY, DENNIS J.**, Prof. of Landscape Arch. (1966). BSLA 1964, Michigan St. U.; MLA 1966, U. of Michigan; Registered Landscape Architect. (\*)

**DAY, DWIGHT D.**, Asst. Prof. of Electrical Engineering and Computer Engineering (1990). BS 1980, MS 1981, PhD 1987, Oklahoma St. U. (\*)

**DAYTON, TIMOTHY A.**, Asst. Prof. of English (1990). BA 1982, Siena Col.; MA 1984, SUNY, Albany; PhD 1990, Duke U. (\*)

**DE LUCCIE, MARY**, Asst. Prof. of Human Dev. and Family Studies (1991). BS 1976, MA 1982, U. of New Mexico; PhD 1987, Kansas St. U. (\*)

**DE BOWES, RICHARD M.**, Prof. of Equine Medicine (1982). DVM 1979, U. of Illinois; MS 1982, Washington St. U.; Diplomate 1985, American Col. of Vet. Surgeons. (\*)

**DE BOWES, LINDA J.**, Asst. Prof. of Small Animal Medicine (1982). DVM 1981, Washington St. U.; MS 1985, Kansas St. U.; Diplomate 1986, American Col. of Vet. Internal Medicine. (\*)

**DE BRES, KAREN J.**, Asst. Prof. of Geography (1990). BS 1973, MA 1974, U. of Missouri; PhD 1986, Columbia U. (\*)

**DE MAND, JOHN WESLEY**, Prof. Emeritus, Education (1940). AB 1937, U. of Kansas; MS 1940, Kansas St. U.; EdD 1953, U. of Colorado. (\*)

**DEB, N. C.**, Rsearch Assoc. Temp. (1986). PhD 1986, Jadavpur U., India.

**DEES, JEROME STEELE**, Prof. of English (1976). BA 1958, Catawaba Col.; MA 1961, Florida St. U.; PhD 1968, U. of Illinois, Urbana. (\*)

**DEHON, CLAIRE LOUISE**, Prof. of Modern Languages (1972). BA 1962, Royal Art Inst. of Brussels; MA 1964, MA 1969, MPhil 1971, PhD 1973, U. of Kansas. (\*)

**DEIHL, LINCOLN W.**, Prof. Emeritus of Management (1979). BS 1949, Bowling Green St. U.; MS 1951, Indiana U.; PhD 1964, Ohio St. U.

**DEINES, DAN**, Assoc. Prof. of Accounting (1982). BA 1970, Fort Hays St. U.; MS 1974, Emporia St. U.; CPA 1984, PhD 1985, U. of Nebraska. (\*)

**DEINES, VERNON PHILLIP**, Prof. of Planning (1957). BS 1952, MRP 1962, Kansas St. U.; PhD 1977, U. of Pittsburgh. Registered Professional Engineer. Certified Planner. (\*)

**DEITCH, DAVID A.**, Assoc. Dir. of Operations, Kansas Regents Educational Communications Cntr. (1984). BS 1974, U. of Florida; MA 1984, Kansas St. U.

**DELANO, FREDRICK D.**, Administrator, Farm Management Association Program (1981). BS 1961, Kansas St. U.; MS 1972, U. of Missouri.

**DELGADILLO, ALEJANDRO S.**, Coord. of Residence Life Program, Housing and Dining Services (1991). BA 1978, U. of California-Los Angeles; MA 1989, Michigan St. U.

**DELGADO, ALBERTO L.**, Assoc. Prof. of Mathematics (1984). BA 1977, U. of Southern California; PhD 1981, U. of California. (\*)

**DELKER, DAVID G.**, Prof. and Section Head of Electronic Engineering Tech. (1984). AT 1973, KTI; BS 1977, MS 1979, Oklahoma St. U.

**DEMPSEY, DANIELLE**, Dir. of Classified Affirmative Action (1993). BA 1989, Kansas St. U.; JD 1992, Washburn U.

**DENELL, ROBIN**, Prof. of Biology, Molecular Geneticist, Agr. Exp. Sta. (1972). BS 1965, U. of California; MA 1968, PhD 1969, U. of Texas. (\*)

**DENNING, JANICE**, Assoc. Prof. of Social Work (1988). BSW 1976, MSW 1978, U. of Kansas.

**DePAOLA, BRETT DAVID**, Assoc. Prof. of Physics (1986). BA 1973, MS 1979, Miami U.; PhD 1984, U. of Texas, Dallas. (\*)

**DePEW, LESTER J.**, Prof. Emeritus of Entomology; Research Entomologist, Insects of SW Kansas, SW Research-Extension Cntr. (1954). BS 1949, Colorado A&M; MS 1954, U. of Minnesota.

**DESAL, ANAND S.**, Asst. Prof. of Finance (1994). BE 1973, Maharaja Sayajirao U.; MS 1975, Iowa St. U.; PhD 1985, U. of Michigan.

**DETTMER, PEGGY A.**, Prof., Education (1979). BME 1958, Pittsburg St. U.; MS 1976, PhD 1979, Kansas St. U. (\*)

**DEUS, ROBERT N.**, Pharmacist, Lafene Health Ctr. (1975). BS 1965, U. of Kansas.

**DEVAULT, JAMES E.**, Assoc. Prof. of Electrical and Computer Engineering (1985). BS 1970, MS 1971, Michigan Tech. U.; MS 1977, U. of Michigan.

**DEVAULT, GUNILE**, Assoc. Registrar (1987). BS 1970, Kansas St. U.; MS 1972, U. of Illinois.

**DeVILBISS, EDWARD A.**, Prof. of Arch. (1975). BArch Eng 1953, U. of Colorado. Registered Architect.

**DEVLIN, DANIEL L.**, Assoc. Prof. of Agronomy; Extension Specialist, Crops and Soils, Northeast (1985). BS 1979, MS 1983, Kansas St. U.; PhD 1985, Washington St. U.

**DEVLIN, MARJORIE P.**, Asst. Spec., Libraries (1992). BS 1983, Kansas St. U.

**DEVORE, JOHN J.**, Assoc. Prof. of Electrical and Computer Engineering (1982). BS 1971, MS 1973, PhD 1984, Kansas St. U. (\*)

**DeWERFF, DONALD M.**, Co. Extension Agent, Agr. and Community Dev., Rice Co., Lyons (1977). BS 1976, Kansas St. U.

**DEXTER, MIRIAM L.**, Assoc. Prof. Emerita; Asst. Extension Editor, Publications (1944). BS 1926, MS 1933, Kansas St. U.

**DEYOE, CHARLES W.**, Prof. of Grain Science and Industry; Feed Tech. Research Scientist, Agr. Exp. Sta. (1962). BS 1955, Kansas St. U.; MS 1957, PhD 1959, Texas A&M. (\*)

**DHUYVETTER, KEVIN C.**, Assoc. Prof. of Agricultural Economics; Extension Agricultural Economist, Southwest (1990). BS 1984 N. Dakota St. U.; MS 1986, Iowa St. U.

**DIAMOND, CAROLE A.**, Nurse Practitioner, Lafene Health Cntr. (1989). BSN Troy St. U.; Cert. San Jose St. U.

**DICK, GARY L.**, Asst. Prof. of Entomology; Research Entomologist, Corn Insects, SW Research-Extension Cntr. (1989). BS 1977, Colorado St. U.; MS 1987, Kansas St. U.

**DICKEN, D. DEAN**, Prof. Emeritus; Area Extension Specialist, Crops and Soils (1942). BS 1937, Kansas St. U.; MS 1942, U. of Illinois.

**DICKSON, WILLIAM M.**, Farm Management Association Fieldman Emeritus (1961). BS 1956, MS 1961, Kansas St. U.

**DIEBEL, PENELOPE L.**, Asst. Prof. of Agricultural Economics, Natural Resource Economics (1990). BS 1983, MS 1986, Colorado St. U.; PhD 1990, Virginia Poly. and St. U. (\*)

**DIKEMAN, MICHAEL E.**, Prof. of Animal Sciences and Industry; Meats Research Scientist, Agr. Exp. Sta. (1970). BS 1966, Kansas St. U.; MS 1968, Michigan St. U.; PhD 1970, Kansas St. U. (\*)

**DILLMAN, NORMAN G.**, Prof. of Electrical and Computer Engineering (1990). BS 1960, MS 1962, PhD 1965, Iowa State U. (\*)

**DILLON, JANET K.**, Instr. of English (1986). BSF 1970, Emporia St. U.; MSF 1982, Kansas St. U.

**DIMEL, DANA**, Asst. Football Coach (1990). BS 1987, Kansas St. U.

**DIXON, LYLE J.**, Prof. Emeritus of Mathematics (1963). BS 1948, MS 1950, Oklahoma St. U.; PhD 1963, U. of Kansas. (\*)

**DIXON, MICHAEL E.**, Asst. Dir., Video Specialist, KS Industrial Ext. Service (1989). BS 1978, Kansas St. U.

**DOAN, DOROTHY M.**, Auditor, Internal Auditing (1992). BBA 1994, Baker U.

**DODD, ELIZABETH C.**, Assoc. Prof. of English (1989). BA 1983, Ohio U.; MFA 1986, PhD 1989, Indiana U. (\*)

**DODDS, WALTER K.**, Asst. Prof. of Biology; Aquatic Ecology, Agr. Exp. Sta. (1990). BS 1980, U. of Denver; PhD 1986, U. of Oregon. (\*)

**DOLLAR, DIANE A.**, Asst. Prof. of Art (1976). BS 1955, MA 1967, Kansas St. U.; MFA 1986, U. of Kansas.

**DOLLAR, JOHN PAUL**, Asst. Dean Emeritus of Engineering, Assoc. Prof. Emeritus of Electrical and Computer Engineering (1960). BS 1956, MS 1966, Kansas St. U.

**DOMAINGUE, ROBERT**, Coord. of Mediated Learning, Cont. Ed. (1994). BA 1982, Drew U. Madison, NJ; MED 1985, Washington St. U.; PhD 1990, U. of Wisconsin-Madison.

**DOMSCH, L. ANN**, Co. Extension Agent, Home Economics, Rawlins Co., Atwood (1959). BS 1958, MS 1981, Kansas St. U.

**DONNELLY, ANTHONY**, Asst. Dir., Employee Relations (1991). BA 1973, MS 1979, Pittsburg St. U.

**DONNELLY, DAVID P.**, Prof. of Accounting (1977). BS 1973, MBA 1977, Kansas St. U.; PhD 1983, U. of Illinois; CPA 1973, Kansas. (\*)

**DONNELLY, MICHAEL L.**, Assoc. Prof. of English (1972). AB 1963, Harvard Col.; PhD 1970, Harvard U. (\*)

**DONNERT, HERMANN JAKOB ANTON**, Prof. of Nuclear Engineering and Dir. of Neutron Activation Analysis Lab (1966). PhD 1951, Leopold-Franzens U., Austria. (\*)

**DONOGHUE, NANCY H.**, Instr., Libraries (1990). BA 1960, U. of Notre Dame; MLS 1965, Western Michigan U.

**DONOGHUE, TIMOTHY R.**, Vice Provost for Research and Dean of the Graduate School; Prof. of Physics (1990). BS 1957, Boston Col.; PhD 1963, U. of Notre Dame. (\*)

**DONOVAN, ROBERT KENT**, Assoc. Prof. of History (1964). BA 1954, Harvard U.; BA 1958, MA 1963, Cambridge U.; PhD 1965, Harvard U. (\*)

**DORCEY, MICHAEL J.**, Asst. Editor, Engineering Extension Programs (1988). BA 1978, Creighton U.

**DOVENMUEHLER, ANN**, Asst. Athletic Trainer (1991). BS 1989, Mankato St.; MS 1991, U. of Oklahoma.

**DOVER, BARRY A.**, Asst. Prof. of Entomology, Stored Products (1989). BS 1981, MS 1983, Clemson U.; PhD 1987, Texas A&M. (\*)

**DOVETON, JOHN D.**, Adjunct Prof. of Geology (1982). PhD 1970, U. of Edinburgh, Scotland.

**DOWELL, GORDON R.**, Dir. of Publications, KSU Foundation (1985). BS 1983, Kansas St. U.

**DOWDY, ALAN K.**, Asst. Prof. of Entomology, Adjunct. USDA-ARS. PhD 1988, Oklahoma St. Univ. (\*)

**DOWNEY, DOROTHY J.**, Administrative Asst., KSU Foundation (1983).

**DOWNEY, RONALD G.**, Dir., Inst. Research and Analysis; Prof. of Psychology (1975). BA 1966, U. of Texas; MA 1968, PhD 1971, Temple U. (\*)

**DOYLE, JAMES**, Asst. Prof. of Philosophy (1993). BA 1986, MA 1989, Cambridge U.; PhD 1991, U. of Virginia.

**DRAGSDORF, R. DEAN**, Prof. Emeritus of Physics (1948). BS 1944, PhD 1948, Massachusetts Inst. of Tech. (\*)

**DRAKE, CALVIN L.**, Prof. of Animal Sciences and Industry; Beef Cattle Scientist, Agr. Exp. Sta. (1966). BS 1955, Kansas St. U.; MS 1959, U. of Arkansas; PhD 1963, Kansas St. U.

**DRAKE, TERRY**, Asst. Track Coach (1993). MS 1987, Kansas St. U.; BA 1991, Azusa Pacific U.

**DRAPER, GEORGE**, Asst. Prof. of Philosophy (1993). BA 1979, PhD 1989, U. of California—Irvine.

**DREHER, GERALD L.**, Co. Extension Agent, Agr., Edwards Co., Kinsley (1987). BS 1986, Kansas St. U.

**DRESSLER, ROBERT E.**, Assoc. Head and Prof. of Mathematics (1970). BA 1965, U. of Rochester; MA 1966, PhD 1969, U. of Oregon. (\*)

**DRISS, ANN**, Instr. of Modern Languages (1967). AB 1952, Washburn U.; MS 1966, Emporia St. U.

**DRYDEN, MICHAEL W.**, Asst. Prof. of Parasitology (1990). BS 1981, DVM 1984, Kansas St. U.; MS 1988, PhD 1990, Purdue U. (\*)

**DUBOIS, JAMES H.**, Assoc. Prof. of Interior Arch. (1983). BArch 1978, MArch 1985, Kansas St. U.

**DUCKERS, HARRY G., JR.**, Co. Extension Dir. Emeritus, Wyandotte Co., Kansas City (1944). BS 1943, Kansas St. U.

**DUDZIAK, DONALD J.**, Adjunct Prof. of Nuclear Engineering (1989). BS 1956, U.S. Merchant Marine Academy; MS 1957, U. of Rochester; PhD 1963, U. of Pittsburgh.

**DUKAS, STEPHEN**, Asst. Prof. of Finance (1990). BS 1981, BA 1989, PhD 1989, Florida St. U. (\*)

**DUMLER, JEFFERY K.**, Pharmacist, Lafene Health Ctr. (1993). BS 1974, U. of Kansas.

**DUNAVAN, WILBUR J.**, Co. Extension Agricultural Agent Emeritus, Smith Co., Smith Cntr. (1959). BS 1958, Kansas St. U.

**DUNBAR, JOHN O.**, Prof. and Dean Emeritus of Agr.; Dir. of the Agr. Exp. Sta. (1976). BS 1942, MS 1948, PhD 1954, Purdue U.

**DUNCAN, ALLEY H.**, Prof. Emeritus of Mechanical Engineering (1942). BS 1937, MS 1949, Kansas St. U.; Professional Engineer, 1948.

**DUNCAN, STEVEN S.**, Asst. Prof. of Agricultural Economics, Grain Marketing, Agribusiness (1988). BS 1982, U. of Missouri; MS 1986, PhD 1988, Iowa St. U.

**DUNCAN, STEWART R.**, Asst. Prof.; Extension Specialist, Crops and Soils, South Central (1991). BS 1977, MS 1988, PhD 1991, Kansas St. U.

**DUNECZKY, CSILLA A.**, Asst. Prof. of Chemistry, (1989). BS 1981, U. of Colorado; PhD 1987, U. of Pennsylvania (\*).

**DUNHAM, JAMES R.**, Prof. of Animal Sciences and Industry; Extension Specialist, Dairy Science (1969). BS 1959, MS 1967, PhD 1969, Kansas St. U.

**DUNN, JON D.**, Prof. and Head of Anatomy and Physiology (1990). BA 1962, Col. of Idaho; PhD 1967, U. of Kansas (\*).

**DUNNING, BEVERLY K.**, Co. Extension Agent, Home Economics, Sedgwick Co., Wichita (1964). BS 1963, Kansas St. U.; MS 1970, Wichita St. U.

**DURAI, DEIVAN**, Computer Information Specialist, Planning and Evaluation Services (1987). BS 1976, MS 1978, Indian Agricultural Research Inst.; MS 1989, Kansas St. U.; PhD 1984, Kansas St. U.

**DURGAN, JACK CLYDE**, Prof. Emeritus of Interior Arch. (1954). BArch 1951, Oklahoma St. U.; MS 1957, Kansas St. U. Registered Architect. (\*)

**DUSHKIN, LELAH**, Assoc. Prof. of Sociology (1968). AB 1953, Smith Col.; MA 1957, PhD 1974, U. of Pennsylvania. (\*)

**DYCK, NORMA J.**, Prof., Education (1976). BA 1957, Bethany Col.; MS 1970, EdD 1972, U. of Kansas. (\*)

**DYER, RUTH A.**, Assoc. Prof. of Electrical and Computer Engineering (1983). BS 1973, MS 1975, Kansas St. U.; PhD 1980, U. of Kentucky. (\*)

**DYER, STEPHEN A.**, Prof. of Electrical and Computer Engineering (1983). BS 1973, MS 1974, PhD 1977, Kansas St. U. (\*)

**DZEWALTOWSKI, DAVID**, Assoc. Prof. of Kinesiology (1987). BA 1987, U. of Iowa; MS 1985, West Virginia U.; PhD 1987, U. of Iowa. (\*)

**EALY, ROBERT P.**, Prof. Emeritus of Landscape Arch. (1969). BS 1941, Oklahoma St. U.; MS 1946, Kansas St. U.; PhD 1955, Louisiana St. U. Registered Landscape Architect. (\*)

**EASTERDAY, WILDA L.**, Co. Extension Agent, Home Economics; Meade Co., Mcade (1990). BS 1966, Kansas St. U.

**EBADI, YAR M.**, Assoc. Dean of Bus. Admin.; Prof. of Management (1983). BS 1968, Kabul U.; MS 1970, Georgia Inst. of Tech.; MBA 1974, DBA 1977, Indiana U. (\*)

**EBERLE, WILLIAM M.**, Assoc. Prof. of Agronomy; Ext. Spec., Land Resources (1973). BS 1968, Purdue U.; MS 1970, PhD 1973, U. of Illinois.

**ECK, THOMAS P.**, Asst. Prof. of Animal Science and Industry; Extension Specialist, Livestock Production, Southwest (1992). BS 1983, Panhandle St. U.; MS 1987, Texas Tech. U.; PhD 1991, U. of Arizona.

**ECKELS, STEVEN J.**, Asst. Prof. of Mechanical Engineering (1993). BS 1988, Dordt College; MS 1991, PhD 1993, Iowa St. U. (\*)

**ECKHOFF, N. DEAN**, Head and Prof. of Nuclear Engineering; Dir. of Cntr. for Energy Studies (1961). BS 1961, MS 1963, PhD 1968, Kansas St. U.; Professional Engineer, 1978. (\*)

**ECKLUND, ROBERT D.**, Staff Physician, Lafene Health Cntr. (1979). BS 1970, Virginia Poly. Inst.; MD 1974, Medical Col. of Virginia.

**EDELBLUTE, DALE H.**, Prof. Emeritus; Area Extension Specialist, Crops and Soils (1947). BS 1934, Kansas St. U.

**EDGAR, JAMES H.**, Assoc. Prof. of Chemical Engineering (1988). BS 1981, U. of Kansas; MS 1982, PhD 1987, U. of Florida. (\*)

**EDWARDS, A. THORNTON**, Dir. Emeritus of Housing and Dining Services (1945). BS 1941, MS 1946, Kansas St. U.

**EDWARDS, ALVIN J.**, Prof. Emeritus of Food Animal Medicine (1975). DVM 1959, PhD 1979, Kansas St. U. (\*)

**EDWARDS, JENNIFER R.**, Asst. Prof. of Music (1973). BA 1967, Austin St. Col.; MA 1970, U. of Oregon. (\*)

**EDWARDS, MARK D.**, Unit Dictitian, Housing and Dining Services (1983). BS 1982, U. of Arizona; MS 1986, Kansas St. U.

**EDWARDS, ROBERT L.**, Prof. of Music (1972). BM 1961, MM 1963, Wichita St.; DMA 1972, U. of Oregon. (\*)

**EGGELSTON, TIMOTHY L.**, Co. Extension Agent, Agr.; Kearney Co., Lakin (1991). BS 1988, Panhandle St. U.

**EHLER, STANLEY W.**, Assoc. Prof. of Agronomy (1972). BS 1962, MS 1964, U. of Southern Illinois; PhD 1974, U. of Missouri. (\*)

**EILERT, ARNOLD**, Research Assoc., Grain Science and Industry (1986). MS 1986, Kansas St. U.

**EILERT, SCOTT**, Video Dir., Intercollegiate Athletics (1993). BS 1991, Kansas St. U.

**EISELEIN, GREGORY**, Asst. Prof. of English ().BA 1987, U. of Idaho; PhD 1993, U. of Iowa. (\*)

**EISENHOUR, LARRY O.**, Instr. of Computer Tech. (1987). AA 1986, Kansas Col. of Tech.; BS 1962, Fort Hays St. U.

**EITNER, WALTER H.**, Prof. Emeritus of English (1954). AB 1948, U. of Denver; AM 1949, U. of Michigan; PhD 1959, U. of Denver. (\*)

**EL-GHORI, ALI KANSO**, Asst. Prof. of Journalism and Mass Communications (1990). BA 1975, The Lebanese U.; MS 1981, PhD 1986, Ohio U. (\*)

**ELCOCK, DOUGLAS A.**, Asst. to Dean for Bus. Adm., Vet. Medicine (1989). BS 1971, U. of Kansas; MS 1986, Kansas St. U.

**ELDER, NELDA J.**, Chair, Collection Dev., Libraries (1972). BA 1963, Wichita St. U.; MLS 1970, Emporia St. U.

**ELKINS, RICHARD N.**, Dir. of Admissions (1966). BS 1956, MS 1963, Kansas St. U.

**ELLIOTT, DENNIS R.**, Phys. Asst., Lafene Health Cntr. (1981). BS 1977, Wichita St. U.; Phys. Asst. Program, 1977, Wichita St. U.

**ELLIOTT, MARK**, Golf Coach (1991). BE 1984, Washburn U.

**ELLITHORPE, VERA M.**, Prof. Emerita; Extension Specialist, Family Housing and Safety (1938). BS 1935, MS 1939, Kansas St. U.; PhD 1963, Ohio St. U.

**ELMORE, RONNIE G.**, Associate Dean and Prof. of Theriogenology (1990). BA 1969, Greenville College; BS 1970, DVM 1972, U. of Illinois; MS 1978, U. of Missouri. Diplomate 1977, American Col. of Theriogenologists.

**ELSEA, STANLEY W.**, Assoc. Prof. of Management (1985). BS 1954, MBA 1981, Kansas St. U.; DBA 1984, Indiana U. (\*)

**ELZINGA, AGNES L.**, Student Personnel Specialist, Education (1987). BS 1983, MS 1986, Kansas St. U.

**ELZINGA, RICHARD J.**, Prof. of Entomology; Research Entomologist, Medical Insects and Mites, Agr. Exp. Sta. (1961). BS 1955, MS 1956, PhD 1960, U. of Utah. (\*)

**EMERSON, M. JARVIN**, Prof. of Economics; Economist, Agr. Exp. St. (1962). BA 1957, Luther Col.; MA 1960. PhD 1963, U. of Iowa. (\*)

**EMIZET, KISANGANI**, Asst. Prof. of Political Science (1994). PhD 1994, U. of Iowa.

**ENGLAND, NAOMI A.**, Co. Extension Agent, Home Economics, Sedgwick Co., Wichita (1976). BS 1960, Central Oklahoma St. Col.; MS 1968, Kansas St. U.

**ENGLER, CATHERINE J.**, Co. Extension Agent, 4-H, Grant Co., Ulysses (1985). BS 1985, Kansas St. U.

**EPPS, JAMES**, Assoc. Athletic Dir. (1981). BA 1969, Washburn U.; MS 1972, Pittsburg St. U.

**ERDWIEN, NEIL C.**, Assoc. Intersystems Applications Support Specialist, Computing and Telecommunications Activities (1984). BS 1984, MS 1989, Kansas St. U.

**ERHART, ANDREW B.**, Prof. Emeritus, SW Kansas Branch Agr. Exp. Sta. (1931). BS 1933, Kansas St. U.

**ERICKSON, DONALD B.**, Prof. of Agricultural Economics; Extension Agricultural Economist, Marketing (1966). BS 1955, MS 1960, Wyoming U.; PhD 1964, Purdue U. (\*)

**ERICKSON, HOWARD H.**, Prof. of Anatomy and Physiology; Research Cardiovascular Physiologist (1981). BS 1957, DVM 1959, Kansas St. U.; PhD 1966, Iowa St. U. (\*)

**ERICKSON, LARRY EUGENE**, Prof. of Chemical Engineering; Dir. of Hazardous Substance Research Cntr. (1964). BS 1960, PhD 1964, Kansas St. U. (\*)

**ERICKSON, PHYLLIS**, Education Bibliographer, Libraries (1990). BS 1954, Northern St. U. of S. Dakota; MLS 1962, U. of Washington.

**ERNST, F. GENE**, Prof. Emeritus of Arch. and Planning (1967). BArch 1953, Kansas St. U.; MArch (Urban Design) 1971, U. of Washington. Registered Architect. (\*)

**ERPELDING, LAWRENCE H., JR.**, Assoc. Prof.; Assoc. Dir. of Resident Instruction, Col. of Agr. (1977). BS 1965, MS 1969, PhD 1972, Kansas St. U.

**ERSKIN, LORI A.**, Co. Extension Agent, Home Economics, Stanton Co., Johnson (1983). BS 1983, Kansas St. U.

**ESAU, JULIE A.**, Asst. Dir., Student Financial Assistance (1993). BS 1983, Bethel College; MS 1992, Emporia St. U.

**ESHBAUGH, ELBERT L.**, Asst. Prof. Emeritus of Entomology (1945). BS 1936, MS 1951, Kansas St. U.

**EUSTACE, WALTER D.**, Prof. of Grain Science and Industry; Milling Tech. Research Scientist, Agr. Exp. Sta. (1973). BS 1959, MS 1962, PhD 1967, Kansas St. U. (\*)

**EVANS, CINDY L.**, Instr.; Co. Extension Home Economist, EFNEP Shawnee Co., Topeka (1990). BS 1980, Fort Hays St. U.; MS 1991, Kansas St. U.

**EVANS, KRISTI**, TV-Radio Coord., News Services (1993). BA 1987, U. of Wisconsin-Eau Claire.

**EVANS, THOMAS MARION**, Prof. Emeritus of Health, Physical Education, and Recreation (1942). BS 1930, Kansas St. U.; MS 1942, U. of Michigan; PDir 1958, Indiana U. (\*)

**EVERSMAYER, MERLE G.**, Adjunct Assoc. Prof. of Plant Pathology; Research Cereal Rust Plant Pathologist, USDA, SEA-AR (1965). BS 1966, MS 1969, PhD 1971, Kansas St. U. (\*)

**EVERSON, EVERETT K.**, Farm Management Association Fieldman (1974). BS 1973, MS 1974, Kansas St. U.

**EWANOW, LYNN**, Asst. Dean of Arch. and Design; Assoc. Prof. of Landscape Arch. (1979). BA 1975, Keuka Col.; MLA 1979, SUNY, Col. of Environmental Science and Forestry.

**EXDELL, JOHN B.**, Assoc. Prof. of Philosophy (1972). BA 1967, Dickinson Col.; PhD 1973, U. of Texas at Austin. (\*)

**EYESTONE, CECIL L.**, Assoc. Prof. Emeritus; Extension Specialist, 4-H Youth (1943). BS 1944, Kansas St. U.; MS 1958, Colorado St. U.

**EYESTONE, GREGG R.**, Co. Extension Agent, Horticulture; Lyon Co., Emporia (1990). BS 1986, Kansas St. U.

**FAHRENHOLZ, CHARLES H. III**, Research Asst. of Grain Science and Industry (1984). MS 1983, PhD 1989, Kansas St. U.

**FAIDLEY, DONALD L.**, Fieldman Emeritus, Farm Management Association (1956). BS 1953, Kansas St. U.

**FAIRBANKS, GUSTAVE EDMUND**, Prof. Emeritus of Agricultural Engineering; Ag. Exp. Sta. (1941). BS 1941, MS 1950, Kansas St. U.; Professional Engineer, 1948. (\*)

**FAIRMAN, JOHN T.**, Asst. VP, for Institutional Advancement/U. Relations (1987). BS 1966, Central Michigan U.

**FALLIN, JANA R.**, Assoc. Prof. of Music Education and Education (1988). BME 1968, Baylor U.; MM 1974, PhD 1979, U. of Texas. (\*)

**FALLON, DON**, Coord. Religious Activities (1989). BA 1948, Wartburg Col., Iowa; BD, M Div 1952, Wartburg Seminary, Iowa.

**FAN, LIANG-TSENG**, Univ. Distinguished Prof. and Head, Chemical Engineering; Dir., Inst. for Systems Design and Optimization; Assoc., Inst. for Environmental Research (1958). BS 1951, National Taiwan U.; MS 1954, Kansas St. U.; MS 1958, PhD 1957, West Virginia U. (\*)

**FARLEY, ELIZABETH KAY**, Bookstore Dir., K-State Union (1988). BA 1982, National U. Irrive, California.

**FARMER, DIANA M.**, Collection Development, Libraries (1972). BA 1971, MLS 1972, Emporia St. U.

**FARMER, EARL L.**, Prof. Emeritus of Animal Sciences and Industry; Dairy Cattle Research Physiologist, Agr. Exp. Sta. (1949). BS 1948, U. of Missouri; MS 1957, Kansas St. U.; PhD 1963, U. of Wisconsin. (\*)

**FARMER, LARRY A.**, Prof. of Electronic Engineering Tech. (1968). AS 1955, Sayre Junior Col.; BS 1957, Oklahoma St. U.; MS 1971, Kansas St. U.

**FARRAND, CARLA R.**, Co. Ext. Agent, Home Economics, Wallace Co., Sharon Springs (1992). BS 1992, Panhandle St. U.

**FARRAND, DOROTHY M.**, Psychologist, U. Counseling Services (1989). BA 1977, MA 1981, PhD 1989, Witwatersrand, South Africa.

**FARRELL, EUGENE PATRICK**, Prof. Emeritus of Grain Science and Industry (1949). BS 1935, MS 1952, Kansas St. U. (\*)

**FATELEY, WILLIAM G.**, Prof. of Chemistry (1972). AB 1951, Franklin Col.; PhD 1956, Kansas St. U. (\*)

**FATEMI, ALI**, Prof. of Finance (1980). BA 1972, Tehran Bus. Col.; MBA 1975, PhD 1979, Oklahoma St. U. (\*)

**FATTAEY, A. ABE**, U. Engineer, Facilities Planning (1988). BA 1982, Kansas St. U.

**FAUBION, JON M.**, Assoc. Prof. of Grain Science and Industry (1983). BS 1973, PhD 1980, Kansas St. U. (\*)

**FAUSETT, MARVIN R.**, Prof. of Agricultural Economics; Extension Agricultural Economist, Southeast (1979). BS 1961, MS 1970, PhD 1979, U. of Missouri.

**FAW, RICHARD EARL**, Prof. of Nuclear Engineering; Dir. of Nuclear Reactor Facility (1962). BS 1959, U. of Cincinnati; PhD 1962, U. of Minnesota; Professional Engineer, 1970. (\*)

**FAY, KEVIN T.**, Research Asst. of Plant Pathology (1983). BS 1975, Kansas St. U.

**FEATHERSTONE, ALLEN M.**, Dir. of Graduate Studies; Assoc. Prof. of Agricultural Economics (1986). BS 1982, U. of Wisconsin; MS 1984, PhD 1986, Purdue U. (\*)

**FEDDE, M. ROGER**, Prof. of Anatomy and Physiology; Research Neurophysiologist (1964). BS 1957, Kansas St. U.; MS 1959, PhD 1963, U. of Minnesota. (\*)

**FEDDER, NORMAN J.**, Distinguished Prof. of Speech (1970). BA 1955, Brooklyn Col.; MA 1956, Columbia U.; PhD 1962, New York U. (\*)

**FELTNER, KURT C.**, Prof.; Dir.-at-Large, NC Association of AES Directors (1982). BS 1957, MS 1959, U. of Wyoming; PhD 1963, U. of Arizona. (\*)

**FENTON, DONALD L.**, Prof., Mechanical Engineering (1986). BS 1969, Kansas St. U.; MS 1970, PhD 1974, U. of Illinois. (\*)

**FENWICK, BRADLEY W.**, Assoc. Prof. of Pathology (1986). DVM 1981, MS 1983, Kansas St. U.; PhD 1985, U. of California; Diplomate 1988, American Col. of Vet. Microbiology. (\*)

**FERGUSON, CLYDE RANDOLPH**, Assoc. Prof. Emeritus of History (1960). BA 1955, U. of Oklahoma; MA 1957, PhD 1960, Duke U. (\*)

**FEYERHERM, ARLIN M.**, Prof. Emeritus of Statistics; Statistical Consultant, Agr. Exp. Sta. (1953). BS 1946, U. of Minnesota; MS 1948, U. of Iowa; PhD 1952, Iowa St. U. (\*)

**FEYERHARM, WILLIAM R.**, Asst. Dean of Arts and Sciences; Asst. Prof. (1979). AB 1959, Carleton Col.; MA 1964, PhD 1971, U. of Wisconsin.

**FICK, WALTER H.**, Assoc. Prof. of Agronomy, Range Management Research Agronomist, Agr. Exp. Sta. (1978). BS 1973, MS 1975, U. of Nebraska; PhD 1978, Texas Tech. U. (\*)

**FICKEN, WILLA L.**, Co. Extension Home Economist Emerita, Grant Co., Ulysses (1957). BS 1930, Kansas St. U.

**FIGURSKI, DONALD L.**, Prof. Emeritus; Extension Economist, Northeast (1966). BS 1952, MS 1959, Colorado St. U.

**FIKE, GARY D.**, Co. Extension Agent, Mitchell Co., Beloit (1983). BS 1983, Oklahoma Panhandle St. U.

**FINA, LOUIS R.**, Prof. Emeritus of Biology; Microbiologist, Agr. Exp. Sta. (1954). AB 1942, MS 1948, PhD 1950, U. of Illinois. (\*)

**FINCK, STANLEY G.**, Assoc. Prof. Emeritus of Music (1983). BM 1962, U. of Iowa; MME 1965, U. of Arkansas; MA 1971, North Texas St. U.

**FINGLAND, ROGER B.**, Assoc. Prof. of Small Animal Surgery (1987). DVM 1981, U. of Missouri; MS 1985, Ohio St. U.; Diplomate 1987, American Col. of Vet. Surgeons. (\*)

**FINK, ANDREW E.**, Hall Dir., Housing and Dining Services (1992). BS 1989, U. of Akron; MEd 1992, U. of South Carolina.

**FINK, CAROL J.**, Co. Extension Agent, 4-H, Pottawatomie Co., Westmoreland (1980). BS 1977, MS 1991, Kansas St. U.

**FINLEY, PHILIP B.**, Assoc. Prof. Emeritus; Area Extension Dir. (1967). BS 1951, MS 1956, Kansas St. U.

**FINNEGAN, MICHAEL**, Prof. of Anthropology (1973). BA 1967, MA 1970, PhD 1972, U. of Colorado. Diplomate 1978, American Board of Forensic Anthropology. (\*)

**FISCHER, EMIL C.**, Prof. and Dean Emeritus, Col. of Architecture and Design (1955). AB 1929, Columbia Col.; BS in Arch. 1932, MS in Arch. 1933, Columbia U.; Registered Architect. (\*)

**FISH, G. KEITH**, Co. Extension Agricultural Agent Emeritus, Trego Co., WaKeeney (1958). BS 1943, Kansas St. U.

**FISHER, CARL D.**, Asst. Prof. of Military Science (1985). BS 1977, U. of Kansas.

**FISHER, DANNY G.**, Asst. Prof. of Accounting (1991). BS 1985, MAcc 1988, Kansas St. U.; CPA 1985, Kansas U.; PhD 1992, U. of Missouri.

**FISHER, JOHN MICHAEL**, Research Asst., KABSU (1989). BS 1985, Kansas St. U.

**FISHER, SHANNON C.**, Instr. of Accounting (1990). BS 1984, MAcc 1985, Kansas St. U.; CPA 1986, Kansas.

**FISHER, STEVEN D.**, Assoc. Prof.; Extension Specialist, 4-H Youth Programs (1971). BS 1971, MS 1977, Kansas St. U.

**FISHER, WALTER H.**, Asst. Prof. of Economics (1992). BA 1984, U. of Cal.-Berkeley; PhD 1990, U. of Washington. (\*)

**FITZGERALD, DONALD M.**, Visiting Prof. of Journalism (1984). BA 1942, U. of Kansas.

**FJELL, DALE L.**, Assoc. Prof., Extension Specialist, Crops Production (1982). BS 1974, Kearny St. Col.; MS 1978, Wayne St. Col.; PhD 1982, Kansas St. U.

**FJELL, SHERYL**, Coord. of Directed Study Program, Academic Assistance Cntr. (1991). BS 1977, Kansas St. U.

**FLAHERTY, GLASSEL D.**, Research Asst., KABSU (1977). BS 1974, Kansas St. U.

**FLAHERTY, ROBERTA D.**, Instr. of Education; Exec. Dir. of NACADA (1970). BEd 1970, Washburn U. of Topeka; MS 1975, Kansas St. U.

**FLAMING, SHAROLYN K.**, Co. Extension Agent, Home Economics, Riley Co., Manhattan (1983). BS 1982, Bethel Col.

**FLANAGAN, BRUCE**, Prof. Emeritus of Speech (1966). BS 1953, Western Michigan U.; MS 1958, Southern Illinois U.; PhD 1966, U. of Florida. (\*)

**FLINCHBAUGH, BARRY L.**, Prof. of Agricultural Economics; Extension St. Leader, Agricultural Economics (1971). BS 1964, MS 1967, PhD 1971, Purdue U.

**FLINN, PAUL W.**, Adjunct Asst. Prof. of Entomology, USDA Grain Marketing Research Cntr. (1988). BS 1977, U. of Michigan; MS 1981, PhD 1984, Pennsylvania St. U. (\*)

**FLITER, JOHN.**, Asst. Prof. of Political Science (1994). PhD 1993, U. of Maryland.

**FLOUER, JACK**, Prof. and Head of Music (1971). BA 1960, Marshall U.; MM 1962, Eastman School of Music; DM 1971, Indiana U. (\*)

**FOERSTER, BERND**, Prof. Emeritus of Arch. and Planning (1971). BS in Arch. 1954, U. of Cincinnati; MArch 1957, Rensselaer Polytechnic Inst. (\*)

**FOLLAND, NATHAN O.**, Prof. of Physics (1966). BA 1959, Concordia Col.; PhD 1965, Iowa St. U. (\*)

**FOLTZ-SCHLEGEL, KRISTEN A.** Co. Extension Agent, Home Economics; Haskell Co., Sublette (1991). BS 1987, Southeast Missouri St. U.

**FORD, ROY D.**, Co. Extension Agricultural Agent Emeritus, Sumner Co., Wellington (1964). BS 1964, MS 1975, Oklahoma St. U.

**FORSHEE, JOHN D.**, Co. Extension Agent, Agr., Rooks Co., Stockton (1989). BS 1982, Kansas St. U.

**FORSYTH, PENNY J.**, Temp. Asst. to the Dean of Engineering (1984). BS 1966, Michigan St. U.

**FORSYTH, RICHARD H.**, Prof. of Landscape Arch.; Dir. of Cntr. for Research and Community Services (1979). BSLA 1967, Michigan St. U.; MLA 1969, Harvard U. Registered Landscape Architect. (\*)

**FORSYTH, SARAH W.**, Asst. Dir. for Fitness and Aquatics, Recreational Services (1993). BFA 1972, U. of North Texas; MS 1990, Texas Christian U.

**FORTNEY, WILLIAM D.**, Asst. Prof. of Small Animal Medicine (1977). BS 1970, DVM 1974, U. of Missouri.

**FOSTER, DONALD E.**, U. Registrar (1965). BS 1960, MS 1961, Kansas St. U.

**FOWLER, EDDIE R.**, Prof. of Electrical and Computer Engineering (1962). BS 1957, MS 1965, Kansas St. U.; PhD 1969, Oklahoma St. U. (\*)

**FOX, KENNETH L.**, Prof. Emeritus of Accounting (1969). BA 1953, MA 1960, Baylor U.; CPA 1958, Texas, Louisiana; CPA 1971, Kansas; PhD 1966, U. of Illinois. (\*)

**FOX, MARK**, Asst. Basketball Coach (1994). BS 1989, Eastern New Mexico U.; MS 1994, U. of Kansas.

**FOX, RODNEY O.**, Asst. Prof. of Electrical and Computer Engineering (1989). BS 1982, MS 1985, PhD 1987, Kansas State U. (\*)

**FRAHM, ROBERT L.**, Adjunct Clinical Instr. of Med. Tech. (1976). BM 1958, Bethany Col.

**FRANCIS, EUGENE N.**, Prof. Emeritus; Extension Specialist, Animal Science, Northeast (1967). BS 1949, Kansas St. U.; MS 1953, Iowa St. U.

**FRANCISCO, JOHN F.**, Assoc. Prof. of Computer Engineering Tech. (1983). AT 1982, BS 1969, Fort Hays St. U.

**FRANK, RONALD E.**, Assoc. Prof., Extension Television Producer (1985). BA 1972, Fort Hays St. U.; MA 1979, Kansas St. U.

**FRANKE, JAMES L.**, Assoc. Prof. of Political Science (1984). BS 1972, Bradley U.; MA 1974, PhD 1979, N. Illinois U. (\*)

**FRANKLIN, E. BERNARD**, Asst. Dean of Student Life (1990). BS 1976, Kansas St. U.; MS 1989, U. of Southern Alabama.

**FRANKO, CAROL S.**, Asst. Prof. of English (1990). BA 1983, The American U.; MA 1984, PhD 1990, U. of Wisconsin-Madison. (\*)

**FRANSEEN, EVAN**, Adjunct Asst. Prof. of Geology (1989). BS 1981, MS 1985, PhD 1988, Wisconsin U. (\*)

**FRASER, TRACEY**, Asst. Dir., Career and Employment Services (1990). BS 1985, MS 1987, Kansas St. U.

**FRAZIER, ANGELA R.**, Co. Ext. Agent, Home Economics, Decatur Co., Oberlin (1992). BS 1991, U. of Nebraska-Lincoln.

**FRAZIER, EVELYN M.**, Instr. of English (1984). BS 1955, Sterling Col.; MA 1970, Kansas St. U.

**FRAZIER, LESLIE P.**, Prof. Emeritus; Extension Specialist, Organization and Leadership Dev. (1943). BS 1941, Oklahoma St. U.; MA 1962, Colorado St. U.

**FREDENBURG, NEOSHO L.**, Co. Extension Home Economist Emerita, Morris Co., Council Grove (1953). BS 1925, Kansas St. U.

**FREELAND, GLORIA B.**, Asst. Dir. of Student Publications; Asst. Prof. of Journalism (1983). BA 1975, MBA 1983, Kansas St. U.

**FREEMAN, ARTHUR S.**, Asst. Prof. of SW Research Extension Cntr. (1989). BS 1979, MS 1983, U. of Florida; PhD 1987, New Mexico St. U.

**FREEZE, JERRY D.**, Farm Management Association Fieldman (1979). BS 1977, MS 1979, U. of Missouri.

**FREY, ALICE L.**, Co. Extension Agent, Home Economics, Grant Co., Ulysses (1955). BS 1955, MS 1968, Kansas St. U.

**FREY, MARSHA L.**, Prof. of History (1973). BA and BSc in Educ. 1967, MA 1968, PhD 1971, Ohio St. U. (\*)

**FREY, R. SCOTT**, Assoc. Prof. of Sociology; Agr. Exp. Sta. (1985). BS 1973, NW Missouri St. U.; MA 1976, Drake U.; PhD 1980, Colorado St. U. (\*)

**FREY, RONALD E.**, Asst. Prof. of Arch. (1988). BArch 1984, Kansas St. U.; Registered Architect.

**FREY, RUSSELL A.**, Prof. of Nutritional Physiology (1963). DVM 1952, PhD 1970, Kansas St. U.; Diplomate 1988, American Col. of Vet. Nutrition. (\*)

**FRIEDMANN, EUGENE A.**, Prof. Emeritus of Sociology (1965). AB 1947, MA 1949, PhD 1953, U. of Chicago. (\*)

**FRIEDMANN, ROGER A.**, Inst. of English, BA 1978, MA 1987, Kansas St. U.

**FRIEMAN, JEROME**, Prof. of Psychology (1968). BA 1963, MS 1965, Western Reserve U.; PhD 1969, Kent St. U. (\*)

**FRIESEN, JUDITH A.**, Adjunct Instr. of Hotel, Restaurant, Institution Management and Dietetics (1983). BS 1972, Kansas St. U.; MS 1981, Wichita St. U.

**FRISBIE, ROBERT L.**, Co. Extension Agent, Agr., Pawnee Co., Larned (1971). BS 1969, Kansas St. U.

**FRITCHEN, DAVID R.**, Asst. Prof. of Architectural Engineering and Construction Science (1993). BS 1971, Kansas St. U.; MS 1977, U. of Washington

**FRITH, THOMAS J.**, Dir. Emeritus, Housing and Dining Services (1965). BA 1960, MS 1963, EdS 1965, U. of Iowa.

**FRITZ, JOHN O.**, Asst. Prof. of Agronomy; Forage Crops Research, Agr. Exp. Sta. (1990). BS 1978, MS 1981, Purdue U.; PhD 1988, U. of Illinois. (\*)

**FROMM, KENNETH W.**, Co. Extension Agricultural Agent Emeritus Mitchell Co., Beloit (1953). BS 1951, Kansas St. U.; MEd 1964, Colorado St. U.

**FRY, JACK D.**, Asst. Prof. of Horticulture; Turfgrass Management (1991). BS 1982, Kansas St. U.; MS 1984, U. of Maryland; PhD 1987, Colorado St. U. (\*)

**FRYER, E. BETH**, Prof. Emerita of Foods and Nutrition; Agr. Exp. Sta. (1959). BS 1945, U. of New Mexico; MS 1949, Ohio St. U.; PhD 1959, Michigan St. U. (\*)

**FRYER, HOLLY CLAIRE**, Prof. Emeritus of Statistics (1940). BS 1931, U. of Oregon; MS 1933, Oregon St. U.; PhD 1940, Iowa St. U. (\*)

**FULLAGAR, CLIVE J. A.**, Assoc. Prof. of Psychology (1988). BA 1977, MA 1981, PhD 1986, U. of Witwatersrand. (\*)

**FULLER, DEANNA R.**, Employer Relations Specialist, Cooperative Education, Career and Employment Services (1993). BS 1992, Friends U.

**FULTON, R. STEVEN**, Asst. Prof., Libraries (1993). MLS 1973, U. of North Texas; BA 1971, East Central U.

**FULTZ, PATRICIA TROTTER**, Assoc. Prof.; Ext. Spec., 4-H Volunteerism (1993). BS 1970, Colorado St. U.; MS 1980, EdD 1989, Oklahoma St. U.

**FULTZ, WILLIAM E.**, Co. Extension Agent, 4-H Youth, Sedgwick Co., Wichita (1962). BS 1961, Kansas St. U.; MEd 1964, Wichita St. U.

**FUNG, DANIEL Y. C.**, Prof. of Animal Sciences and Industry; Food Microbiologist, Agr. Exp. Sta. (1978). BS 1965, International Christian U., Japan; MSPH 1967, U. of North Carolina; PhD 1969, Iowa St. U. (\*)

**FUNKHOUSER, SARA**, Prof. of Music (1976). BM 1974, MM 1975, DM 1982, U. of Missouri, Kansas City. (\*)

**FURBEE, ROBERT R.**, Assoc. Prof; Head, Dept. of Communications (1992). BA 1972, BS 1977, MS 1978, Ohio St. U.

**GAFFORD, NANCY M.**, Co. Extension Agent, Home Economics, Nemaha Co., Seneca (1958). BS 1958, Kansas St. U.

**GAINES, JOSEPH D.**, Asst. Prof. of Theriogenology (1991). BS 1977, DVM 1979, U. of Illinois; MS 1984, Texas A&M; Diplomate 1984, American Col. of Theriogenologists.

**GALE, IRENE F.**, Asst. Prof. of English (1992). BA 1981, MA 1983, U. of Wisconsin; PhD 1992, U. of South Florida. (\*)

**GALITZER, STEVEN J.**, Asst. U. Industrial Hygienist, Public Safety; Adjunct Asst. Prof. of Industrial Engineering (1988). BS 1974, MS 1978, PhD 1984, Kansas St. U. (\*)

**GALLAGHER, RICHARD R.**, Prof. of Electrical and Computer Engineering; Assoc., Inst. for Environmental Research (1968). BS 1964, MS 1966, PhD 1968, Iowa St. U. (\*)

**GALLAND, JOHN C.** Asst. Prof. of Food Animal Production (1990). BA 1971, Adams St. Col.; MS 1979, PhD 1985, U. of California. (\*)

**GAN, LI-XIAN**, Research Assoc. of Grain Science and Industry (1989). BS 1962, Sichuan U., China.

**GARAVITO, C. LUCIA**, Assoc. Prof. of Modern Languages (1986). BA 1974, Universidad Pedagogica Nacional, Bogota, Colombia; MA 1979, PhD 1982, U. of Kansas. (\*)

**GARDNER, RICHARD L.**, Instr., Extension Energy Service (1981). BS 1969, Kansas St. U.

**GARG, LALIT C.**, Research Assoc. of Biochemistry (1982). PhD 1980, U. of Jawahara, India.

**GARRETT, G. KAY**, Assoc. Dir. of News Services (1984). BA 1967, Bowling Green St. U.; MS 1982, Kansas St. U.

**GARRISON, WILLIAM E.**, Asst. Prof. of Professional Pilot Program (1979). BA 1971, Park Col.; All flight ratings, airplane and helicopter.

**GARTEN, CARL H.**, Co. Extension Dir., Saline Co., Salina (1978). BS 1976, Kansas St. U.

**GARVIN, RICK L.**, Assoc. Data Base Administrator of Administrative User Services, Computing and Telecommunications Activities (1972). BA 1970, San Jose St. U.

**GARVIN, W. LAWRENCE**, Prof. of Arch. (1985). BS 1948, Washington and Lee U.; BArch 1952, Ohio St. U.; MArch 1958, Massachusetts Inst. of Tech.; Registered Architect.

**GARZIO, ANGELO C.**, Prof. Emeritus of Art (1957). BA 1949, BS 1949, Syracuse U.; Diploma di Profitto, 1950, U. of Florence, Italy; MA 1954, MFA 1955, St. U. of Iowa. (\*)

**GAST, KAREN L. B.**, Asst. Prof. of Horticulture; Extension Specialist, Post Harvest (1989). BS 1978, MS 1981, Iowa St. U.; PhD 1988, U. of New Hampshire. (\*)

**GASTON, GLORIA J.**, Co. Extension Agent Emerita, Marshall Co., Marysville (1960). BS 1960, Kansas St. U.

**GATES, DELL E.**, Prof. Emeritus; Extension St. Leader, Entomology Program (1948). BS 1948, MS 1952, Kansas St. U.

**GATEWOOD, EDGAR C., JR.**, Asst. Architect, Facilities Planning (1986). BA 1977, U. of Arizona; BA 1970, U. of Randolph-Macon. Registered Architect.

**GATSHALL, JOHN W.**, Co. Extension Agent, Agr.; Dickinson Co., Abilene (1991). BS 1988, Kansas St. U.

**GAUGHAN, EARL M.**, Asst. Prof. of Equine Surgery (1989). DVM 1981, U. of Georgia; Diplomate 1990, American Col. of Vet. Surgeons. (\*)

**GAUGHAN, KATHY**, Temp. Instr., Small Animal Medicine (1993). BS 1990, DVM 1992, Kansas St. U.

**GAUTHIER, CHARLES P.**, Adjunct Clinical Assoc. of Medical Tech. (1993). BS 1958, St. Martin's Col.; MD 1962, St. Louis U.

**GEBHART, JEWELL O.**, Co. Extension Agricultural Agent Emeritus, Sheridan Co., Hoxie (1945). BS 1940, Oklahoma St. U.

**GEISER, CHERIE J.**, ILDT, Libraries (1978). BA 1972, U. of N. Dakota; MLS 1978, U. of Missouri.

**GEISSLER, WINNIFRED J.**, Assoc. Prof. Emerita of English (1954). B Music Ed 1940, Bethany Col.; MS 1954, PhD 1976, Kansas St. U.

**GEORGE, HERSCHEL C.**, Co. Extension Agent, Agr., Miami Co., Paola (1970). BS 1970, MS 1983, Kansas St. U.

**GERHARDT, PATRICIA A.**, Co. Extension Agent, Cloud Co., Concordia (1988). BS 1978, Kansas St. U.

**GERMANN, RALPH N.**, Farm Management Association Fieldman Emeritus (1956). BS 1951, MS 1957, Kansas St. U.

**GERMER, GINA M.**, Co. Ext. Agent, Republic Co., Belleville (1992). BS 1992, Kansas St. U.

**GERRITZ, ELLSWORTH M.**, Dean/Prof. Emeritus, Admissions and Records (1954). BE 1937, St. Cloud St. Teachers Col.; MA 1948, PhD 1951, U. of Minnesota.

**GEYER, KATHERINE**, Prof. Emerita of Physical Education, Dance, and Leisure Studies (1927). BS 1927, Ohio St. U.; MA 1934, Columbia U. (\*)

**GEYER, WAYNE A.**, Prof. of Forestry; Research Forester, Ecology Silviculture, Agr. Exp. Sta. (1966). BS 1955, Iowa St. U.; MS 1962, Purdue U.; PhD 1971, U. of Minnesota. (\*)

**GFELLER, KRISTI A.**, Co. Ext. Agent, 4-H; Cowley Co., Winfield (1994). BS 1993, Kansas St. U.

**GIBBONS, JACQUE E.**, Asst. Prof. and Dir. of Social Work Program (1982). BA 1968, U. of Kansas; MSW 1973, PhD 1981, Washington U.-St. Louis. (\*)

**GIBBS, MARY LOU**, Co. Extension Agent, Home Economics, Pottawatomie Co., Westmoreland (1972). BS 1952, Kansas St. U.

**GIESE, JOHN P.**, Assoc. Prof. of Physics (1989). BS 1982, PhD 1986, Kansas St. U. (\*)

**GILL, BIKRAM S.**, Prof. of Plant Pathology, Research Cytogeneticist, Agr. Exp. Sta. (1979). BS 1966, MS 1966, Punjab U., India; PhD 1973, U. of California. (\*)

**GILLESPIE, JERRY R.**, Prof. and Head of Clinical Science (1985). DVM 1961, Oklahoma St. U.; PhD 1965, U. of California; Diplomate 1975, American Col. of Vet. Anesthesiologists. (\*)

**GILLESPIE, VINCENT E.**, Assoc. Prof. of English (1966). BA 1952, Sterling Col.; MA 1956, PhD 1970, U. of Kansas.

**GILROY, MARILYN**, Adjunct Instr. of Dietetics (1981). BS 1962, Col. of St. Francis; MS 1966, St. Louis U.

**GIPSON, PHILIP S.**, Adjunct Assoc. Prof. of Biology; Research Leader, Kansas Cooperative Fish and Wildlife (1993). BS 1964, U. of Central Arkansas; MS 1967, PhD 1971, U. of Arkansas. (\*)

**GLASGOW, LARRY A.**, Prof. of Chemical Engineering (1978). BS 1972, MS 1974, PhD 1977, U. of Missouri at Columbia. (\*)

**GLENN, ESTHER BEACHEL**, Asst. Prof. Emerita of English (1948). AB 1930, Kansas Wesleyan U.; MS 1938, Kansas St. U. (\*)

**GLENN, MARILYN S.**, Co. Extension Agent, Kingman Co., Kingman (1971). BS 1968, Kansas St. U.

**GODDARD, JAMES F.**, Assoc. Prof. of Architectural Engineering and Construction Science (1972). BSBC 1969, Kansas St. U.; MS 1972, U. of Florida.

**GOE, W. RICHARD**, Asst. Prof. of Sociology (1991). BA 1979, MA 1981, Marshall U.; PhD 1988, Ohio St. U. (\*)

**GOERTZ, HARVEY E.**, Asst. Prof. Emeritus; Area Extension Specialist, 4-H Youth (1937). BS 1937, Kansas St. U.; MS 1963, Colorado St. U.

**GOETTEL, EVON W.**, Co. Extension Agent, Home Economics, Cherokee Co., Columbus (1969). BS 1965, MS 1978, Kansas St. U.

**GOGUMALLA, NEELIMA V.**, Assoc. Dir. of International Trade Inst. (1991). MBA 1989, Drury Col.; MIM 1990, Thunderbird.

**GOLD, GARRETT L.**, Co. Extension Agent, Agr., Stevens Co., Hugoton (1973). BS 1973, Kansas St. U.

**GOLL, ROSEANNE M.**, Asst. Prof. of Computer Science Tech. (1983). BS 1982, Fort Hays St. U.

**GOLLADAY, RICHARD E.**, Co. Extension Agent, Agr., Osborne Co., Osborne (1979). BS 1952, Kansas St. U.

**GOOD, DON L.**, Prof. Emeritus, Head of Animal Sciences and Industry (1947). BS 1947, Ohio St. U.; MS 1950, Kansas St. U.; PhD 1956, U. of Minnesota. (\*)

**GOODBAND, ROBERT D.**, Asst. Prof. of Animal Sciences and Industry; Extension Specialist, Swine (1989). BS 1984, Pennsylvania St. U.; MS 1986, PhD 1989, Kansas St. U. (\*)

**GOODENOW, PHILIP E.**, Asst. Instr. Emeritus, Education (1967). BA 1953, Kansas Wesleyan.

**GOODHEART, CLARENE L.**, Co. Extension Agent, Home Economics, Rooks Co., Stockton (1974). BS 1961, Fort Hays St. U.

**GOODIN, DOUGLAS G.**, Asst. Prof. of Geography. BA 1986, U. of Northern Colorado; MA 1989, U. of Illinois; PhD 1993, Univ. of Nebraska-Lincoln. (\*)

**GOODIN, KATHY R.**, Co. Extension Agent, Home Economics, Marion Co., Marion (1984). BS 1982, Kansas St. U.

**GOODMAN, ALLAN P.**, Asst. Prof. of Architectural Engineering (1977). BArch 1967, MArch 1988, Kansas St. U.; Registered Architect, Kansas, 1970.

**GOODWIN, BARRY K.**, Assoc. Prof. of Ag. Economics, Demand/Trade, Trade, Advance Demand (1988). BS 1982, Troy St. U.; MS 1984, Mississippi St. U.; PhD 1988, N. Carolina St. U. (\*)

**GORDER, PETER**, Asst. Prof. of Mechanical Engineering (1993). BS 1986, MS 1988, PhD 1993, U. of California-Davis. (\*)

**GORDON, DWIGHT W.**, Asst. Prof. of Electrical and Computer Engineering (1987). BS 1981, Susquehanna U.; MS 1982, Kansas St. U.; PhD 1988, Lehigh U. (\*)

**GORDON, SCOTT C.**, Co. Extension Agent, Agr., Wilson Co., Fredonia (1989). BS 1987, Kansas St. U.

**GORDON, W. BARNEY**, Asst. Prof. of Agronomy; Research Agronomist in Charge, Irrigation Experimental Field-Scandia, Agr. Exp. Sta. (1990). BS 1973, Mississippi St. U.; MS 1985, Auburn U.; PhD 1990, S. Dakota St. U. (\*)

**GORMELY, PATRICK JOSEPH**, Assoc. Prof. of Economics (1967). AB 1963, Catholic U. of America; PhD 1967, Duke U. (\*)

**GORMELY, SUSAN**, Arts and Sciences Advisor (1989). BSN 1964, Catholic U. of America; MS 1988, Kansas St. U.

**GORTON, ROBERT LESTER**, Prof. Emeritus of Mechanical Engineering; Assoc., Inst. for Environmental Research (1960). BS 1953, Louisiana Polytechnic Inst.; MS 1960, Louisiana St. U.; PhD 1966, Kansas St. U.; Professional Engineer, 1953. (\*)

**GOTTSCH, A. HAROLD**, Co. Extension Dir. Emeritus, Reno Co., Hutchinson (1954). BS 1953, Oklahoma St. U.; MS 1962, Kansas St. U.

**GOULD, LEONARD K.**, Assoc. Prof. Emeritus of Forestry; Forestry Specialist, Utilization and Marketing (1963). BS 1956, Colorado St. U.; MS 1972, Kansas St. U.

**GOULD, REBECCA A.**, Assoc. Prof. of Hotel, Restaurant, Institution Management and Dietetics (1992). BS 1977, Sam Houston St. U.; MS 1982, PhD 1986, Texas Women's U. (\*)

**GOULDEN, NANCY**, Asst. Prof. of Speech (1985). BS 1957, Kansas Teacher's Col.; MA 1981, Villanova U.; EdD 1989, N. Arizona U. (\*)

**GOVINDARAJU, RAO S.**, Asst. Prof. of Civil Engineering (1993). BS 1984, Indian Inst. of Tech.; MS 1985, U. of Kentucky; PhD 1989, U. of California-Davis. (\*)

**GOWDY, KENNETH K.**, Assoc. Dean of Engineering and Prof. of Mechanical Engineering (1957). BS 1955, MS 1961, Kansas St. U.; PhD 1965, Oklahoma St. U.; Professional Engineer. (\*)

**GRABER, DEBRA T.**, Co. Extension Agent, Horticulture, Reno Co., Hutchinson (1989). BS 1981, MS 1985, Kansas St. U.

**GRABER, RONALD W.**, Co. Extension Agent, Agr., Harvey Co., Newton (1986). BS 1982, MS 1985, Kansas St. U.

**GRABHORN, LAURA**, Coord. of Multicultural Student Organizations (1993). BA 1983, MS 1986, Indiana St. U.

**GRAF, JOSEPH L.**, Head of Geology and Assoc. Prof. (1980). BA 1968, Columbia U.; MPhil 1972, PhD 1975, Yale U. (\*)

**GRAHAM, JOHN**, Prof. of Finance (1970). BA 1967, Kansas St. U.; MBA 1968, PhD 1970, U. of Arkansas. (\*)

**GRAHAM, RALF O.**, Prof. Emeritus; Extension Instructional Media Coord. (1961). BA 1948, Peru St. Teachers Col., Nebraska; MS 1955,

**GRAHAM, TREVOR**, Asst. Track Coach (1991). BS 1989, St. Augustine Col.

**GRANT, STANLEY C.**, Assoc. Dir. of Hazardous Substance Research Cntr. (1991). BA 1953, Coe Col.; MA 1955, U. of Wyoming; PhD 1971, U. of Idaho.

**GRANZOW, CINDY A.**, Asst. Budget Dir. (1989). BS 1982, Kansas St. U.

**GRAVES, DAN E.**, Instr., Professional Pilot Program (1990). AS 1976, Los Angeles Comm. Col.; Air Traffic Control, Commercial SMEL Flight Simulator.

**GRAY, ANDREW P.**, Assoc. Prof. Emeritus, Diagnostic Lab; Research Pathologist (1964). DVM 1953, MS 1963, PhD 1966, Kansas St. U.

**GRAY, MARION WILSON, JR.**, Prof. of History (1969). BA 1964, Texas Christian U.; MA 1966, PhD 1971, U. of Wisconsin. (\*)

**GRAY, THOMAS J.**, Prof. of Physics (1977). BS 1960, MS 1962, North Texas St. U.; PhD 1967, Florida St. U. (\*)

**GREATHOUSE, KAREN**, Adjunct Asst. Prof. of Hotel, Restaurant, Institution Management and Dietetics (1989). BS 1972, MS 1974, Southern Illinois U.; PhD 1987, Kansas St. U.

**GREENE, GERALD L.**, Prof. of Entomology; SW Research-Extension Cntr. (1976). BS 1959, MS 1961, Kansas St. U.; PhD 1966, Oregon St. U. (\*)

**GREENE, KATHLEEN V.**, Academic Services Coord., Educational Supportive Services (1989). BA 1968, Ottawa U.; BS 1971, U. of Kansas; MS 1977, Kansas St. U.

**GREENE, LAURENZ S.**, Farm Management Assoc. Fieldman Emeritus (1952). BS 1950, Kansas St. U.

**GREENLEE, JOHN W.**, Asst. Prof. of Arch. (1989). BArch 1979, Kansas St. U.

**GREIG, BETTY S.**, Adjunct Asst. Prof. of Hotel, Restaurant, Institution Management and Dietetics (1989). BS 1948, U. of Arkansas; MS 1968, Kansas St. U.

**GREIG, JAMES K., JR.**, Prof. Emeritus of Horticulture; Research Horticulturist, Vegetable Crops, Agr. Exp. Sta. (1952). BS 1949, MS 1950, U. of Arkansas; PhD 1960, Kansas St. U. (\*)

**GRENSING, GREG**, Asst. Men's Basketball Coach (1986). BS 1979, MS 1981, Southwest Texas St. U.

**GRIEGER, DAVID M.**, Asst. Prof. of Animal Sciences and Industry; Beef Cattle Reproduction/Molecular-Cellular Physiologist (1992). BS 1981, MS 1984, Purdue; PhD 1989, Washington St. U. (\*)

**GRIFFIN, CHARLES**, Assoc. Prof. of Speech (1984). BA 1975, Northwestern U.; MA 1980, PhD 1983, U. of Missouri. (\*)

**GRIFFITH, BEN**, Asst. Football Coach (1990). MS 1973, Tennessee Tech U.

**GRIFFITH, LESTER E.**, Co. Extension Agricultural Agent Emeritus, Marion Co., Marion (1949). BS 1949, Kansas St. U.

**GRIFFITH, MARY EVAN**, Assoc. Prof., Education (1969). BS 1950, Kansas St. U.; MS 1957, Iowa St. U.; PhD 1966, Ohio St. U. (\*)

**GRIFFITT, COYE A.**, Assoc. Systems Manager, Computing and Telecommunications Activities (1972). BS 1964, Kansas St. U.

**GRIFFITT, WILLIAM B.**, Prof. of Psychology (1968). BA 1964, Kansas St. U.; PhD 1967, U. of Texas. (\*)

**GRIMES, TOM**, Assoc. Prof. of Journalism and Mass Communications (1991). BA 1973, U. of Arkansas; MS 1974, Columbia U.; PhD 1986, Indiana U. (\*)

**GRIMM, CAROL A.**, Medical Technologist, Lafene Health Ctr. (1990). BS 1983, BS 1984, Marymount College.

**GRINDELL, ROBERT M.**, Assoc. Prof. Emeriti of English (1972). AB 1956, Harvard U.; MA 1964, New York U.; PhD 1972, U. of Arizona. (\*)

**GRONQUIST, DAVID**, Dir. of Facilities (1985). BS 1971, Emporia St. U.

**GROSH, DORIS L.**, Prof. Emeritus of Industrial Engineering; Joint Appt. Statistics (1965). BS 1946, U. of Chicago; MS 1949, PhD 1969, Kansas St. U. (\*)

**GROSH, LOUIS E., JR.**, Assoc. Prof. Emeritus of Industrial Engineering (1965). BS 1944, Louisiana St. U.; BS 1947, MS 1949, PhD 1954, Purdue U. (\*)

**GROSS, WILLIAM R.**, Assoc. Prof. and Section Head of Professional Pilot Program (1987). BS 1970, MS 1973, Kansas St. U.; All flight ratings, airplane and helicopter.

**GRUNEWALD, KATHARINE K.**, Prof. of Foods and Nutrition; Agr. Exp. Sta. (1979). BS 1974, U. of Wisconsin; MS 1976, PhD 1979, U. of Kentucky. (\*)

**GRUNEWALD, ORLEN C.**, Assoc. Prof. of Agricultural Economics, Marketing (1979). BA 1973, U. of Wisconsin, Green Bay; MS 1975, PhD 1980, U. of Kentucky. (\*)

**GUFFY, MARK M.**, Prof. Emeritus of Radiology (1963). DVM 1949, MS 1966, Colorado St. Univ; Diplomate 1968, American Col. of Vet. Radiology. (\*)

**GUGLE, TERRY L.**, Special Asst., Animal Sciences and Industry (1974). BS 1971, Kansas St. U.

**GUGLER, MERLE E.**, Assoc. Prof. Emeritus (1947). BS 1940, Emporia St. U.; MS 1948, Kansas St. U.; CPA 1956, Kansas. (\*)

**GUIKEMA, JAMES A.**, Prof. of Biology; Plant Physiologist, Agr. Exp. Sta. (1981). BA 1973, Calvin Col.; PhD 1978, U. of Michigan. (\*)

**GUSTAFSON, DAVID A.**, Assoc. Prof. of Computing and Information Sciences (1977). B. Math 1967, U. of Minnesota; BS 1969, U. of Utah; MS 1973, PhD 1979, U. of Wisconsin. (\*)

**GUSTAFSON, MERLIN DeWAYNE**, Assoc. Prof. Emeritus of Political Science (1960). BS 1943, MS 1947, Kansas St. U.; PhD 1956, U. of Nebraska. (\*)

**GUTHRIE, GERSILDA**, Asst. Prof. Emerita; Area Extension Specialist, Home Management (1937). BS 1934, Kansas St. U.; MA 1949, Columbia U.

**GWIRTZ, JEFFREY A.**, Instr. of Grain Science and Industry (1989). BS 1979, Kansas St. U.

**HAAG, MARY L.**, Instr., English Language Program (1991). BA 1974, Kent State U.; MA 1986, U. of Kansas.

**HACKLER, RAYMOND F.**, Farm Management Assoc. Fieldman Emeritus (1960). BS 1952, MS 1966, Oklahoma St. U.

**HADDOCK, MICHAEL J.**, Science Reference Bibliographer, Libraries (1989). BA 1977, Kansas St. U.; MLS 1988, Emporia St. U.

**HADJISTAMOULOU, CHRYSOSTOMOS**, Research Assoc. of Physics (1985). BS 1983, U. of Colorado; MS 1985, U. of Manitoba.

**HADLE, FRED B.**, Asst. Prof. Emeritus of Horticulture (1951). MS 1958, Kansas St. U.

**HAFT, EVERETT EUGENE**, Prof. Emeritus of Electrical and Computer Engineering (1961). BS 1947, MS 1951, PhD 1955, U. of Wisconsin; Professional Engineer in Wisconsin, 1952. (\*)

**HAGAN, PATRICIA W.**, Instr. Emerita of Art (1971). BS 1970, Kansas St. U.

**HAGEMAN, CHARLES A.**, Farm Management Assoc. Fieldman Emeritus (1936). BS 1936, Kansas St. U.

**HAGEN, LAWRENCE J.**, Adjunct Asst. Prof. of Agronomy; Research Agricultural Engineer, Wind Erosion Research Unit, USDA, ARS (1967). BS 1962, MS 1967, N. Dakota St. U.; PhD 1980, Kansas St. U. (\*)

**HAGER, DARREL B.**, Co. Ext. Agent, Greeley Co., Tribune (1993). BS 1985, Oklahoma St. U.

**HAGMANN, CONSTANZA**, Asst. Prof. of Management (1976). BS 1975, U. of Oregon; MBA 1976, MS 1984, PhD 1988, Kansas St. U. (\*)

**HAGMANN, SIEGBERT**, Prof. of Physics (1980). MA 1973, U. of Munster; PhD 1977, U. of Cologne. (\*)

**HAGOOD LOWE, LISA**, Asst. Prof. of Architecture (1990). BArch 1985, Louisiana St. U. Registered Architect.

**HAGSTRUM, DAVID W.**, Adjunct Assoc. Prof. of Entomology, USDA Grain Marketing Research Cntr. (1983). BS 1965, PhD 1970, U. of California, Riverside. (\*)

**HAGUE, JAMES R.**, Assoc. Prof. of Architectural Engg. and Construction Science (1988). BS 1977, MS 1984, U. of Kansas.

**HAHN, RICHARD R.**, Head and Prof. of Grain Science and Industry (1992). PhD 1957, Kansas St. U. (\*)

**HAJDA, JOSEPH**, Prof. Emeritus of Political Science (1957). BA 1951, MA 1952, Miami U.; PhD 1955, Indiana U. (\*)

**HAJDA, NINA J.**, Instr. of English (1984). BS 1953, Indiana U.

**HALAZON, GEORGE C.**, Assoc. Prof. Emeritus; Extension Specialist, Wildlife and Outdoor Recreation (1954). PhB 1943, MS 1950, U. of Wisconsin.

**HALE, BYRON W.**, Co. Extension Agent, Agr., Decatur Co., Oberlin (1989). BS 1987, Panhandle St. U.

**HALL, CHARLES T.**, Co. Extension Agricultural Agent Emeritus, Johnson Co., Olathe (1934). BS 1932, Kansas St. U.

**HALL, DEAN G.**, Assoc. Prof. and Head of English (1983). BA 1968, MA 1970, U. of Northern Iowa; PhD 1977, Kent St. U. (\*)

**HALL, LAWRENCE FENOR**, Assoc. Prof. Emeritus of Education (1926). BS 1923, MS 1927, Kansas St. U. (\*)

**HAM, GEORGE E.**, Prof.; Assoc. Dean of Agr., Assoc. Dir. of Agr. Exp. Sta. (1980). BS 1961, MS 1963, PhD 1967, Iowa St. U. (\*)

**HAM, JAY M.**, Asst. Prof. of Agronomy (1990). BS 1984, Kansas St. U.; MS 1986, Oklahoma St. U.; PhD 1989, Texas A&M. (\*)

**HAMILTON, DELILIAH E.**, Asst. Instr., Libraries (1991). BA 1990, Kansas St. U.

**HAMILTON, JAMES R.**, Assoc. Prof. and Head of Philosophy (1971). BA 1964, Pfeiffer Col.; MA 1967, Emory U.; MDiv 1968, Union Theological Seminary; PhD 1974, U. of Texas at Austin. (\*)

**HAMILTON, KIM**, Writer/Multicultural Constituent Program Coord., KSU Alumni Assoc. (1992). BS 1989, Kansas St. U.

**HAMMAKER, ROBERT M.**, Prof. of Chemistry (1961). BS 1956, Trinity Col.; PhD 1960, Northwestern U. (\*)

**HAMMEL, MARY L.**, Instr. and Dir. of Media Services, Education (1981). BFA 1980, Kansas St. U.

**HAMSCHER, ALBERT N. III**, Prof. of History (1972). BA 1968, Pennsylvania St. U.; MA 1970, PhD 1973, Emory U. (\*)

**HANCOCK, JOE D.**, Asst. Prof. of Animal Sciences and Industry (1988). BS 1978, MS 1983, Texas Tech.; PhD 1987, U. of Nebraska. (\*)

**HANCOCK, MARJORIE R.**, Asst. Prof. of Education (1991). BS 1969, MS 1974, EdD 1991, Northern Illinois U. (\*)

**HANKLEY, WILLIAM JOHN**, Prof. of Computing and Information Sciences (1972). BSEE 1962, MS 1964, Northwestern U.; PhD 1967, Ohio St. U. (\*)

**HANNA, GERALD**, Prof., Education (1967). AB 1956, MA 1959, Long Beach St. Col.; EdD 1965, U. of Southern California. (\*)

**HANNA, JOHN B.**, Assoc. Prof. Emeritus; Extension Specialist, 4-H Youth (1934). BS 1932, MS 1954, Kansas St. U.

**HANSEN, CARL ULLMAN**, Asst. Prof. Emeritus of Industrial Engineering (1957). BS 1936, Kansas St. U.; MS 1961, U. of Nebraska; Professional Engineer, 1961.

**HANSEN, MERLE FREDRICK**, Prof. Emeritus of Biology; Parasitologist, Agr. Exp. Sta. (1950). AB 1939, MA 1941, U. of Minnesota; PhD 1948, U. of Nebraska. (\*)

**HANSEN, RICHARD**, Asst. Prof. of Landscape Arch. (1989). BA 1971, William and Mary; MLA 1985, U. of Colorado; Registered Landscape Architect. (\*)

**HANSON, JILL T.**, Co. Extension Agent, Home Economics and 4-H, Ellsworth Co., Ellsworth (1989). BS 1989, N. Dakota St. U.

**HAQUE, EKRAMUL**, Assoc. Prof. of Grain Science and Industry; Grain Processing Tech. Scientist (1987). BS 1964, Bangladesh U. of Engineering and Tech.; MS 1969, Purdue U.; PhD 1978, Kansas St. U. (\*)

**HARBERS, CAROLE ANN ZIMMERMAN**, Assoc. Prof. of Foods and Nutrition; Agr. Exp. Sta. (1979). BS 1969, Ohio U.; MS 1976, Virginia Poly. Inst. and St. U.; PhD 1979, Kansas St. U. (\*)

**HARBERS, LENIEL H.**, Prof. of Animal Sciences and Industry; Animal Research Nutritionist, Agr. Exp. Sta. (1964). BS 1957, MS 1958, Texas A&M; PhD 1961, Oklahoma St. U. (\*)

**HARBSTREIT, STEVEN R.**, Assoc. Prof. of Education (1987). BS 1971, U. of Missouri–Columbia; MEd 1976, Northwest Missouri St. U.; PhD 1987, U. of Missouri–Columbia. (\*)

**HARMES, DAVID L.**, Assoc. Prof. of Art (1981). BA 1968, Kansas City Art Inst.; MFA 1984, Kansas St. U. (\*)

**HARMON, DAVID L.**, Assoc. Prof. of Animal Sciences and Industry (1983). BS 1978, Ohio St. U.; MS 1980, PhD 1983, U. of Nebraska. (\*)

**HARMS, BRIAN K.**, Prof. of Electrical and Computer Engineering (1985). BS 1980, MS 1981, PhD 1985, Kansas St. U. (\*)

**HARNER, JOSEPH P., III**, Prof. of Agricultural Engineering; Agricultural Engineer (1983). BS 1979, MS 1981, PhD 1983, Virginia Poly. Inst. and St. U.; Professional Engineer, 1983. (\*)

**HARNETT, R. MICHAEL**, Prof. of Industrial Engineering (1988). BS 1968, Louisiana Poly. Inst.; MS 1972, PhD 1974, U. of Alabama. (\*)

**HARPER, ERICK**, Asst. Marketing Dir., Intercollegiate Athletics, (1992). BA 1992, Kansas St. U.

**HARPER, ROBERT**, Instr., Physical Education and Leisure Studies (1987). BS 1984, Kansas St. U.

**HARPER, SKYLER**, Assoc. Univ. Architect, Facilities Planning (1988). BArch 1982, Kansas St. U.; Registered Architect.

**HARRINGTON, JOHN A., JR.**, Assoc. Prof. of Geography (1994). BS 1972, Michigan St. U.; MA 1974, U. of Minnesota; PhD 1980, Michigan St. U.

**HARRINGTON, LISA M.B.**, Asst. Prof. of Geography (1994). BS 1979, Colorado St. U.; MRPA 1982, Clemson U.; PhD 1986, U. of Oklahoma.

**HARRINGTON, MAURICE C.**, Co. Extension Agent Agr. Emeritus, Anderson Co., Garnett (1958). BS 1958, Kansas St. U.

**HARRIS, RICHARD J.**, Prof. of Psychology (1974). BA 1968, Col. of Wooster; MA 1971, PhD 1974, U. of Illinois. (\*)

**HARTKE, GLENN T.**, Assoc. Prof. of Anatomy; Research Anatomist (1962). BS 1958, DVM 1960, MS 1965, PhD 1974, Kansas St. U. (\*)

**HARTMAN, PAUL D.**, Assoc. Head; Area Extension Dir., SW Research–Extension Cntr. (1977). BS 1977, MS 1989, Kansas St. U.

**HARTNETT, DAVID C.**, Assoc. Prof. of Biology; Plant Ecologist, Agr. Exp. Sta. (1986). BS 1977, MS 1978, Bucknell U.; PhD 1983, U. of Illinois. (\*)

**HARVEY, T. L.**, Prof. of Entomology; Research Entomologist, Insects of North Central and Northwest Kansas (P.O. Hays) Agr. Exp. Sta. (1954). BS 1950, MS 1951, Kansas St. U.; PhD 1963, Oklahoma St. U. (\*)

**HASAN, SHAH M.**, Asst. Dir. of Housing and Dining Services (1993). BA 1985, College of Wooster; MA 1988, Ohio St. U.

**HASASI, KADOSA**, Asst. Prof. of Mathematics (1986). BA 1971, MA 1976, PhD 1983, U. of Colorado.

**HASSAN, MASUD A.**, Prof. of Mechanical Engineering Tech. (1983). BS 1954, Punjab U.; MS 1957, PhD 1966, U. of Manchester, UK.

**HASTINGS, ALLAN J.**, Asst. Prof. of Interior Arch. (1988). BArch 1958, Kansas St. U.; BPA 1963, Art Cntr. Col. of Design.

**HATCHETT, JIMMY H.**, Adjunct Prof. of Entomology; Research Entomologist, USDA, ARS (1976). BS 1959, MS 1960, U. of Missouri; PhD 1965, Purdue U. (\*)

**HAUSE, NANCY**, Asst. Prof. of Journalism and Mass Communications (1983). AB 1953, U. of Colorado; MS 1982, Kansas St. U.

**HAUSE, RICHARD G.**, Prof. of Education (1966). AB 1954, MA 1955, Colorado St. Col.; EdD 1966, U. of Colorado. (\*)

**HAUSMANN, EVELYN L.**, Assoc. Prof. Emerita of Education (1976). BS 1961, Lindenwood Col.; MEd 1965, St. Louis U.; PhD 1976, U. of Missouri. (\*)

**HAVLICEK, BARBARA J.**, Staff Asst., Education (1985). BS 1972, MEd 1980, U. of Nebraska–Lincoln.

**HAVLIN, JOHN L.**, Assoc. Prof. of Agronomy; Research Soil Chemist Agr. Exp. Sta. (1985). BS 1973, Illinois St. U.; MS 1980, PhD 1983, Colorado St. U. (\*)

**HAWKINSON, DALE P.**, Math Skills Specialist, Academic Assistance Cntr. (1983). BA 1975, MS 1977, MS 1984, Kansas St. U.

**HAVENSTEIN, PATRICIA A.**, Asst. Controller for Sponsored Projects Accounting (1993). MBA 1992, BS 1985, Kansas St. U.

**HAWKS, ANN**, Adjunct Instr. of Human Dev. and Family Studies (1990). BA 1975, U. of Kansas; MA 1979, U. of New Mexico.

**HAWLEY, M. DALE**, Head and Prof. of Chemistry (1966). BA 1960, MA 1962, U. of Northern Iowa; PhD 1965, U. of Kansas. (\*)

**HAYCOCK, GARY E.**, Prof. of Interior Arch. (1976). BFA 1970, Pratt Inst.; MArch 1972, U. of Oregon.

**HAYES, MARY M.**, Co. Extension Home Economist Emerita, Smith Co., Smith Cntr. (1962). BS 1939, Kansas St. U.

**HAYTER, RICHARD B.**, Assoc. Dean for Extension and Outreach; Prof. of Architectural Engineering and Construction Science; Dir. of Kansas Industrial Extension Service; Asst. Dir. of Cooperative Extension (1980). BS 1965, S. Dakota St. U.; MS 1973, PhD 1975, Kansas St. U. (\*)

**HAZELTON, JANET**, Research Asst. of Grain Science and Industry (1991). BS 1987, Kansas St. U.

**HEAD, MURRAY**, Asst. Dir. of Planned Giving (1986). BS 1985, Washburn U.

**HEADLEY, RANCE K.**, Research Asst. KABSU (1987). BS 1966, Kansas St. U.

**HEATON, LOUIS A.**, Asst. Prof. of Plant Pathology; Research Plant Pathologist, Agr. Exp. Sta. (1989). BS 1978, MS 1980, Eastern Illinois U.; PhD 1986, Purdue U. (\*)

**HEDGCOTH, CHARLIE, JR.**, Prof. of Biochemistry; Biochemist, Agr. Exp. Sta. (1965). BS 1961, PhD 1965, U. of Texas. (\*)

**HEDRICK, DONALD K.**, Prof. of English (1976). BA 1969, U. of Kansas; MA 1972, PhD 1974, Cornell U. (\*)

**HEER, WILLIAM F.**, Assoc. Prof. of Agronomy; Research Agronomist in Charge, South Central Exper. Field, Agr. Exp. Sta. (1985). BS 1972, MS 1974, Central Missouri St.; PhD 1985, Oklahoma St. U.

**HEERMAN, CHARLES**, Prof., Education (1975). BA 1966, MS 1970, EdD 1974, Oklahoma St. U. (\*)

**HEIN, RANDY V.**, Co. Extension Agent, Agr., Graham Co., Hill City (1989). BS 1989, Fort Hays St. U.

**HEINLY, KAYANN**, Co. Extension Home Economist Emerita, Riley Co., Manhattan (1957). BS 1952, Midwestern U.; MS 1967, Kansas St. U.

**HEINTZELMAN, JOHN CRANSTON**, Prof. Emeritus of Arch.; Assoc., Inst. for Environmental Research (1947). BArch 1938, Massachusetts Inst. of Tech.; MArch 1941, Columbia U., Registered Architect. (\*)

**HEINZ, JO L.**, Adjunct Asst. Prof. of Clothing, Textiles, and Interior Design (1985). BS 1971, Kansas St. U.

**HELLEBUST, GARY**, Executive VP, KSU Foundation (1986). BS 1969, Kansas St. U.

**HELLER, MARY**, Assoc. Prof., Education (1987). BA 1971, MS 1974, EdD 1979, Oklahoma St. U. (\*)

**HELLER, STEVE F.**, Prof. of English (1981). BA 1971, MS 1976, EdD 1978, Oklahoma St. U.; MFA 1981, Bowling Green St. U. (\*)

**HELLMAN, EDWARD W.**, Assoc. Prof. of Horticulture (1984). BS 1977, MS 1980, U. of Illinois; PhD 1982, U. of Arkansas. (\*)

**HENDERSON, D. CLYDE**, Asst. Instr., Libraries (1993). BA 1991, Arizona St. U.

**HENDERSON, F. ROBERT**, Prof. of Animal Sciences and Industry; Extension Specialist, Animal Damage Control (1968). BS, MS 1956, Fort Hays St. U.

**HENRICKS, THOMAS G.**, Asst. Prof. (1990). BBA 1977, Eastern Michigan U.; MS 1982, Colorado St. U.; PhD 1991, U. of Nebraska–Lincoln.

**HENRY, DAVID H.**, Asst. Prof. of Statistics (1983). BS 1979, U. of Pittsburgh; PhD 1983, Stanford U.

**HENRY, JACK. C.**, Dean (1992). BS 1965, U. of Wyoming; MS 1969, Air Force Inst. of Technology; PhD 1984, Texas A & M; Professional Engineer.

**HENSLEY, BETTY A.**, Research Asst. of Animal Sciences and Industry (1989). BS 1989, West Virginia St. U.

**HENSLEY, DAVID L.**, Assoc. Prof. of Horticulture (1981). BS 1972, U. of Missouri; MS 1973, PhD 1978, Purdue U. (\*)

**HENSON, DARL W.**, Co. Extension Agent, Agr., Grant Co., Ulysses (1983). BS 1978, Fort Hays St. U.

**HERALD, THOMAS J.**, Asst. Prof. of Foods and Nutrition (1991). BS 1980, MS 1987, PhD 1991, Michigan St. U. (\*)

**HERMAN, LOUIS M.**, Assoc. Prof. of Mathematics (1970). BA 1963, MS 1965, U. of Florida; PhD 1979, U. of Massachusetts. (\*)

**HEROD, JON G.**, Farm Management Association Fieldman (1957). BS 1957, Kansas St. U.

**HERRING, NANCY S.**, Adjunct Instr. of Dietetics (1983). MS 1974, Purdue U.

**HERRMAN, TIMOTHY J.**, Asst. Prof.; Ext. State Leader, Grain Science and Industry (1992). BS 1979; MS 1983, U. of Idaho; PhD 1992, Washington St. U.

**HERRON, GEORGE M.**, Assoc. Prof. Emeritus; Research Agronomist, Soil Testing, SW Kansas Branch Agr. Exp. Sta. (1956). BS 1949, MS 1950, Oklahoma St. U.; PhD 1968, U. of Nebraska.

**HERSPRING, DALE**, Prof. and Head of Political Science. AB 1965, MA 1967, Georgetown u.; PhD 1972, Univ. of Southern California. (\*)

**HERZOG, TONI**, Coord., Cooperative Education, Career and Employment Services (1992). BA 1982, Montana St. U., MEd 1993, Colorado St. U.

**HESS, CARROLL V.**, Prof. of Agricultural Economics; Research Agr. Econ., Agr. Exp. Sta. (1966). BS 1947, Pennsylvania St. U.; MS 1948, PhD 1953, Iowa St. U. (\*)

**HETER, HALEY J.**, Fin. Aid Coord. (1993). BS 1993, Kansas St. U.

**HETRICK, BARBARA A. DANIELS**, Prof. of Plant Pathology; Research Plant Pathologist, Agr. Exp. Sta. (1980). BA 1973, Ohio Wesleyan U.; MS 1975, Washington St. U.; PhD 1978, Oregon St. U. (\*)

**HEUBLEIN, JOHN**, Prof. of General Engineering Tech. (1981). BS 1964, Kansas St. U.; MS 1967, Emporia St. U.

**HEYNE, ELMER GEORGE**, Prof. Emeritus of Agronomy (1936). BS 1935, U. of Nebraska; MS 1938, Kansas St. U.; PhD 1952, U. of Minnesota.

**HEYWOOD, KENNETH M.**, VP Emeritus, KSU Foundation (1956). BS 1938, Kansas St. U.

**HIBDON, DARREN D.**, Co. Ext. agent, Agr., Franklin Co., Ottawa (1992). BS 1991, Kansas St. U.

**HIBDON, MILA L.**, Co. Ext. Agent, Cheyenne Co., St. Francis (1993). BS 1990, Kansas St. U.

**HICKS, ARLAND V.**, Adjunct Prof. of Civil Engineering (1988). BS 1954, Kansas St. U.; MS 1968, U. of Missouri, Columbia; PhD 1977, U. of Kansas.

**HIGGINS, JAMES J.**, Prof. and Head of Statistics; Dir., Statistical Laboratory (1980). BS 1965, U. of Illinois; MS 1967, Illinois St. U.; PhD 1970, U. of Missouri–Columbia. (\*)

**HIGGINS, MARY L.**, Adjunct Asst. Prof. of Foods and Nutrition (1985). BS 1975, MS 1979, PhD 1982, Iowa St. U.

**HIGGINS, RANDALL A.**, Assoc. Prof. of Entomology; Extension St. Leader, Entomology (1982). BS 1976, Purdue U.; MS 1978, PhD 1982, Iowa St. U. (\*)

**HIGHAM, ROBIN**, Prof. of History (1963). AB 1950, Harvard Col.; MA 1953, Claremont Grad. School; PhD 1957, Harvard U. (\*)

**HIGHTOWER, ROSS T.**, Asst. Prof. (1991). BS 1982, U. of Florida; MS 1988, Georgia St. U.; PhD 1991, Georgia St. U.

**HIGHTOWER, RAY E.**, Asst. Dean of Engineering; Asst. Prof. of Nuclear Engineering; (1961). BS 1964, Kansas St. U.

**HILL, RANDALL CONRAD**, Prof. Emeritus of Sociology (1929). BS 1924, MS 1927, Kansas St. U.; PhD 1929, U. of Missouri. (\*)

**HILL, OPAL BROWN**, Assoc. Prof., Emerita of Art and Clothing, Textiles, and Interior Design (1944). BS 1944, MS 1950, Kansas St. U. (\*)

**HILLIER, DAVID E.**, Assoc. Management Information Specialist for Student Systems (1991). MA 1984, Webster U; BS 1961, Washington U.

**HINES, ROBERT H.**, Prof. of Animal Sciences and Industry; Swine Research Scientist, Agr. Exp. Sta. (1966). BS 1957, Purdue U.; MS 1961, PhD 1966, Michigan St. U. (\*)

**HINRICHS, CARL**, Assoc. Prof. of Speech (1964). AB 1959, MA 1960, U. of North Carolina. (\*)

**HIRSCHMANN, DAVID**, Assoc. Prof. of Political Science (1984). BA 1967, MA 1969, PhD 1979, U. of Witwatersrand, Johannesburg, S. Africa. (\*)

**HITE, ROBERT E.**, Prof. of Marketing (1986). BS 1970, Indiana U.; MBA 1977, Indiana St. U.; PhD 1982, U. of Arkansas. (\*)

**HITE FRASER, CYNTHIA**, Prof. of Marketing (1986). BA 1974, U. of Missouri–Kansas City; PhD 1980, U. of Pennsylvania. (\*)

**HOAG, LINDA A.**, Assoc. Prof. of Speech (1986). BA 1969, U. of Washington; MA 1974, PhD 1979, U. of Illinois–Champaign. (\*)

**HOAG, RICHARD**, Prof. of Arch. (1985). BA 1969, MArch 1977, U. of Washington. (\*)

**HOBBS, JAMES A.**, Prof. Emeritus of Agronomy; Soil Management Research Scientist, Agr. Exp. Sta. (1950). BS 1935, MS 1940, U. of Manitoba, Winnipeg; PhD 1948, Purdue U. (\*)

**HOBROCK, BRICE G.**, Dean of Libraries (1982). BA 1959, Emporia St. U.; MS 1961, PhD 1964, Kansas St. U.; MLS 1973, U. of Denver.

**HOBSON, RYAN D.**, Assoc. Specialist; Extension Specialist, Community Resources (1987). BS 1984, MS 1985, Kansas St. U.

**HOCH, CONNIE M.**, Co. Extension Agent; Barber Co., Medicine Lodge (1991). BS 1966, Fort Hays St. U.

**HODGES, R. JEAN**, Co. Extension Agent Emerita, Home Economics, Sedgwick Co., Wichita (1964). BS 1947, Kansas St. U.; MS 1970, Wichita St. U.

**HODGES, TEDDY OMAR**, Prof. Emeritus of Architectural Engineering and Construction Science (1959). BS 1950, Texas A&M; MS 1951, Iowa St. U.; PhD 1959, Michigan St. U.; Professional Engineer in Iowa, 1952; Professional Engineer in Kansas, 1974. (\*)

**HODGSON, DAVID S.**, Assoc. Prof. of Anesthesiology (1989). DVM 1968, Kansas St. U.; Diplomate 1985, American Col. of Vet. Anesthesiology.

**HOEFFNER, DENISE R.**, Asst. Registrar, Col. of Tech. (1990). BA 1987, Kansas Wesleyan U.

**HOEFLIN, RUTH**, Dean and Prof. Emerita of Home Economics; Agr. Exp. Sta. (1957). BS 1940, Iowa St. U.; MA 1945, U. of Michigan; PhD 1950, Ohio St. U. (\*)

**HOFFMAN, WALTER C., Jr.**, Asst. Controller, Grants and Contracts (1960). BS 1959, Kansas St. U.

**HOGG, DONALD E.**, Assoc. Dir., Engineering, Kansas Regents Educational Communications Cntr. (1988). BS 1953, Kansas Wesleyan U.

**HOLCOMB, CAROL ANN**, Assoc. Prof. of Foods and Nutrition (1979). AB 1966, Mercer U.; MA 1975, PhD 1977, Oregon St. U. (\*)

**HOLDEN, GRETCHEN**, Dir., Services for Students with Physical Limitations and Services for Learning Disabled (1982). BA 1962, Oberlin Col.; MSW 1968, Rutgers U.; MA 1981, Kansas St. U.

**HOLDEN, JONATHAN**, Distinguished Prof. of English (1978). BA 1963, Oberlin Col.; MA 1970, San Francisco St. Col.; PhD 1974, U. of Colorado. (\*)

**HOLDER, MICHAEL S.**, Co. Extension Agent, Agr., Chase Co., Cottonwood Falls (1973). BS 1971, Kansas St. U.

**HOLEN, KATHRYN**, Asst. Prof., Education (1975). BS 1971, MS 1973, EdD 1975, Oklahoma St. U.

**HOLEN, MICHAEL C.**, Dean and Prof. of Education (1971). BA 1967, Stanford U.; MA 1968, PhD 1971, U. of Oregon. (\*)

**HOLL, JACK M.**, Prof. of History (1989). BA 1959, Pacific Lutheran U.; MA 1961, U. of Maine; PhD 1969, Cornell U. (\*)

**HOLLINGER, ROBERT D.**, Prof. Emeritus of Finance (1966). BS 1964, MS 1968, PhD 1973, Kansas St. U. (\*)

**HOLMES, ELWYN SPRUIELL**, Prof. Emeritus of Extension Agricultural Engineering (1966). BS 1943, MS 1953, Texas A&M.

**HOLTHAUS, JODY R.**, Co. Extension Agent, Jackson Co., Holton (1980). BS 1980, Kansas St. U.

**HOMOLKA, ROBERT D.**, Prof. of General Engineering Tech. (1973). BA 1966, Northern Iowa U.; MED 1971, U. of New Mexico.

**HONEYMAN, MARY K.**, Asst. Prof. of Landscape Arch. (1993). BMusic 1964, Washburn U.; MME 1980, Wichita St. U.; MLA 1987, Kansas St. U. Registered Landscape Architect.

**HONSTEAD, ARLISS E.**, Assoc. Prof. Emerita; Extension Specialist, 4–H and Youth (1946). BS 1937, Kansas St. U.; MA 1960, Columbia U.

**HONSTEAD, WILLIAM HENRY**, Prof. Emeritus of Chemical Engineering; Dir., Executive VP, Kansas St. U. Research Foundation (1943). BS 1939, MS 1946, Kansas St. U.; PhD 1956, Iowa St. U.; Professional Engineer, 1948. (\*)

**HOOK, PATRICIA W.**, Instr. of Biology (1970). BA 1963, MS 1965, Kansas St. U.; PhD 1970, Oregon St. U.

**HOOVER, JIMMY D.**, Asst. Prof. of Animal Sciences and Industry (1966). BS 1960, MS 1970, Kansas St. U.

**HOOVER, LU ANN**, Instr. of Human Dev. and Family Studies (1978). BS 1974, MS 1978, Kansas St. U.

**HOOVER, WILLIAM J.**, Adjunct Prof. of Grain Science and Industry; Pres., Amer. Inst. of Baking (1966). BS 1950, MS 1954, PhD 1961, U. of Illinois. (\*)

**HOPKINS, T. L.**, Prof. of Entomology; Research Entomologist, Insect Physiology, Biochemistry, Toxicology, Agr. Exp. Sta. (1960). BS 1951, MS 1956, Oregon St. U.; PhD 1960, Kansas St. U. (\*)

**HOPPE, FREDERICK J.**, Prof. Emeritus of Engineering Tech. (1984). BS 1950, U. of Washington; MS 1972, U. of Missouri, Kansas City; Professional Engineer, 1963

**HORAK, MICHAEL J.**, Asst. Prof. of Agronomy; Weed Biology/Ecology, Agr. Exp. Sta. (1991). BS 1983, MS 1985, U. of California–Davis; PhD 1990, U. of Illinois. (\*)

**HORAN, VIKI L.**, Admin. Asst. to the Dean, Continuing Education (1993).

**HORBER, ERNST K.**, Prof. Emeritus of Entomology; Research Entomologist, Host–Plant Resistance to Insects, Agr. Exp. Sta. (1970). BS 1945, DSc 1951, Swiss Fed. Inst. of Tech.; PhD 1954, Kansas St. U. (\*)

**HORTIN, JOHN A.**, Assoc. Prof. of Education (1980). BS 1967, MS 1968, Eastern Illinois U.; MSLS 1972, U. of Illinois; PhD 1980, Northern Illinois U. (\*)

**HORTON, KENNETH A.**, Research Asst., KABSU (1987). BS 1979, Kansas St. U.

**HOSENEY, R. CARL**, Prof. of Grain Science and Industry; Research Cereal Chemist, Agr. Exp. Sta. (1971). BS 1957, MS 1960, PhD 1968, Kansas St. U. (\*)

**HOSIE, DARREL D.**, Co. Extension Agent, Cloud Co., Concordia (1966). BS 1967, Kansas St. U.

**HOSKINSON, JAMES J.**, Asst. Prof. of Radiology (1991). BS 1982, 1984, DVM 1986, Washington St. U. Diplomate 1991, American Col. of Vet. Radiology. (\*)

**HOSNI, MOHAMMAD H.**, Assoc. Prof. of Mechanical Engineering; Dir., Inst. Environmental Research (1993). BS 1981, Southern U., Louisiana; MS 1984, Louisiana St. U.; PhD 1989, Mississippi St. U. (\*)

**HOSSAIN, ASM MUSTAQUE**, Asst. Prof. of Civil Engineering (1991). BS 1983, MS 1986, Bangladesh U. of Engineering and Tech.; PhD 1990, Arizona State U. (\*)

**HOUCK, MARCIA L.**, Co. Ext. Agent, Home Economics, Franklin Co., Ottawa (1976). BS 1976, Emporia St. U.; MS 1982, Kansas St. U.

**HOUSER, VIRGINIA**, Asst. Prof. of Music (1989). BA 1977, Columbia Col.; MM 1985, DM 1992, U. of Oklahoma. (\*)

**HOUSH, GERALD**, Asst. Dir. of Planned Giving, KSU Foundation (1991). BA 1956, Manhattan Christian College; MS 1960, Phillips U.; D Min 1975, San Francisco Theological Seminary.

**HOVE, GERTRUDE**, Co. Extension Home Economist Emerita, Cherokee Co., Columbus (1934). BS 1931, Oklahoma St. U.

**HOWARD, RALPH W.**, Adjunct Assoc. Prof. of Entomology; USDA Grain Marketing Research Cntr. (1984). BS 1965, Centenary Col. of Louisiana; MS 1971, PhD 1974, U. of Arkansas. (\*)

**HOWE, JERELDINE R.**, Assoc. Prof. Emerita of Clothing, Textiles, and Interior Design; Extension Specialist, Textiles (1965). BS 1951, MS 1965, Kansas St. U.

**HOWELL, RODNEY**, Assoc. Prof. of Computing and Information Sciences (1988). BS 1984, Wichita St. U.; PhD 1988, Texas at Austin. (\*)

**HOWER, ROBERT F.**, Assoc. Prof. of Art (1990). BFA 1973, U. of Nebraska, Omaha; MFA 1975, Cranbrook Academy of Art. (\*)

**HOWERTON, PHYLLIS Y.**, Co. Extension Agent, Home Economics, Reno Co., Hutchinson (1966). BA 1963, Southwestern Col.; MS 1982, Kansas St. U.

**HOXWORTH, DAN H.**, Program Coord. of Kansas City Ctr. for Design Education and Research, Arch. and Design (1992). BA 1982, U. of Missouri–Columbia; MPA 1991, U. of Missouri–Kansas City.

**HOYT, DONALD P.**, Asst. Provost Emeritus; Dir. of Planning and Evaluation Services; Prof. of Education (1968). BS 1948, U. of Illinois; MA 1950, PhD 1954, U. of Minnesota. (\*)

**HOYT, KENNETH B.**, Distinguished U. Prof., Education (1984). BS 1948, U. of Maryland; MA 1950, George Washington U.; PhD 1954, U. of Minnesota. (\*)

**HU, KUO-KUANG**, Prof. of Civil Engineering (1968). Graduation, 1956, Taiwan Provincial Taipei Inst. of Tech.; MS 1966, PhD 1969, Kansas St. U. (\*)

**HUA, DUY**, Prof. of Chemistry (1982). BS 1976, Kyoto U., Japan; PhD 1979, Southern Illinois U. at Carbondale. (\*)

**HUANG, CHI-LUNG**, Prof. of Mechanical Engineering (1964). BS 1954, National Taiwan U.; MS 1960, U. of Illinois; Doctor of Engineering 1964, Yale U. (\*)

**HUANG, YEE-WEI**, Adjunct Asst. Prof. of Chemical Engineering (1988). BS 1980 National Taiwan U.; MS 1987, PhD 1988, Kansas St. U. (\*)

**HUBBARD, JOHN D.**, Adjunct Research Assoc., Grain Science and Industry; USDA (1971). BS 1963, Washburn U.

**HUBLER, ANGELA**, Asst. Prof. of English and Womens Studies. BA 1985, Col. of Wooster; MA 1986, PhD 1991, Duke U.

**HUCK, JANICE E.**, Assoc. Prof. of Clothing, Textiles and Interior Design (1986). BS 1969, MS 1975, PhD 1986, Kansas St. U. (\*)

**HUDSON, WILLIAM B.**, Asst. Prof. of Electrical and Computer Engineering (1990). BS 1979, Metropolitan State Col.; MS 1986, PhD 1990, New Mexico St. U. (\*)

**HUDZICKI, JANET**, Adjunct Clinical Inst. of Medical Tech. (1994). BS 1978, Indiana U of PA; MT IASCP) SM, CLS (NCA), 1978; MA 1991, U. of Phoenix.

**HUFF-CORZINE, LIN**, Assoc. Prof. of Sociology (1988). BA 1982, U. of Nebraska, Lincoln, PhD 1986, Washington U. (\*)

**HUGHEY, KENNETH F.**, Asst. Prof., Education (1990). BSEd 1972, MAEd 1975, Southeast Missouri St. U.; PhD 1989, U. of Missouri. (\*)

**HUGO, CORNELIUS**, Assoc. Agricultural Economist, Agricultural Economics (1977). BS 1973, MS 1974, PhD 1980, Kansas St. U.

**HULA, DAVID. G.**, Instr. of Economics (1985). BS 1977, U. of Nebraska; MS 1979, PhD 1982, U. of Wisconsin. (\*)

**HULBERT, SCOTT H.**, Asst. Prof. of Plant Pathology; Research Eukaryotic Molecular Geneticist, Agr. Exp. Sta. (1989). BS 1979, Washington St. U.; MS 1982, PhD 1987, U. of California–Davis. (\*)

**HULL, TERRY A.**, Computer Information Specialist, Electrical and Computer Engineering (1988), BS 1986, Kansas St. U.

**HUMERICKHOUSE, MARY KAY**, Administrative Asst., KSU Alumni Association (1988).

**HUMMELS, DONALD RAY**, Prof. of Electrical and Computer Engineering (1970). BS 1967, MS 1968, PhD 1969, Arizona St. U. (\*)

**HUMPHREY, JAMES R., JR.**, Co. Extension Agent, Agr., Elk Co., Howard (1990). Bs 1989, Kansas St. U.

**HUND, MARGARET A.**, Co. Extension Dir. Emerita, Shawnee Co., Topeka (1960). BS 1960, Kansas St. U.

**HUNDLEY, WILLIAM C., JR.**, Co. Extension Dir. Emeritus, Douglas Co., Lawrence (1955). BS 1951, MS 1967, Kansas St. U.

**HUNT, ORVILLE DON**, Prof. Emeritus of Electrical and Computer Engineering (1923). BS 1923, Washington St. U.; MS 1930, Kansas St. U.; Professional Engineer, 1947.

**HUNT, MELVIN C.**, Prof. of Animal Sciences and Industry; Meat Research Scientist, Agr. Exp. Sta. (1975). BS 1965, MS 1970, Kansas St. U.; PhD 1973, U. of Missouri. (\*)

**HUNTER, KIM L.**, Instr., Education (1981). BS 1973, Kansas St. U.

**HUSCHKA, JAMES A.**, Farm Management Association Fieldman (1977). BS 1977, Kansas St. U.

**HUSSEINI, FAYEZ**, Assoc. Prof. of Interior Arch. (1980). BArch 1971, Beirut Arab U.; MArch 1979, MFA 1980, Kansas St. U.

**HUTCHISON, ANN R.**, Co. Extension Agent, 4–H; Finney Co., Garden City (1991). BA 1991, U. of Northern Colorado–Greeley.

**HUYCK, ELNORA T.**, Assoc. Dean and Prof. Emerita of Home Economics; Agr. Exp. Sta. (1977). BS 1940, MS 1958, Kansas St. U.; PhD 1971, U. of Minnesota. (\*)

**HWANG, CHERN-HWANG**, Asst. Scientist of Agronomy (1985). BA 1977, Tunghai U.; MS 1984, Kansas St. U.

**HWANG, CHING-LAI**, Prof. of Industrial Engineering; Assoc., Inst. for Environmental Research (1964). BS 1953, National Taiwan U.; MS 1960, PhD 1962, Kansas St. U. (\*)

**HYLAND, PATRICIA**, Adjunct Asst. Prof. of Human Dev. and Family Studies (1990). RN 1969, Holy Name Hospital School of Nursing; BSE 1979, Washburn U.; MSW 1980, U. of Kansas.

**HYLLEGARD, WAYNE R.**, Asst. Prof. of Kinesiology (1993). BA 1976, MS 1983, U. of Nevada; PhD 1987, Oregon St. U.

**IANDOLO, JOHN J.**, Prof. of Molecular Biology, Dept. of Pathology and Microbiology; Microbiologist, Agr. Exp. Sta. (1967). BS 1961, Loyola U., Chicago; MS 1963, PhD 1965, U. of Illinois. (\*)

**IHRIE, MAUREEN**, Asst. Prof. of Modern Languages (1989). BA 1971, PhD 1980, Bryn Mawr Col. (\*)

**IKEDA, YOSHIRO**, Prof. of Art (1978). BS 1970, Portland St. U.; Research Art Certificate 1973, Kyota U. of Fine Arts; MFA 1977, U. of California, Santa Barbara. (\*)

**IMEL, MARK R.**, Instr. of Architectural Engineering and Construction Science (1990). BS 1985, MS 1990, U. of Illinois.

**IMLER, ALAN W.**, Co. Extension Agent, Ag.; Haskell Co., Sublette (1990). BS 1990, Panhandle St. U.

**INGALSBE, NOALEEN G.**, Adjunct Instr. of Dietetics (1983). BS 1969, Iowa St. U.; MS 1976, Kansas St. U.

**INGLE, DONALD W.**, Co. Extension Agricultural Agent Emeritus, Sedgwick Co., Wichita (1930). BS 1929, U. of Missouri.

**INNES, LINDA**, Constit. Dev. Officer, KSU Foundation (1988). BA, MS 1974, Kansas St. U.

**IOERGER, BRIAN P.**, Research Asst., Animal Sciences and Industry (1990). BS 1984, Kansas St. U.

**ISENHOUR, THOMAS L.**, Prof. of Chemistry (1987). BS 1961, U. of North Carolina; PhD 1965, Cornell U. (\*)

**JACKSON, SUSAN M.**, Co. Extension Agent, Home Economics, Miami Co., Paola (1989). BS 1968, MS 1974, Kansas St. U.

**JACKSON, T. HANLEY**, Prof. of Music (1968). BA 1965, San Fernando Valley St. Col.; MA 1968, California St. Col. at Long Beach. (\*)

**JACKSON, WILLIAM P.**, Instr. of Animal Sciences and Industry; Kansas Artificial Breeding Service Unit, Agr. Exp. Sta. (1965). BS 1965, Colorado St. U.

**JACOBS, HYDE S.**, Asst. to Dean and Prof of Agr. (1981). BS 1952, MS 1954, PhD 1957, Michigan St. U.

**JAHNKE, WILLIAM R.**, Prof. of Arch. (1968). BSME 1948, Duke U. Registered Professional Engineer. (\*)

**JAIN, ASHOK**, Assoc. Research Physicist (1986). PhD 1983, Queen's U. of Belfast.

**JAMES, LOY D.**, Co. Extension Agent, Agr.; Morris Co., Council Grove (1990). BS 1983, Kansas St. U.

**JANKE, ALLEN W.**, Farm Management Association Fieldman Emeritus (1980). BS 1978, MS 1980, Kansas St. U.

**JANKOVICH, ANN G.**, Instr. of Education (1982). BS 1953, Indiana U.; MS 1981, Kansas St. U.

**JANSSEN, KEITH A.**, Assoc. Prof. of Agronomy; Research Agronomist in Charge, East Central Kansas (P.O. Ottawa), Agr. Exp. Sta. (1979). BS 1965, MS 1969, U. of Nebraska; PhD 1973, Michigan St. U.

**JARDINE, DOUGLAS J.**, Assoc. Prof. of Plant Pathology; Extension State Leader, Plant Pathology Program (1985). BS 1976, MS 1977, PhD 1985, Michigan St. U. (\*)

**JAUQUET, CAROL**, Psychologist, U. Counseling Services (1992). MA 1987, PhD 1992, U. of Missouri–Columbia.

**JEFFREY, CYNTHIA K.**, Assoc. TV Prod./Dir., Kansas Regents Educ. Comm. Center (1992). BA 1985, U. of Hawaii; MS 1992, Kansas St. U.

**JENNINGS, KENNETH W.**, Adjunct Clinical Instr. of Medical Tech. (1980). BS 1966, Fort Hays St. U.; Cert. in Med. Tech. 1966, Latimore-Fink School of Med. Tech.; MS 1978, Kansas St. U.

**JENNINGS, PAUL H.**, Prof. of Horticulture; Research Horticulturist, Agr. Exp. Sta. (1982). BS 1960, U. of Massachusetts; MS 1962, PhD 1965, North Carolina St. U. (\*)

**JENSEN, MARSHA L.**, Asst. Production Manager, Education (1984). BA 1972, Kearney St. Col.

**JEON, IKE J.**, Assoc. Prof. of Animal Sciences and Industry; Food Scientist, Agr. Exp. Sta. (1980). BS 1966, Kon-Kuk U., Seoul; MS 1973, PhD 1976, U. of Minnesota. (\*)

**JEPSEN, DELBERT D.**, Co. Extension Agent, Agr., Russell Co., Russell (1962). BS 1956, Kansas St. U.; MS 1974, Fort Hays St. U.

**JEPSEN, RICHARD LOUIS**, Prof. Emeritus of Agricultural Engineering; Extension Specialist, Farm and Community Safety (1963). BS 1950, MS 1963, Kansas St. U.; EEd 1974, North Carolina St. U.

**JIANG, HONGXING**, Assoc. Prof. of Physics (1988). BS 1981, Fudan U., China; MS 1983, PhD 1986, Syracuse U. (\*)

**JOHNSON, ANGIE**, Asst. Marketing Dir., Intercollegiate Athletics (1992). BS 1990, MBA 1992, Kansas St. U.

**JOHNSON, ARTHUR R.**, Co. Extension Agent, Jefferson Co., Oskaloosa (1958). BS 1958, Kansas St. U.

**JOHNSON, BETTY**, Constit. Dev. Officer, KSU Foundation (1989). BA 1980, Fort Hays St. U.

**JOHNSON, DALLAS E.**, Prof. of Statistics; Consultant, Agr. Exp. Sta. (1975). BS 1960, Kearney St. Col.; MA 1966, Western Michigan U.; PhD 1970, Colorado St. U. (\*)

**JOHNSON, GARY LEE**, Prof. Emeritus of Electrical and Computer Engineering (1966). BS 1961, MS 1963, Kansas St. U.; PhD 1966, Oklahoma St. U.; Professional Engineer, 1973. (\*)

**JOHNSON, GEORGE DANA**, Assoc. Prof. Emeritus of Chemistry (1952). AB 1940, MA 1941, Oberlin Col.; PhD 1946, U. of Michigan. (\*)

**JOHNSON, J. HAROLD**, Prof. Emeritus; St. 4–H Club Leader (1927). BS 1927, Kansas St. U.; MS 1942, George Washington U.

**JOHNSON, JILINDA A.**, Medical Technologist, Lafene Health Ctr. (1985). BS 1966, Kansas St. U.

**JOHNSON, JOHN L.**, Libraries (1969). BA 1967, MA 1973, Kansas St. U.

**JOHNSON, JUANITA B.**, Co. Extension Agent Emerita, Home Economics, Crawford Co., Girard (1948). BS 1945, Kansas St. U.

**JOHNSON, LINDA M.**, Instr., Dir. of Audiovisual Resource, Vet. Medicine (1970). BS 1969, Ohio U.; MS 1978, PhD 1990, Kansas St. U.

**JOHNSON, LOWELL B.**, Prof. of Plant Pathology; Research Plant Disease Physiologist, Agr. Exp. Sta. (1968). BS 1957, U. of Illinois; MS 1962, PhD 1964, Purdue U. (\*)

**JOHNSON, LUCIA**, Adjunct Clinical Instr. of Medical Tech. (1985). BS 1974, Kansas St. U.; MA 1984, U. of Missouri.

**JOHNSON, MARC A.**, Dean of Agriculture and Dir. of Ag. Experiment Station and Coop. Ext. Services; Prof. of Ag. Economics (1985). BA 1970, Emporia St. U.; MA 1973, PhD 1975, Michigan St. U. (\*)

**JOHNSON, NAOMI M.**, Assoc. Prof. Emerita; Extension Specialist, Family Clothing (1938). BS 1932, MS 1949, Kansas St. U.

**JOHNSON, ROBERT E.**, Prof. Emeritus of Physical Education and Leisure Studies (1977). BA 1951, Transylvania U.; MA 1969, Georgetown U.; PhD 1975, Ohio U. (\*)

**JOHNSON, ROBERT L.**, Prof. Emeritus; Extension Specialist, Program and Staff Dev. (1965). BS 1951, U. of Nebraska; MS 1956, PhD 1958, U. of Wisconsin. (\*)

**JOHNSON, ROGER T.**, Assoc. Dir., International Grains Program, Grain Science and Industry (1986). BS 1960, Oberlin Col.; MS 1962, PhD 1967, U. of Wisconsin.

**JOHNSON, RONALD E.**, Asst. Prof. of Journalism and Mass Communications; Dir., Student Publications (1989). BA 1981, Fort Hays St. U.; MS 1982, U. of Kansas.

**JOHNSON, SCOTT D.**, Asst. Instr. of Animal Sciences and Industry (1985). BS 1984, Kansas St. U.

**JOHNSON, TERRY C.**, Distinguished Prof. of Biology (1977). BS 1958, Hamline U.; MS 1961, PhD 1964, U. of Minnesota. (\*)

**JOHNSON, THOMAS R.**, Research Asst. of Entomology (1984). BS 1984, Kansas St. U.

**JOHNSON, WILLIAM H.**, Prof. Emeritus, Agricultural Engineering (1970). BS Agr., BS Agricultural Engineering 1948, MS 1953, Ohio St. U.; PhD 1960, Michigan St. U.; Professional Engineer in Ohio, 1970. (\*)

**JOHNSTON, KENNETH K.**, Instr. of Architectural Engineering, Construction Science (1983). BS 1961, Kansas St. U.

**JONES, ANGELA R.**, Science Cataloger, Libraries (1993). MS 1990, U. of North Texas; BA 1986, U. of Texas.

**JONES, BYRON WAYNE**, Prof. and Head, Mechanical Engineering (1989). BS 1971, Kansas St. U.; MS 1973, PhD 1975, Oklahoma St. U.; Professional Engineer, 1977. (\*)

**JONES, C. CLYDE**, Prof. Emeritus of Management (1960). AB 1944, Marshall U.; MA 1950, PhD 1954, Northwestern U. (\*)

**JONES, DALE VINCENT**, Assoc. Prof. Emeritus of English (1946). BS 1931, MS 1941, Kansas St. U. (\*)

**JONES, JAN**, Admissions Representative (1992). BS 1992, Kansas St. U.

**JONES, JAMES S.**, Assoc. Prof. of Arch. (1982). BBAdm 1965, U. of Puget Sound; MArch 1971, U. of Washington; Registered Architect.

**JONES, JOSEPH H.**, Adjunct Prof. of Clothing, Textiles, and Interior Design (1984).

**JONES, JOYCE E.**, Assoc. Prof. of Human Dev. and Family Studies; Extension Specialist, Family Financial Management (1975). BS 1972, Texas A&I U.; MS 1973, U. of Nevada; PhD 1987, Oklahoma St. U.

**JONES, KENNETH W.**, Distinguished Prof. of History (1965). AB 1958, MA 1959, PhD 1966, U. of California. (\*)

**JONES, STEPHAN A.**, Adjunct Instr. of Human Dev. and Family Studies (1982). BS 1960, U. of Utah, MSW 1963, Brigham Young U.

**JORGENSEN, LEE M.**, Assoc. Prof.; Extension News Coord. (1978). BS 1960, MS 1972, S. Dakota St. U.

**JORNS, WILLIAM J.**, Asst. Prof.; Coord., Ext. Education (1971). BS 1954, MS 1961, Kansas St. U.; EdD 1971, North Carolina St. U.

**JULIAN, ROBERT E.**, Prof. and Dir., Program Dev., International Trade Inst. (1988). BS 1955, Kansas St. U.; M.Ag.Ed. 1967, U. of Arizona; Ed.D 1976, Oklahoma St. U.

**JURICH, ANTHONY P.**, Prof. of Human Dev. and Family Studies; Agr. Exp. Sta. (1972). BS 1969, Fordham U.; MS 1971, PhD 1972, Pennsylvania St. U. (\*)

**JUSTICE, MONICA J.**, Asst. Prof. of Biology (1992). BS 1977, Fort Hays St. U.; PhD 1987, Kansas St. U. (\*)

**KAHLICH, LUKE**, Prof. of Dance (1980). BA 1971, MA 1975, Texas Tech U. (\*)

**KAHRS, AMOS J.**, Instr. Emeritus of Animal Sciences and Industry; Poultry Research Farm Supt., Agr. Exp. Sta. (1956). BS 1953, Kansas St. U.

**KAISER, HERBERT EMIL**, Assoc. Prof. Emeritus of Education (1961). BS 1941, Concordia Teachers Col.; MS 1943, Oklahoma St. U.; PhD 1959, U. of Nebraska. (\*)

**KAMERER, DAVID**, Asst. Prof. of Journalism and Mass Communications (1994). BA 1978, U. of Iowa; MA 1983, Kansas State U.; PhD 1989, Indiana U.

**KAMHAMPATI, SRINIVAS**, Asst. Prof. of Entomology. PhD 1987, Simon Fraser Univ. (\*)

**KANE, MARY**, Instr., of Education (1988). BS 1983, MS 1986, Kansas St. U.

**KANOST, MICHAEL**, Asst. Prof. of Biochemistry (1991). BS 1979, Colorado St. U.; PhD 1983, Purdue U. (\*)

**KAPITANSKI, LEV**, Prof. of Mathematics (1993). PhD 1981, Steklov Institute of Mathematics. (\*)

**KASTNER, CURTIS L.**, Prof. of Animal Sciences and Industry; Meat Research Scientist, Agr. Exp. Sta. (1975). BS 1967, MS 1969, PhD 1972, Oklahoma St. U. (\*)

**KATER, LARRY E.**, Co. Extension Agent, Agr., Wichita Co., Leoti (1981). BS 1969, Kansas St. U.

**KAUFMAN, DONALD W.**, Prof. of Biology; Wildlife Ecologist, Agr. Exp. Sta. (1980). BS 1965, MS 1967, Fort Hays St. U.; PhD 1972, U. of Georgia. (\*)

**KEANE, TIMOTHY D.**, Assoc. Prof. of Landscape Arch. (1984). BSLA 1981, Iowa St. U.; MLA 1983, PhD 1990, U. of Michigan. (\*)

**KEATING, JAMES L.**, Prof. and Dept. Head of Engineering Technology (1993). BS 1972, So. Illinois; MS 1973, Cleveland St. U.; Professional Engineer.

**KEELER, GARRY L.**, Co. Extension Dir., Douglas Co., Lawrence (1967). BS 1966, Kansas St. U.

**KEEN, RAY A.**, Prof. Emeritus of Horticulture (1947). BS 1942, Kansas St. U.; MS 1947, PhD 1956, Ohio St. U. (\*)

**KEETON, KERRY S.**, Prof. of Clinical Pathology; Research Clinical Pathologist (1977). Diplomate 1965, American Col. of Vet. Pathologists; BS 1965, DVM 1966, Texas A&M; PhD 1971, U. of California. (\*)

**KEHLER, DAVID F.**, Co. Extension Agent, 4-H Youth, Butler Co., El Dorado (1976). BS 1975, Kansas St. U.

**KEISER, GEORGE R.**, Prof. of English (1973). BA 1962, MA 1964, PhD 1971, Lehigh U. (\*)

**KEITHLEY, CLAUDE A.**, Prof., Assoc. Head and Dir., Graduate Studies (1970). BArch 1965, MRCP 1973, MArch 1973, Kansas St. U.; Certified Planner. (\*)

**KELLER, GLENDA L.**, Co. Extension Agent, Washington Co., Washington (1965). BS 1965, Kansas St. U.

**KELLER, JOHN W.**, Prof. of Planning (1972). BA 1966, St. Benedict's; MA 1967, Kansas St. U.; MS 1971, PhD 1973, Rutgers U.; Certified Planner. (\*)

**KELLER-MCNULTY, SALLIE K.**, Assoc. Prof. of Statistics (1985). BA 1977, MA 1979, U. of South Florida; PhD 1983, Iowa St. U. (\*)

**KELLEY, KENNETH W.**, Asst. Prof.; Crops and Soils Research Scientist, SE Kansas Branch Agr. Exp. Sta. (1975). BS 1967, MS 1973, Kansas St. U.

**KELLEY, PAUL LEO**, Prof. Emeritus, Agricultural Economics; Research Economist, Agr. Exp. Sta. (1943). BS 1943, MS 1946, Kansas St. U.; PhD 1956, Iowa St. U. (\*)

**KELLEY, TERRY L. D.**, Instr. and Section Head of Aviation Maintenance Tech. (1983). AT 1971, Kansas Tech. Inst.; A&P certificate, AA 1968, Cloud County Comm. Col.

**KELLSTROM, MARTHA**, Asst. Prof. of Education (1987). BS 1953, MS 1983, PhD 1985, Kansas St. U.

**KEMP, KENNETH E.**, Prof. of Statistics; Consultant, Agr. Exp. Sta. (1968). BS 1963, MS 1965, PhD 1967, Michigan St. U. (\*)

**KENNEDY, CARROLL E.**, Prof. Emerita of Human Dev. and Family Studies; Agr. Exp. Sta. (1970). AB 1949, Wheaton Col.; MS 1953, Kansas St. U.; EdD 1963, U. of Maryland. (\*)

**KENNEDY, FAYE L.**, Coord. of Microcomputing Systems, Computing and Telecommunications Activities (1985). BS 1969, MS 1982, Kansas St. U.

**KENNEDY, GEORGE A.**, Prof. of Veterinary Diagnostic Pathology, Dept. of Veterinary Diagnosis; Research Pathologist (1970). DVM 1967, Washington St. U.; PhD 1975, Kansas St. U.; Diplomate 1976, American Col. of Vet. Pathologists. (\*)

**KENNEDY, PETER J.**, Asst. Prof., Professional Pilot Program (1990). All flight ratings, airplane and helicopter.

**KENNEY, MICHAEL J.**, Asst. Prof. Physiology (1992). BA 1981, Luther Co.; PhD 1988, U. of Iowa. (\*)

**KENT, NANCY JO**, Co. Extension Agent, Home Economics, Ford Co., Dodge City (1959). BS 1959, Fort Hays St. U.

**KEY, DAVID V.**, Co. Extension Agent, Nemaha Co., Seneca (1988). BS 1986, MS 1987, Kansas St. U.

**KEY, JACK**, Assoc. Athletic Dir. (1991). BBA 1971, U. of Oklahoma.

**KEYS, SAMUEL R.**, Prof. Emeritus, Education (1969). AB 1948, Olivet Nazarene Col.; MA U. of Missouri-Kansas City; PhD 1959, U. of Minnesota. (\*)

**KHATAMIAN, HOUGHANG**, Assoc. Prof. of Horticulture (1977). BS 1965, Egean U.; MS 1971, PhD 1978, U. of Guelph. (\*)

**KIBBY, JIMMIE R.**, Co. Extension Dir., Wyandotte Co., Kansas City (1966). BS 1965, MS 1966, Oklahoma St. U.

**KIDWELL, EDWARD A.**, Master Sergeant, US Army; Chief Inst. of Military Science (1992).

**KIEFER, STEPHEN W.**, Prof. of Psychology (1982). BA 1973, Washington U., St. Louis; MA 1975, PhD 1978, Arizona St. U. (\*)

**KILGORE, GARY L.**, Prof. of Agronomy, Extension Specialist, Crops and Soils, Southeast (1972). BS 1964, MS 1966, Kansas St. U.

**KIM, WANSOO**, Research Assoc. of Grain Science and Industry (1989). BS 1978, MS 1980, Seoul National U.; PhD 1990, Kansas St. U.

**KIMMINS, R. KENT**, Assoc. Prof. of Horticulture, Floriculture (1978). BS 1967, MS 1970, Texas A&M; PhD 1978, North Carolina St. U.

**KINDLER, BEVERLY L.**, Co. Extension Agent, Home Economics, Norton Co., Norton (1952). BS 1952, Kansas St. U.; MS 1967, Michigan St. U.

**KING, CLAUDE L.**, Prof. Emeritus of Plant Pathology; Extension Specialist, Plant Pathology (1934). BS 1932, MS 1953, Kansas St. U.

**KING, DOUGLAS W.**, Dir. of Administrative Systems (1977). BS 1969, Kansas St. U.

**KINSER, JAMES R., III**, Producer/Dir., Kansas Regents Educational Communications Cntr. (1990). BS 1984, U. of Texas at Austin.

**KINSLER, LESLIE A.**, Assoc. Prof. and Section Head of Computer Science Tech. (1980). BA 1972, Emporia St. U.; MCS 1988, Wichita St. U.

**KIRKHAM, MARY BETH**, Prof. of Agronomy; Crops Research Physiologist, Agr. Exp. Sta. (1980). BA 1966, Wellesley Col.; MS 1969, PhD 1971, U. of Wisconsin. (\*)

**KIRMSER, PHILIP GEORGE**, Prof. Emeritus of Mathematics and Engineering (1942). BS 1939, MS 1944, PhD 1958, U. of Minnesota; Professional Engineer, 1961. (\*)

**KIRSCHNER, MOLLY S.**, Adjunct Instr. of Dietetics (1987). BS 1978, U. of Texas at Dallas.

**KIRK, KIMBERLY**, Admissions Representative (1993). BA 1993, Kansas St. U.

**KISER, HARVEY L.**, Senior Agricultural Economist, Agricultural Economics (1979). BS 1959, MS 1963, PhD 1966, Ohio St. U.

**KISSICK-GROB, BEVERLEE**, Assoc. Prof. and Dir. of Libraries (1987). BS 1959, MS 1981, PhD 1985, Kansas St. U.

**KLAASSEN, HAROLD E.**, Assoc. Prof. of Biology; Ichthyologist, Agr. Exp. Sta. (1967). AB 1957, Tabor Col.; MS 1959, Kansas St. U.; PhD 1967, U. of Washington. (\*)

**KLABUNDE, KENNETH J.**, Distinguished Prof. of Chemistry (1979). BS 1965, Augustana Col.; PhD 1969, U. of Iowa. (\*)

**KLEINAU, JAMES L.**, Equipment Manager, Athletics (1979). BS 1977, Oklahoma St. U.

**KLEMM, ROBERT D.**, Prof. Emeritus of Anatomy (1972). BS 1957, Capital U.; MS 1959, Ohio U.; PhD 1964, Southern Illinois U. (\*)

**KLINGLER, BECKY**, Dir. of Constituent Programs, KSU Alumni Association (1987). BS 1986, Kansas St. U.

**KLINKNER, MELVIN**, Assoc. Controller, Accounting Services (1991). BA 1978, Ouachita U., Arkansas.

**KLOPFENSTEIN, CAROL F.**, Assoc. Prof. of Grain Science and Industry, Research Cereal Chemist (1977). BS 1959, MS 1963, Pennsylvania St. U.; PhD 1978, Kansas St. U. (\*)

**KLUITENBERG, GERARD J.**, Asst. Prof. of Agronomy (1989). BS 1982, MS 1984, U. of California-Davis; PhD 1989, Iowa St. U. (\*)

**KNACKENDOFFEL, ELIZABETH A.**, Asst. Prof., Education (1986). BS 1978, MS 1979, Emporia St. U.; PhD 1989, U. of Kansas.

**KNAPP, ALAN**, Assoc. Prof. of Biology; Plant Ecology, Agr. Exp. Sta. (1988). BS 1978, Idaho St. U.; MS 1981, PhD 1988, U. of Wyoming. (\*)

**KNAPP, MARY C.**, Asst. Spec.; Weather Data Librarian (1985). BVS 1977, Kansas St. U.

**KNIGHT, DALE A.**, Assoc. Prof. Emeritus of Agricultural Economics; Research Agr. Econ., Regional and Community Dev., Agr. Exp. Sta. (1948). BS 1945, Kansas St. U.; MS 1946, Cornell U.; AM 1948, PhD 1952, U. of Chicago. (\*)

**KNIGHT, PATRICK A.**, Assoc. Prof. of Psychology (1980). BS 1976, Michigan St. U.; MS 1979, PhD 1981, Purdue U. (\*)

**KNOSTMAN, HARRY DANIEL**, Assoc. Prof. of Architectural Engineering and Construction Science (1957). BS 1955, MS 1961, Kansas St. U.; PhD 1966, U. of Colorado; Professional Engineer, 1959. (\*)

**KNOX, MATTHEW A.**, Asst. Prof. of Architecture (1990). BArch 1987, Kansas St. U.; MArch 1990, U. of Virginia; Registered Architect.

**KNUPFER, NANCY N.**, Asst. Prof. of Education (1991). BS 1972, U. of Wisconsin-LaCrosse; MA 1984, PhD 1987, U. of Wisconsin-Madison. (\*)

**KNUPFER, PETER B.**, Assoc. Prof. of History (1991). BS 1975, MA 1982, PhD 1988, U. of Wisconsin-Madison. (\*)

**KOCH, BERL A.**, Prof. Emeritus of Animal Sciences and Industry (1956). BS 1949, Iowa St. U.; MS 1951, Cornell U.; PhD 1956, U. of California. (\*)

**KOELLIKER, JAMES K.**, Prof. of Civil Engineering (1973). BS 1967, Kansas St. U.; MS 1969, PhD 1972, Iowa St. U.; Professional Engineer, 1972. (\*)

**KOEPPE, OWEN J.**, Prof. Emeritus of Biochemistry and Education (1980). AB 1949, Hope Col.; MS 1951, PhD 1953, U. of Illinois. (\*)

**KOEPSSEL, WELLINGTON WESLEY**, Prof. Emeritus of Electrical and Computer Engineering (1964). BS 1944, MS 1951, U. of Texas; PhD 1960, Oklahoma St. U.; Professional Engineer in Texas, 1952; Professional Engineer in Kansas, 1974. (\*)

**KOFOID, KENNETH D.**, Assoc. Prof., Sorghum Research, Fort Hays Branch Agr. Exp. Sta. (1986). BS 1973, Purdue U.; MS 1975, PhD 1979, U. of Nebraska. (\*)

**KOK, HANS**, Asst. Prof. of Agronomy; Extension Specialist, Soil and Water Conservation (1990) BS 1981, MS 1984, Wageningen (Holland) Ag U.; PhD 1989, U. of Idaho.

**KOLONOSKY, PATRICIA A.**, Instr. of English (1983). BA 1963, Roberts Wesleyan Col.; MA 1977, Kansas St. U.

**KOLONOSKY, WALTER F.**, Assoc. Prof. of Modern Languages (1973). BA 1963, Lycoming Col.; MA 1965, U. of Pennsylvania; PhD 1972, U. of Kansas. (\*)

**KONZ, STEPHAN ANTHONY**, Prof. of Industrial Engineering; Assoc., Inst. for Environmental Research (1964). BS 1956, MBA 1956, U. of Michigan; MS 1960, St. U. of Iowa; PhD 1964, U. of Illinois (\*)

**KOO, SUNG**, Prof. of Foods and Nutrition (1990). BS 1970, Kon-Kuk U.; MS 1973, U. of New Hampshire; PhD 1976, Clemson U. (\*)

**KOPP, RICHARD F.**, Research Asst. of Forestry (1986). BS 1984, SUNY ESF; MS 1986, Pennsylvania St. U.

**KORENEK, CAMILLE T.**, Dietitian, Housing and Dining Services (1989). BS 1987, U. of Southwest Louisiana; MA 1989, Texas A&M.

**KOUDELE, JOSEPH WENDELL**, Prof. Emeritus of Agricultural Economics; Research Agr. Econ., Consumption Economics and Marketing, Agr. Exp. Sta. (1947). BS 1943, U. of Nebraska; MS 1947, U. of Minnesota; PhD 1956, Michigan St. U. (\*)

**KRAFT, SUSAN L.**, Asst. Prof. of Radiology (1991). DVM 1985, PhD 1991, Washington St. U. Diplomate 1990, American Col. of Vet. Radiology. (\*)

**KRAINBILL, MILTON L.**, Co. Extension Agent, Agr. and Community Dev., Lincoln Co., Lincoln (1972). BS 1971, Kansas St. U.; MS 1992, Kansas St. U.

**KRAMER, BRADLEY A.**, Assoc. Prof. and Head of Industrial Engineering (1993). BS 1980, MS 1981, PhD 1985, Kansas St. U. (\*)

**KRAMER, CHARLES LAWRENCE**, Prof. of Biology; Mycologist, Agr. Exp. Sta.; Adjunct Prof. of Plant Pathology (1958). AB 1950, MA 1953, PhD 1957, U. of Kansas. (\*)

**KRAMER, KARL J.**, Prof. of Biochemistry; Research Chemist, Grain Marketing Research Cntr. (1974). BS 1964, Purdue U.; PhD 1971, U. of Arizona Adjunct appt. (\*)

**KRAMER, KELLY**, Asst. Women's Basketball Coach (1993). BA 1984, Oklahoma Baptist U.

**KRAUSE, MELANIE J.**, Research Asst. of Animal Sciences and Industry (1987). BS 1979, MS 1981, Kansas St. U.

**KRAUSE, ROBERT S.**, VP for Institutional Advancement (1986). BS 1967, Western Illinois U.; MS 1968, Michigan St. U.

**KRCHMA, LUDWIG J.**, Research Asst. of Entomology (1972). BS 1963, Rockhurst Col.; MS 1971, Kansas St. U.

**KREHBIEL, COREY L.**, Asst. Instr. of Animal Sciences and Industry (1991). BS 1991, Kansas St. U.

**KREISEL, PHYLLIS M.**, Co. Extension Agent, 4-H, Cherokee Co., Columbus (1981). BS 1979, U. of Nebraska.

**KREMER, EUGENE R.**, Prof. and Head of Arch. (1973). BArch 1960, Rensselaer Polytechnic Inst.; MArch 1967, U. of California at Berkeley; Registered Architect. (\*)

**KREMER, S. LILLIAN**, Asst. Prof. of English (1987). BA 1959, SUNY at Albany; MA 1964, City U. of New York, PhD 1979, Kansas St. U. (\*)

**KREN, GEORGE M.**, Prof. of History (1965). BA 1948, Colby Col.; MA 1949, PhD 1960, U. of Wisconsin. (\*)

**KREN, JAMES P.**, Asst. Prof. of Arch. (1989). BArch 1986, U. of Kansas; Registered Architect.

**KREN, MARGO**, Assoc. Prof. of Art (1971). BS 1966, U. of Wisconsin; MA 1969, Kansas St. U.; MFA 1979, U. of Iowa. (\*)

**KRETZ, TAMERA J.**, Asst. Instr. of Agronomy (1988). BS 1984, Kansas St. U.

**KRIDER, ALDEN**, Prof. Emeritus of Arch. (1949). BS in Arch. 1933, MS 1955, Kansas St. U.; Registered Architect. (\*)

**KRISHNAMOORTHY, RAMASWAMY**, Assoc. Prof. of Biochemistry; Asst. Biochemist, Agr. Exp. Sta. (1986). BS 1973, MS 1975, U. of Madras; PhD 1983, U. of California, Davis. (\*)

**KRISHNASWAMI, PRAKASH**, Assoc. Prof. of Mechanical Engineering (1984). BS 1978, Indian Inst. of Tech., Madras; MS 1979, St. U. of New York; PhD 1983, U. of Iowa. (\*)

**KROMM, DAVID E.**, Prof. of Geography (1967). BS 1960, Eastern Michigan U.; MA 1964, PhD 1967, Michigan St. U. (\*)

**KROPF, DONALD HARRIS**, Prof. of Animal Sciences and Industry; Meats Research Scientist, Agr. Exp. Sta. (1962). BS 1952, U. of Wisconsin; MS 1953, U. of Florida; PhD 1956, U. of Wisconsin (\*)

**KRSTIC, VLADIMIR**, Asst. Prof. of Arch. (1988). Diploma 1979, U. of Sarajevo, Yugoslavia; MFngArch 1985, Kyoto U., Japan. (\*)

**KRUCKENBERG, SAMUEL M.**, Prof. of Pathology; Dir. of Animal Resource Facility; Research Pathologist (1975). DVM 1963, MS 1965, Kansas St. U.; Diplomate 1968, American Col. of Lab Animal Medicine; PhD 1971, Kansas St. U.; Diplomate 1982, American Col. of Vet. Pathologists. (\*)

**KRUG, DONNA R.**, Co. Extension Agent, Home Economics, Barton Co., Great Bend (1989). BS 1977, Kansas St. U.

**KRUH, JANET J.**, Dir. Emerita of Kansas Regents Network TELENET (1971). BA 1948, MA 1949, Washington U., St. Louis.

**KRUH, ROBERT F.**, Vice Provost for Academic Services and Technology; Dean of Continuing Education; Prof. Emeritus of Chemistry (1967). AB 1948, PhD 1951, Washington U., St. Louis. (\*)

**KRUMM, SUSAN J.**, Co. Extension Agent, Republic Co., Belleville (1978). BS 1977, Kansas St. U.

**KRUMWIEDE, DENNIS W.**, Instr. (1991). BS 1977, U. of Nebraska-Lincoln; MS 1989, U. of Colorado.

**KRUSE, JEFFREY J.**, Instr. of Finance (1989). BS 1980, Kansas St. U.

**KUBIK, RICHARD S.**, Co. Extension Agricultural Agent Emeritus, Thomas Co., Colby (1949). BS 1949, Kansas St. U.

**KUBITZ, KARLA**, Asst. Prof. of Kinesiology (1990). BA 1975, U. of West Florida; MS 1984, U. of Texas at Dallas; PhD 1990, Arizona St. U. (\*)

**KUECK, DON L.**, Co. Extension Dir., Agr., Reno Co., Hutchinson (1966). BS 1966, MS 1969, Kansas St. U.

**KUEHN, LOWE L.D.**, Asst. Prof. Emeritus; Extension Television Producer (1962). BS 1950, Iowa St. U.; MS 1974, Wichita St. U.

**KUHL, GERRY**, Prof. of Animal Sciences and Industry; Extension Specialist, Beef Cattle Nutrition Management (1981). BS 1967, Michigan St. U.; MS 1971, PhD 1977, Cornell U.

**KUHLMAN, DENNIS K.**, Prof. of Agricultural Engineering; Extension Agricultural Engineer, Pesticide Application (1976). BS 1970, MS 1975, Kansas St. U.; PhD 1985, Oklahoma St. U. Professional Engineer, 1981. (\*)

**KULL, JAMES**, Asst. Prof. of Music (1993). BME 1983, Vander Cool Col. of Music; MM 1988, U. of Illinois.

**KULP, VLASTA**, Instr., Education (1983). BS 1947, MA 1952, U. of Chicago.

**KUNKEL, JAMES W.**, Asst. Prof. of Forestry; Fire Program Leader (1978). BS 1965, U. of Montana; MS 1984, Kansas St. U.

**KURTZ, VERNON RAY**, Prof., Education (1970). BS 1955, MS 1959, Fort Hays St. U.; EdD 1967, U. of Nebraska. (\*)

**KYLE, BENJAMIN GAYLE**, Prof. of Chemical Engineering (1958). BS 1950, Georgia Inst. of Tech.; MS 1955, PhD 1958, U. of Florida. (\*)

**LACY, BURRITT S., JR.**, Psychiatrist Emeritus, U. Counseling Services (1964). BA 1941, Harvard U.; MD 1944, Cornell U.; 1951, American Board of Psychiatry and Neurology.

**LADD, ALAN J.**, Co. Extension Dir., Riley Co., Manhattan (1979). BS 1978, Kansas St. U.

**LADD, CARL RAY**, Co. Extension Agent, Atchison Co., Effingham (1978). BS 1978, Kansas St. U.

**LADD, DALE L.**, Co. Extension Agent, Agr. and Community Dev., McPherson Co., McPherson (1986). BS 1972, Kansas St. U.

**LaFRANCE, DAVID G.**, Asst. Prof. of History (1985). BS 1971, Georgetown U.; MAT 1972, Colorado Col.; MA 1977, MLS 1981, PhD 1984, Indiana U. (\*)

**LAMB, MARY E.S.**, Instr. of Clothing, Textiles, and Interior Design (1992). BA 1974, Penn St. U.; MS 1992, Arizona St. U.

**LAMBERT, DORINDA J.**, Psychologist; Asst. Dir. of Clinical Services, U. Counseling Services (1985). BA 1968, Blackburn Col., Illinois; MA 1977, PhD 1984, U. of Nebraska–Lincoln.

**LAMBERT, JACK L.**, Prof. Emeritus of Chemistry (1950). AB 1947, MS 1947, Pittsburg St. U.; PhD 1950, Oklahoma St. U. (\*)

**LAMBERT, JOHN P.**, Assoc. Prof.; Dir. of Public Safety (1964). BS 1959, Lebanon Valley Col.; MPH 1963, U. of Michigan; PhD 1975, Kansas St. U.

**LAMM, FREDDIE R.**, Asst. Prof.; Agr. Engineer Research Scientist, NW Research–Extension Cntr. (1979). BS 1978, MS 1979, U. of Missouri; PhD 1991, Kansas St. U. (\*)

**LAMOND, RAY E.**, Prof. of Agronomy; Extension Specialist, Soil Fertility and Management (1982). BS 1973, MS 1975, PhD 1979, Kansas St. U. (\*)

**LAMONT, WILLIAM J., JR.**, Assoc. Prof. of Horticulture; Research Horticulturist, Vegetable Crops, Agr. Exp. Sta. (1988). BS 1975, Del. Valley Col.; MS 1979, PhD 1981, Cornell U. (\*)

**LANE, JERALD L.**, Dir. of Facilities Services, Div. of Facilities (1989). BS 1974, U. of S. Dakota.

**LANCASTER, JILL**, Asst. Track Coach (1993). BA 1981, MS 1983, U. of Oklahoma.

**LANG, TERESA A.**, Co. Extension Agent, Home Economics, Sedgwick Co. (1982). BS 1971, MS 1973, Kansas St. U.

**LANGEMEIER, LARRY N.**, Prof. of Agricultural Economics; Extension Agricultural Economist, Farm Management Studies (1968). BS 1963, U. of Nebraska; MS 1965, PhD 1968, U. of Missouri. (\*)

**LANGEMEIER, MICHAEL L.**, Asst. Prof. of Agricultural Economics; Extension Agricultural Economist, Farm Management (1990). BS 1984, MS 1986, U. of Nebraska; PhD 1990, Purdue U. (\*)

**LANGENKAMP, JERRY REESE**, Prof. of Music (1970). BM 1953, U. of Oklahoma; MM 1958, DMA 1970, U. of Michigan. (\*)

**LANHAM, DALE L.**, Co. Extension Agent, Agr., Woodson Co., Yates Cntr. (1974). BS 1973, Kansas St. U.

**LANHAM, K. EUGENE**, Co. Extension Agent, Agr. and 4–H, Wyandotte Co., Kansas City (1971). BS 1970, Kansas St. U.

**LANNING, FRANCIS C.**, Assoc. Prof. Emeritus of Chemistry (1942). BS 1930, MS 1931, U. of Denver; PhD 1936, U. of Minnesota. (\*)

**LARMER, OSCAR VANCE**, Prof. Emeritus of Art (1950). BFA 1949, U. of Kansas; MFA 1955, Wichita U. (\*)

**LARSON, DELBERT M.**, Assoc. Staff Physician, Lafene Health Ctr. (1964). MD 1964, U. of Iowa.

**LARSON, GEORGE HERBERT**, Prof. Emeritus of Agr. Engineering; Agr. Exp. Sta. (1939). BS 1939, MS 1940, Kansas St. U.; PhD 1955, Michigan St. U.; Professional Engineer, 1947.

**LARSON, SUSAN S.**, Asst. Prof. Emerita of Human Dev. and Family Studies (1955). BS 1940, U. of Iowa; MS 1942, U. of Wisconsin.

**LARSON, VERNON C.**, Prof. Emeritus of Agr. (1962). BS 1947, MS 1950, PhD 1954, Michigan St. U.

**LASHBROOK, RALPH RICHARD**, Prof. and Head Emeritus, Department of Journalism (1934). BS 1929, Kansas St. U.; MS 1942, U. of Wisconsin. (\*)

**LATIMORE, MAURICE “MO”**, Asst. Football Coach (1994). BS 1976, Kansas St. U.

**LATINA, JOHN J.**, Asst. Football Coach (1988). BS 1979, Virginia Poly.

**LaTOUSH, ELIZABETH J.**, Co. Extension Agent, Home Economics, Scott Co., Scott City (1986). BS 1962, U. of Wyoming; MS 1969, U. of Nebraska.

**LAUGHLIN, J. BRUCE**, Dir. Emeritus, Career Planning and Placement Cntr. (1962). BS 1950, U. of Kansas; MS 1961, Kansas St. U.; JD 1967, Washburn Law School.

**LAUGHLIN, EUGENE J.**, Prof. Emeritus of Accounting (1955). BS 1951, Rockhurst Col.; MS 1959, Kansas St. U.; CPA 1960, Kansas; PhD 1965, U. of Illinois. (\*)

**LAUGHLIN, JAY L.**, Asst. Prof. of Marketing (1990). BS 1974, Kansas St. U.; MBA 1982, U. of Northern Iowa; PhD 1991, Michigan St. U.

**LAUNCHBAUGH, JOHN L., JR.**, Prof. Emeritus; Range Research Ecologist, Fort Hays Branch Agr. Exp. Sta. (1955). AB 1947, MS 1948, Fort Hays St. U.; PhD 1952, Texas A&M.

**LAURIE, DAVID R.**, Assoc. Prof. of Education (1968). BS 1963, MS 1966, Kansas St. U.; EdD 1974, Oklahoma St. U. (\*)

**LAVELLE, JEROME P.**, Asst. Prof. of Industrial Engineering (1993). BS 1984, MS 1986, Ohio U.; PhD 1992, North Carolina St. U. (\*)

**LAW, BEVERLY E.**, Instr., English Language Program (1990). DipTESL 1979, PhD 1989, Victoria U. Wellington, New Zealand.

**LAW, BRUCE M.**, Assoc. Prof. of Physics (1989). BS 1978, PhD 1985, Victoria U., New Zealand. (\*)

**LAW, DENNIS L.**, Prof. of Landscape Arch. (1974). BS 1967, Texas Tech U.; MLA 1976, Kansas St. U.; Registered Landscape Architect. (\*)

**LAWLESS, JOHN R.**, Assoc. Prof. Emeritus; Crops Research Scientist, NW Research–Ext. Ctr. (1960). BS 1958, U. of Nebraska; MS 1960, Washington St. U.

**LAYTON, CANDACE E.**, Assoc. Prof. of Small Animal Surgery (1980). BS 1975, MS 1982, DVM 1977, Kansas St. U.; Diplomate 1988, American Col. of Vet. Surgeons.

**LEA, JOHN D. “ZACH,”** Asst. Agr. Economist; Agr. Economics (1988). BS 1969, MS 1974, Louisiana St. U.; PhD 1988, U. of Florida. (\*)

**LEACH, JAN E.**, Assoc. Prof. of Plant Pathology; Research Plant Disease Physiologist, Agr. Exp. Sta. (1984). BS 1975, MS 1977, U. of Nebraska–Lincoln; PhD 1981, U. of Wisconsin–Madison. (\*)

**LEACH, GLINDA B.**, Co. Extension Agent Home Economics Emerita, Shawnee Co., Topeka (1967). BS 1950, Southeast Missouri St. Col.; MS 1961, MEd 1966, U. of Missouri.

**LEAVENGOOD, LUTHER OMAR**, Prof. Emeritus of Music (1945). BM 1929, U. of Kansas; MM 1936, U. of Michigan. (\*)

**LEAVITT, JIM**, Asst. Football Coach (1990). PhD 1990, U. of Iowa.

**LECROY, MARY W. H.**, Instr. of Modern Languages (1984). MA 1971, Emory U.

**LEDUC, FRANCES A.**, Asst. Prof. in Horticulture, Forestry and Recreation Resources (1993). PhD 1993, U. of Texas.

**LEE, E. STANLEY**, Prof. of Industrial Engineering (1966). BS 1953, Ordinance Engineering Col., China; MS 1957, North Carolina St. Col.; PhD 1962, Princeton U. (\*)

**LEE, YUAN-SHIN**, Asst. Prof. of Industrial Engineering (1993). BS 1984, National Taiwan U.; MS 1990, PhD 1993, Purdue U. (\*)

**LEE, YU-LEE**, Prof. of Mathematics (1967). BS 1955, MA 1959, National Taiwan U.; PhD 1964, U. of Oregon. (\*)

**LEET, GREGORY R.**, Dir., Library Campaign, KSU Foundation (1993). BS 1981, Kansas St. U.

**LEGG, JAMES C.**, Head and Prof. of Physics (1967). BS 1958, Indiana U.; MA 1960, PhD 1962, Princeton U. (\*)

**LEGG, MARILYN R.**, Adm. Asst., Cntr. for Aging (1983). PhD 1981, Kansas St. U.

**LEIPOLD, HORST W.**, Distinguished Prof. of Medical Genetics, Dept. of Pathology and Microbiology; Research Pathologist (1970). DVM 1963, Justus Liebig U.; MS 1967, PhD 1968, Kansas St. U. (\*)

**LEITH, DAVID E.**, Regents Distinguished Prof. Emeritus (1987). BA 1953, Lehigh U.; MD 1957, Harvard Medical School; Diplomate 1964, American Board of Anesthesiology. (\*)

**LEITNAKER, GARY**, Dir. Human Resource Services (1994). BS 1973, MS 1974, Emporia St.

**LELAND, STANLEY E., JR.**, Prof. Emeritus of Parasitology, Department of Pathology and Microbiology; Research Pathologist (1967). BS 1949, MS 1950, U. of Illinois; PhD 1953, Michigan St. U. (\*)

**LENHERT, ANNE G.**, Asst. Prof. of Chemistry (1967). BA 1958, Hollins Col.; MS 1963, PhD 1965, U. of New Mexico.

**LENHERT, DONALD HOWARD**, Prof. of Electrical and Computer Engineering (1966). BS 1956, Kansas St. U.; MS 1958, Syracuse U.; PhD 1966, U. of New Mexico; Professional Engineer, 1973. (\*)

**LEROY, LANNY**, Athletic Trainer, Lafene Health Ctr. (1993). BS 1987, UNLV; MEd 1988, U. of Virginia.

**LESLIE, JOHN F.**, Assoc. Prof. of Plant Pathology; Research Fungal Molecular Geneticist, Agr. Exp. Sta. (1984). BA 1975, U. of Dallas; MS 1977, PhD 1979, U. of Wisconsin–Madison. (\*)

**LETCHER, LLOYD, JR.**, Instr. of Management (1994). BBA 1973, Idaho St. U.; MA 1978, Boston U.

**LEUTHOLD, LARRY D.**, Prof. of Horticulture; Extension Horticulturist, Turfgrass and Home Floriculture (1966). BS 1959, MS 1966, Kansas St. U.

**LeVALLEY, GERALD E., JR.**, Co. Extension Agent, Agr., Sumner Co., Wellington (1967). BS 1967, Oklahoma St. U.

**LEWIS, DAVID C.**, Asst. Prof., Small Animal Internal Medicine (1993). BVSC 1983, U. of Sydney, Australia; PhD 1993, Washington St. U.

**LEWIS, GARLAND G.**, Information Processing Dir., Asst. Instr.; Housing and Dining Services (1973). BS 1972, Kansas St. U.

**LEWIS, JAMES E.**, Instr., English Language Program (1990). BA 1968, Oberlin Col.; MA 1985, U. of Colorado.

**LEWIS, LANCE**, Academic Outreach Coord. (1988). BS 1984, MS 1986, Kansas St. U.

**LEWIS, ROBERT L.**, Instr. of Animal Sciences and Industry, KABSU (1986). BS 1974, MS 1986, Colorado St. U.

**LI, LIGE**, Assoc. Prof. of Mathematics (1986). BS 1964, Shanghai Normal U.; MS 1983, PhD 1986, Tulane U. (\*)

**LI, YI**, Asst. Prof. of Biology (1993). BS 1982, Beijing Forestry Col.; PhD 1989, St. U. of NY; Syracuse. (\*)

**LIANG, YUN-TEH S.**, Research Assoc. of Grain Science and Industry (1972). BS 1959, S. Dakota U.; MS 1961, PhD 1965, U. of Wisconsin.

**LIANG, GEORGE H. L.**, Prof. of Agronomy; Research Cytogeneticist, Agr. Exp. Sta. (1964). BS 1956, Taiwan Provincial Col.; MS 1961, U. of Wyoming; PhD 1964, U. of Wisconsin. (\*)

**LILYHORN, BARBARA G.**, Co. Extension Agent, 4–H Youth, Douglas Co., Lawrence (1984). BS 1977, Kansas St. U.

**LIN, CHII-DONG**, Distinguished Prof. of Physics (1976). BA 1969, Natl. Taiwan U.; MS 1970, PhD 1974, U. of Chicago. (\*)

**LIN, JINGYU**, Asst. Prof. of Physics (1992). BS 1982, The St. U. of New York at Oneonta; MS 1985, PhD 1989, Syracuse U. (\*)

**LIN, WEI DAW**, Research Asst., Grain Science and Industry (1991). BS 1983, MS 1985, National Taiwan Ocean U.; PhD 1991, Kansas St. U.

**LIN, ZONGZHU**, Asst. Prof. of Mathematics (1993). PhD 1989, U. of Massachusetts. (\*)

**LINDEMUTH, JAMES T.**, Dir. of Publications, KSU Alumni Assn. (1993). BA 1972, U. of New York at Potsdam; MS 1977, Kansas St. U.

**LINDER, ROBERT D.**, Prof. of History (1965). BS 1956, Emporia St. U.; MDiv. MRE 1958, Central Baptist Theological Seminary; MA 1960, PhD 1963, U. of Iowa. (\*)

**LINDHOLM, JOHN C.**, Prof. Emeritus of Mechanical Engineering (1960). BS 1949, Kansas St. U.; MS 1957, U. of Kansas; PhD 1961, Purdue U.; Professional Engineer, 1954. (\*)

**LINDLEY, DONALD D.**, Assoc. Prof. Emeritus of Physical Education and Leisure Studies (1973). BA 1949, Wichita St. U.; MEd 1952, U. of Minnesota; DEd 1970, U. of Oregon. (\*)

**LINDLY, EDWIN CURGUS**, Prof. Emeritus of Civil Engineering and Architectural Engineering (1949). BS 1942, Oklahoma St. U.; MS 1949, Purdue U.; MS 1957, Kansas St. U.; PhD 1964, Iowa St. U.; Professional Engineer, 1950. (\*)

**LINDQUIST, JAMES L.**, Coord., Extension Personnel and Recruitment (1974). BS 1973, MS 1974, PhD 1987, Kansas St. U.

**LINDQUIST, JACK W.**, Dir. of Kansas Agr. and Rural Leadership Dev. (1981). BS 1980, Kansas St. U.

**LINDQUIST, LINDY R.**, Assoc. Extension Specialist, 4-H Events Coord. (1973). BS 1973, Kansas St. U.

**LINDQUIST, TOM B.**, Co. Extension Agent, 4-H-Youth; Barton Co., Great Bend (1990). BS 1985, MS 1988, Kansas St. U.

**LIPPERT, GEORGE E.**, Assoc. Prof. of Entomology; Extension Specialist, Crop Protection, Southeast (1978). BS 1967, Cornell U.; MS 1974, West Virginia U. (\*)

**LITTREL, DAVID**, Assoc. Prof. of Music (1987). BM 1971, Kansas St. U.; MM 1972, U. of Texas; DMA 1979, U. of Texas. (\*)

**LITRELL, J. HARVEY**, Prof. Emeritus, Education (1954). BA 1935, Iowa St. Teachers Col.; MA 1939, St. U. of Iowa; EdD 1950, U. of Missouri.

**LITZ, CHARLES E.**, Prof., Education (1971). BA 1963, Ohio U.; MA 1967, PhD 1970, U. of Michigan. (\*)

**LIU, XUE SHENG**, Research Asst., Grain Science and Industry (1986). BS 1969, Huazhong Ag. Col.

**LIVINGSTON, GARY A.**, Instr., Education (1975). BS 1969, Kansas St. Teachers Col.; PhD 1976, Kansas St. U. (\*)

**LOBMEYER, SUSAN J.**, Captain, US Air Force, Asst. Prof. of Aerospace Studies (1994). BS 1987, US Air Force Academy; MA 1990, Webster U.

**LOCKHART, CHARLES HOWARD**, Assoc. Prof. Emeritus of Biology (1940). BS 1934, MS 1938, Kansas St. U. (\*)

**LOGAN, THOMAS D.**, Instr.: Kansas Industrial Extension Services (1989). BS 1977, Kansas St. U.

**LOMAS, LYLE W.**, Prof. and Head; Research Animal Scientist, SE Kansas Branch Agr. Exp. Sta. (1979). BS 1975, MS 1976, U. of Missouri; PhD 1979, Michigan St. U. (\*)

**LONG, CHARLES E.**, Assoc. Prof. of Horticulture; Research Horticulturalist, Woody Ornamentals, Agr. Exp. Sta. (1972). BS 1964, MS 1965, Oklahoma St. U.; PhD 1972, Kansas St. U. (\*)

**LONG, GLENN WESLEY**, Asst. Prof. Emeritus of Sociology (1938). AB 1926, Baker U.; MS 1940, Kansas St. U. (\*)

**LONG, IVALEE McCORD**, Prof. Emerita of Human Dev. and Family Studies (1957). BS 1933, MS 1951, Kansas St. U.; PhD 1964, Purdue U. (\*)

**LONG, JAMES H.**, Asst. Prof.; Research Agronomist SE Kansas Branch, Agr. Exp. Sta. (1983). MS 1980, PhD 1981, U. of Arkansas.

**LONGBERG, LESLIE C.**, Controller, KSU Foundation (1977). BS 1968, Kansas St. U.; MBA 1973, U. of Western Florida; CPA 1974, U. of Kansas.

**LOOKHART, GEORGE**, Adjunct Prof. of Grain Science and Industry (1982). BS 1968, Kearney St. Col.; PhD 1973, U. of Wyoming. (\*)

**LORENZ, MICHAEL D.**, Dean of Vet. Medicine; Prof. of Small Animal Medicine, Dept. of Clinical Sciences; Asst. Dir. of Agr. Exp. Sta. (1988). BS 1967, DVM 1969, Oklahoma St. U.; Diplomate 1976, American Col. of Vet. Internal Medicine. (\*)

**LOUB, ARTHUR F.**, Pres. Emeritus and Consultant, KSU Foundation (1979). BA 1952, Duke U.

**LOUCKS, WILLIAM L.**, Prof. of Forestry; Tree Planting Program Leader (1967). BS 1963, Colorado St. U.; MS 1971, Kansas St. U.

**LOUGHIN, THOMAS M.**, Asst. Prof. of Statistics, BS 1985, Rensselaer Polytechnic Institute; MS 1987, U. of North Carolina-Chapel Hill; PhD 1993, Iowa St. U.

**LOVE, JUDITH**, Asst. Prof. of Art (1970). AA 1961, Cottey Col.; BFA 1964, Kansas City Art Inst.; MFA 1969, U. of Nebraska. (\*)

**LOWE, JOHN P.**, Asst. Prof. of Architecture (1990). BArch 1985, Louisiana St. U.; MArch 1987, U. of Michigan. Registered Architect. (\*)

**LOWE, PAUL R.**, Asst. Dir. of Pre Award Services; Research and Sponsored Programs (1987). BS 1985, Eastern Illinois U.

**LUBBERS, CHARLES A.**, Asst. Prof. of Journalism and Mass Communications (1991). BS 1982, MA 1984, S. Dakota St. U.; PhD 1992, U. of Nebraska-Lincoln. (\*)

**LUCAS, MICHAEL S. P.**, Prof. of Electrical and Computer Engineering (1968). MS 1962, PhD 1964, Duke U. (\*)

**LULLA, KAMISH, Adjunct Faculty of Geography (1992). BA 1970, MA 1972, PhD 1977, India; PhD 1983, Indiana State University. (\*)**

**LUNDQUIST, MARVIN C.**, Asst. Prof. Emeritus of Agronomy; Research Agronomist in Charge, Cornbelt Experimental Field (P.O. Powhattan), Agr. Exp. Sta. (1951). BS 1950, MS 1952, Kansas St. U.

**LUPFER-NIELSEN, KATHRYN L.**, Co. Extension Agent, Lincoln Co., Lincoln (1977). BA 1976, Sterling Col.

**LYLE, JOHANNA D.**, Instr. of Accounting (1983). BA 1965, U. of Kansas; MAcc 1983, Kansas St. U.; CPA 1983, Kansas.

**LYLES, LEON**, Adjunct Prof. Emeritus of Agronomy; Research Agricultural Engineer, Wind Erosion Research Unit, USDA, ARS (1968). BS 1955, Oklahoma St. U.; MS 1959, PhD 1970, Kansas St. U. (\*)

**LYNCH, JUDITH A.**, Educational Psychologist; Assoc. Dir., Academic Assistance Cntr. (1982). BS 1969, Bethany Col.; MS 1972, MS 1980, PhD 1984, Kansas St. U.

**LYNCH, KEITH D.**, Assoc. Prof. of Forestry; Forestry Specialist, Tree Improvement (1977). BS 1967, MS 1970, Oklahoma St. U.; PhD 1980, Auburn U.

**LYNCH, MICHAEL L.**, Asst. VP for Institutional Advancement/Educational and Personal Dev. Programs; Dir., Academic Assistance Cntr.; Assoc. Prof., Education (1972). BS 1967, MS 1968, EdD 1972, Indiana U. (\*)

**MAATTA, ERIC A.**, Prof. of Chemistry (1981). BS 1974, Carnegie-Mellon U.; PhD 1980, Indiana U. (\*)

**MACDONOUGH, TOMI S.**, Assoc. Prof. of Psychology (1983). PhD 1972, U. of Georgia.

**MACFARLAND, CHARLOTTE**, Asst. Prof. of Speech (1978). BA 1968, MA 1969, U. of Wisconsin.

**MACFARLAND, DAVID T.**, Assoc. Prof. of Journalism and Mass Communications (1972). BA 1965, MA 1966, Stetson U.; PhD 1972, U. of Wisconsin. (\*)

**MACHOR, JAMES L.**, Assoc. Prof. of English (1990). BA 1972, Ohio U.; MA 1974, U. of Idaho; PhD 1980, U. of Illinois. (\*)

**MACY, ELBERT B.**, Assoc. Prof. Emeritus of Journalism (1946). BS 1930, MS 1939, Kansas St. U.

**MADDUX, ALBERT G.**, Co. Extension Agent Agr. Emeritus, Scott Co., Scott City (1959). BS 1954, Oklahoma St. U.

**MADDUX, LARRY D.**, Prof. of Agronomy, Research Agronomist in Charge, Kansas River Valley Experimental Field (P.O. Topeka) Agr. Exp. Sta. (1975). BS 1965, MS 1967, Oklahoma St. U.; PhD 1973, U. of Nebraska. (\*)

**MADER, ERNEST LEE**, Prof. Emeritus of Agronomy (1948). BS 1936, MS 1944, Oklahoma St. U.; PhD 1948, U. of Nebraska

**MADISON, ANITA**, Community Resource Dir., UFM (1988). BS 1986, Kansas St. U.

**MADSEN, DEBORA L.**, Chair, Acquisitions (1983). BA 1970, U. of California-Los Angeles; MLS 1979, U. of Arizona.

**MAES, SUE C.**, Assoc. Dir. of Continuing Education, Dir. of Academic Outreach (1969). BS 1969, MS 1973, Kansas St. U.

**MAGGARD, MARGARET H.**, Co. Extension Agent, Home Economics, Butler Co., El Dorado (1963). BS 1963, Kansas St. U.

**MAGINNESS, PAUL K.**, Dir. of Photo Services (1968).

**MAGINNIS, JOHN**, Assoc. Prof. of Mathematics (1990). BS 1980, Massachusetts Inst. of Tech.; PhD 1987, Stanford U. (\*)

**MAHONEY, SHERRIE Z.**, Co. Extension Agent, Home Economics, Saline Co., Salina (1980). BS 1972, N.W. Missouri St. U.; MS 1978, U. of Missouri.

**MALEY, ALVIN E.**, Co. Extension Agricultural Agent Emeritus, Lyon Co., Emporia (1953). BS 1950, Kansas St. U.

**MAI IARD, CHARLES E.**, Adjunct Instr. of Human Dev. and Family Studies (1987). BA 1961, Stetson Univ.; MA 1975, Azusa Pacific Col.

**MAIMBERG, DANIEL Z.**, Co. Extension Agent, Agr., Phillips Co., Phillipsburg (1986). BS 1985, U. of Nebraska.

**MANGES, HARRY LEO**, Prof. Emeritus of Agricultural Engineering; Ag. Exp. Sta. (1956). BS 1949, MS 1959, Kansas St. U.; PhD 1969, Oklahoma St. U.; Professional Engineer, 1960. (\*)

**MANGINO, MARK**, Football Recruiting Coord. (1992). BS 1987, Youngstown St. U.

**MANN, RAY H.**, Prof. Emeritus; Area Extension Dir. (1956). BS 1951, Oklahoma St. U.; MS 1965, Kansas St. U.

**MANNELI, TERRENCE L.**, Co. Extension Agent, Horticulture, Ellis Co., Hays (1978). BS 1973, Kansas St. U.; MS 1977, Ohio St. U.

**MANNEY, THOMAS R.**, Prof. of Physics (1971). BA 1958, Western Washington St. Col.; PhD 1964, U. of California. (\*)

**MANNING, DAVID R.**, Research Asst. of Biochemistry (1979). BS 1979, Kansas St. U.

**MANNING, ROBERT T.**, Adjunct Asst. Prof. of Dietetics (1983). MD 1954, U. of Kansas Medical Cntr.

**MANNING, R. WILLIAM**, Constit. Dev. Officer, KSU Foundation (1990). BA 1980, Kansas St. U.

**MANNY, BRYAN L.**, Farm Management Association Fieldman (1988). BS 1983, Iowa St. U.; MS 1988, U. of Missouri.

**MANRY, E. CLIFFORD**, Co. Extension Agricultural Agent, Emeritus, Pawnee Co., Larned (1940). BS 1940, Oklahoma St. U.

**MANSON, JANET M.**, Asst. Prof. of History (1989). BA 1970, MA 1977, Portland St. U.; PhD 1987, Washington St. U. (\*)

**MANTZ, HELEN M.**, Co. Extension Home Economist Emerita, Smith Co., Smith Cntr. (1942). BS 1942, Kansas St. U.

**MANUEL, MILTON LLOYD**, Prof. Emeritus and Head of Agricultural Economics (1945). BS 1941, MS 1948, Kansas St. U.; PhD 1952, U. of Minnesota. (\*)

**MAPLES, CHRISTOPHER G.**, Adjunct Asst. Prof. of Geology (1987). BS 1980, W. Georgia Col.; MS 1985, PhD 1985, Indiana U. (\*)

**MARCHIN, GEORGE L.**, Assoc. Prof. of Biology; Microbiologist, Agr. Exp. Sta. (1970). BA 1962, Rockhurst Col.; PhD 1967, U. of Kansas. (\*)

**MARCUM, KENNETH B.**, Asst. Prof. in Horticulture, Forestry and Recreation Resources (1992). PhD 1989, U. of Hawaii. (\*)

**MARGOLIES, DAVID C.**, Assoc. Prof. of Entomology, Insect Ecology (1985). BS 1976, Brown U.; MS 1980, U. of Massachusetts; PhD 1984, North Carolina St. U. (\*)

**MARK, EMILY R.**, Assoc. Prof.; Extension Home Economist, Northeast (1983). BS 1965, Sterling Col.; MS 1981, Kansas St. U.

**MARLER, RONALD J.**, Dean of Vet. Medicine; Prof. of Toxicology; Asst. Dir. of Agr. Exp. Sta. (1994). BS 1971, DVM 1973, PhD 1978, Kansas St. U. Diplomate, American Coll. of Vet. Pathologists and American Board of Vet. Toxicologists.

**MARLOW, DAROLD D.**, Instr. Emeritus; Area Watershed Specialist, Wakarusa (1950). BS 1950, Kansas St. U.

**MARR, CHARLES W.**, Prof. of Horticulture; Extension Horticulturist, Vegetable Crops, Agr. Exp. Sta. (1971). BS 1963, MS 1967, Southern Illinois U.; PhD 1970, U. of Tennessee. (\*)

**MARR, JOHN M.**, Prof. Emeritus of Mathematics (1953). BS 1941, Central Missouri St. Col.; MA 1948, U. of Missouri; PhD 1953, U. of Tenn. (\*)

**MARSH, BRIAN H.**, Asst. Prof. of Agronomy; Research Agronomist in Charge, Cornbelt Field-Powhattan, Agr. Exp. Sta. (1991). AS 1979, Ricks Col.; BS 1986, MS 1987, Utah St. U.; PhD 1990, U. of Kentucky.

**MARSH, HARRY D.**, Prof. of Journalism and Mass Communications (1980). BA 1949, Baylor U.; BS 1957, Columbia U.; PhD 1974, U. of Texas. (\*)

**MARSHALL, LANE L.**, Dean of Arch. and Design; Prof. of Landscape Arch. (1989). BLA 1960, U. of Florida; MLA 1980, U. of Illinois; Registered Landscape Architect. (\*)

**MARSHALL, SHIRLEY M.**, Project Dir., Education (1990). BS 1972, MS 1976, Kansas St. U.; MA 1981, Ball St. U.; PhD 1988, Kansas St. U.

**MARTIN, CHARLES W.**, Asst. Prof. of Geography (1989). AB 1982, Dartmouth Col.; MA 1985, PhD 1990, U. of Kansas. (\*)

**MARTIN, CHARLES R.**, Adjunct Asst. Prof. of Agricultural Engineering (1985). BS 1958, Purdue U. (\*)

**MARTIN, DANIEL C.**, Staff Physician, Lafene Health Cntr. (1976). BS 1952, Arkadelphia U.; MD 1958, U. of Kansas; Fellow, American Col. of Clinical Pharmacology.

**MARTIN, KAREN**, Dir. of Minority Engineering Programs (1993). BS 1978, Xavier U.; MCD 1979, Louisiana St. U.; PhD 1993, Kansas St. U.

**MARTIN, LARRY D.**, Adjunct Prof. of Geology (1988). BS 1966, MS 1969, Nebraska; PhD 1973, U. of Kansas.

**MARTIN, LINDA C.**, Asst. Prof. of Animal Sciences and Industry (1988). BS 1982, Ohio St. U.; MS 1985, VPI St. U.; PhD 1987, Colorado St. U.

**MARTIN, RICHARD P.**, Dir. of McCain Auditorium (1987). AB 1962, U. of Chicago; MPhil 1983, Columbia U.

**MARTIN, T. JOE**, Prof.; Wheat Research Geneticist, Fort Hays Branch Agr. Exp. Sta. (1974). BS 1970, Pittsburg St. U.; MS 1971, Kansas St. U.; PhD 1974, Michigan St. U. (\*)

**MARTIN, VAUGHN**, Academic Counselor, Intercollegiate Athletics (1992). BS 1983, U. of Wyoming; MS 1986, Adams St. College; PhD 1992, Kansas St. U.

**MARTIN, VICTOR L.**, Asst. Prof. of Agronomy; Research Agronomist, Sandyland Exp. Field-St. John, Agr. Exp. Stn. (1991). BS 1979, U. of Akron; MS 1986, PhD 1991, Ohio St. U.

**MARTINI, STEVE**, Assoc. Dir. and Intramural Coord., Recreational Services (1980). MA 1977, BA 1974, California St.-Chico.

**MARTINSON, DONNA R.**, Co. Extension Agent, Home Economics, Geary Co., Junction City (1971). BS 1971, MS 1980, Kansas St. U.

**MARYMOUNT, JESSE H.**, Adjunct Clinical Assoc. of Med. Tech. (1976). BS 1950, Syracuse U.; MD 1954, SUNY at Syracuse.

**MASON, JAMES**, Preservation Librarian (1989). BA 1975, Illinois Wesleyan U.; MLS 1988, U. of Illinois.

**MASTRANARDI, MICHAEL A.**, Asst. Prof. of Art (1993). BA 1979, Central Connecticut St. U.; MALS 1986, Wesleyan U.; MFA 1993, Massachusetts Col. of Art.

**MATHEWS, ALEXANDER P.**, Prof. of Civil Engineering (1979). BS 1966, U. of Madras-India; MS 1968, U. of Rhode Island, Kingston; PhD 1975, U. of Michigan, Ann Arbor; Professional Engineer, 1977. (\*)

**MATSAKIS, MANNY**, Asst. Football Coach (1994). BA 1984, Capital U.-Ohio; MS 1989, PhD 1994, Kansas St. U.

**MATTESON, DENNIS K.**, Instr.; Kansas Industrial Extension Services (1981). BS 1978, MS 1980, Kansas St. U.

**MATTESON, DIANE**, Conference Coord., National Conference Office, (1988). BS 1974, MS 1988, Kansas St. U.

**MATTHEWS, JOHN CARTER**, Prof. of Chemical Engineering (1962). BS 1959, DSc 1965, Washington U. (\*)

**MATTHEWS, LYNNETTE**, Asst. Dir., Admissions (1991). BS 1989, Peru St. Co.; MS 1991, Kansas St. U.

**MATTSON, GARY A.**, Assoc. Prof. of Planning (1992). BA 1969, SUNY-Albany; MPA 1976, City Univ. of New York; MCP 1978, U. of Rhode Island; Ph.D. 1983, U. of Delaware. (\*)

**MATTSON, RICHARD H.**, Prof. of Horticulture; Horticultural Therapy (1969). BS 1964, U. of Nebraska; PhD 1969, U. of Minnesota. (\*)

**MAULLAR, MARCI E.**, Asst. Prof. of Speech (1988). BA 1975, MA 1981, Kent St. U.; MFA 1986, Penn St. U. (\*)

**MAXON, RICHARD C.**, Prof. Emeritus of Agricultural Economics (1981). PhD 1963, U. of Missouri.

**MAXWELL, THOMAS M.**, Co. Extension Agent Agr. Emeritus, Saline Co., Salina (1981). BS 1978, MS 1980, Kansas St. U.

**MAXWELL, THOMAS R.**, Co. Extension Agent Agr. Emeritus, Allen Co., Iola (1954). BS 1954, MS 1968, Kansas St. U.

**MAY, CHERYL**, Dir., News Services (1978). BA 1974, U. of Missouri-Kansas City; MS 1985, Kansas St. U.

**MAYER, STEVEN L.**, Co. Extension Agent, Horticulture, Harvey Co., Newton (1980). BS 1977, MS 1979, U. of Wisconsin.

**McADOO, ROBERT STANDISH**, Assoc. Specialist; Extension PRIDE Program Coordinator (1989). BS 1967, Emporia St. U.; MS 1970, Kansas St. U.

**McALEER, EDWARD M.**, Dir. of Academic Outreach (1985). BA 1967, MA 1973, PhD 1978, Michigan St. U.

**McANARNEY, HARRY EDWARD**, Assoc. Prof. Emeritus, Education (1957). BS 1943, Emporia St. U.; MS 1947, EdD 1958, U. of Kansas. (\*)

**McCAHON, CYNTHIA S.**, Assoc. Prof. of Management (1989). BS 1978, Purdue; MS 1980, PhD 1987, Kansas St. U. (\*)

**McCARTHY, PAUL E.**, Prof. Emeritus of English (1967). BA 1948, MFA 1951, St. U. of Iowa; PhD 1962, U. of Texas. (\*)

**McCLURE, GREGORY W.**, Co. Extension Agent, Clay Co., Clay Center (1986). BS 1980, Kansas St. U.

**McCOLLUM, ERIC E.**, Adjunct Asst. Prof. of Human Dev. and Family Studies (1988). BA 1974, MSW 1975, U. of Iowa; PhD 1986, Kansas St. U.

**McCOLM, CAROLYN S.**, Co. Extension Agent, Home Economics, Graham Co., Hill City (1989). BS 1987, MS 1989, Pittsburg St. U.

**McCOMAS, MARLENE J.**, Instr. of Clothing, Textiles, and Interior Design (1980). BS 1974, MS 1980, U. of Wisconsin-Stout.

**McCORKLE, DEAN A.**, Farm Management Assoc. Fieldman (1991). BS 1988, MS 1991, Texas A&M U.

**McCORMACK, GREGORY D.**, Co. Extension Agent, Agr., Kingman Co., Kingman (1990). BS 1989, Kansas St. U.

**McCORMICK, FRANK JAMES**, Prof. Emeritus of Civil Engineering (1939). BS 1927, MS 1931, Iowa St. U.; Professional Engineer, 1944.

**McCOY, JOHN HENRY**, Prof. Emeritus of Agricultural Economics (1940). BS 1940, MS 1942, Kansas St. U.; PhD 1955, U. of Wisconsin. (\*)

**McCRACKEN, ELIZABETH UNGER**, Assoc. Prof. Emerita of Biology (1938). AB 1929, MA 1932, Wellesley Col.; PhD 1937, U. of California. (\*)

**McCULLOH, JOHN M.**, Prof. of History (1973). BA 1965, Kansas U.; MA 1966, PhD 1971, U. of California, Berkeley. (\*)

**McCULLOH, KAREN I.**, Asst. to Dean, Libraries (1987). BA 1965, U. of Kansas; MS 1988, Kansas St. U.

**McCULLOUGH, ELIZABETH**, Prof. of Clothing, Textiles, and Interior Design (1978). BS 1974, Ohio St. U.; MS 1975, PhD 1978, U. of Tennessee. (\*)

**McCULLY, WILLIAM B.**, Co. Extension Agricultural Agent Emeritus, Harper Co., Anthony (1959). BS 1954, MS 1959, Oklahoma St. U.

**McDONALD, C. RICHARD**, Prof. of Interior Arch. (1974). BS 1960, March 1979, Kansas St. U.; Registered Professional Engineer.

**McDONALD, M. JEAN**, Asst. to the Dean, Libraries (1992). BS 1968, Emporia St. U.

**McDONALD, RICHARD N.**, Prof. of Chemistry (1960). BS 1954, MS 1955, Wayne St. U.; PhD 1956, U. of Washington. (\*)

**McELLINEY, ROBERT R.**, Prof. Emeritus of Grain Science and Industry; Feed Tech. Research Scientist, Agr. Exp. Sta. (1979). BS 1952, Purdue U., MBA 1963, Indiana U., Mgt. of Mgrs. Prog. 1972, U. of Michigan.

**McELROY, MARY A.**, Prof. of Kinesiology (1978). BA 1974, Queens Col., New York; MA 1975, Ohio St. U.; PhD 1978, U. of Maryland. (\*)

**McEOWEN, ROGER T.**, Asst. Prof. of Agr. Economics; Ext. Agr. Economist, Agr. Law (1993). BS 1986, Purdue U.; MS 1990, Iowa St. U.; JD 1991, Drake U.

**McFADDEN, WILLIAM F.**, Dietitian, Housing and Dining Services (1990). BS 1981, U. of Nebraska-Lincoln; MS 1990, Iowa St. U.

**McFARLAND, MARCIA R.**, Assoc. Prof., Extension Specialist, 4-H Youth Programs (1980). BS 1975, MS 1977, Wichita St. U.

**McFARLIN, NANCY**, Assoc. Prof., Education; Instructional Services Librarian, Libraries (1987). BS 1977, Fort Hays St. U.; MLS 1978, Emporia St. U.; PhD 1986, Kansas St. U.

**McGAUGHEY, K. BOBETTE**, Asst. to the Dean, Graduate School (1989). BS 1986, Kansas St. U.

**McGAUGHEY, WILLIAM H.**, Adjunct Prof. of Entomology; Research Entomologist, USDA ARS (1973). BS 1963, Texas Tech. Col.; MS 1965, PhD 1967, Iowa St. U. (\*)

**McGINNESS, KENNETH E.**, Co. Extension Agricultural Agent Emeritus, Johnson Co., Olathe (1954). BS 1949, Kansas St. U.

**McGLASHON, DOLORES M.**, Assoc. Prof.; Extension Communications Specialist (1977). AB 1974, Baker U.; MS 1981, Kansas St. U.

**McGOWAN, JUANITA M.**, Asst. Prof. of Education (1980). BS 1974, MA 1975, U. of Kansas; PhD 1991, Kansas St. U.

**McGOWAN, REGINLAND**, Dir. of Upward Bound Program (1986). BS 1979, Alcorn U.; MS 1986, Kansas St. U.

**McGRATH, DIANE**, Assoc. Prof., Education (1987). AB 1963, Oberlin Col.; MS 1969, MEd 1983, PhD 1973, U. of Illinois. (\*)

**McGRAW, BETTY R.**, Assoc. Prof. of Modern Languages (1963). Licence es Lettres CATES 1961, PhD 1982, Université de Paris. (\*)

**McGRAW, EUGENE THOMAS**, Prof. of Interior Arch. and Planning (1958). BArch 1957, Oklahoma St. U.; MRP 1963, Kansas St. U. (\*)

**McGRAW, JENNIFER L.**, Co. Ext. Agent, Home Economics, Edwards Co., Kinsley (1993). BS 1991, MS 1993, Kansas St. U.

**McKEE, R. MILES**, Prof. of Animal Sciences and Industry; Beef Cattle Research Scientist, Agr. Exp. Sta. (1959). BS 1951, MS 1963, Kansas St. U.; PhD 1967, U. of Kentucky.

**McKINNEY, JANA R.**, Co. Extension Agent, 4-H Youth, McPherson Co., McPherson (1985). BS 1985, U. of Idaho.

**McKINNEY, KATHERYN ANN**, Assoc. Prof. Emerita of Physical Education and Leisure Studies (1946). BS 1934, Kansas St. U.; MA 1935, George Peabody Col. for Teachers. (\*)

**McLAUGHLIN, RONALD JR.**, Asst. Prof. of Small Animal Surgery (1991). DVM 1985, U. of Missouri; DVSc 1991, U. of Guelph. (\*)

**McLELLAN, HILARY**, Asst. Prof., Education (1987). BA 1972, U. of California at Riverside; MEnvS 1976, Miami U. of Ohio; PhD 1987, U. of Wisconsin—Madison. (\*)

**McMAHON, JANICE C.**, Co. Extension Home Economist, EFNEP, Sedgwick Co., Wichita (1983). BS 1980, MS 1982, Colorado St. U.

**McMAHON, RUSSELL**, Dir. of Annual Giving, KSU Foundation (1991). BA 1973, Kansas Wesleyan U.

**McMANIS, HELEN L.**, Asst. Dir. Emerita, Housing and Dining Services (1966). BS 1941, MS 1972, Kansas St. U.

**McMASTER, GERALD O.**, Co. Extension Agricultural Agent Emeritus, Brown Co., Hiawatha (1951). BS 1940, MS 1951, Kansas St. U.

**McMILLEN, MATTHEW A.**, Field Rep., Athletics (1987). BS 1985, Kansas St. U.

**McMURPHY, ROSE M.**, Asst. Prof. of Anesthesiology (1989). DVM 1982, Washington St. U.; Diplomate 1989, American Col. of Vet. Anesthesiology.

**McNAMARA, MICHAEL C.**, Assoc. Prof. of Arch. (1988). BArch 1969, North Carolina St. U.; MA 1974, UCLA. Registered Architect. (\*)

**McNEIL, JOAN N.**, Asst. Prof. Emerita of Human Dev. and Family Studies (1970). BS 1951, Kansas St. U.; MS 1956, U. of Minnesota; PhD 1980, Kansas St. U. (\*)

**McNEILL, DIANE D.**, Co. Extension Agent, 4-H, Ford Co., Dodge City (1986). BS 1983, Kansas St. U.

**McNULTY, MARK S.**, Assoc. Prof. of Economics (1985). BS 1978, U. of S. Dakota; PhD 1985, Iowa St. U. (\*)

**McQUEEN, LEE V.**, Dir., Facilities Architectural and Engineering Services (1988). BS 1978, Kansas St. U.

**McREYNOLDS, KENNETH L.**, Assoc. Prof. Emeritus; Extension Agricultural Economist, South Central (1949). BS 1950, MS 1954, Kansas St. U.

**McVEY, D. SCOTT**, Assoc. Prof. of Clinical Immunology, Dept. of Pathology and Microbiology (1986). DVM 1980, U. of Tennessee; PhD 1986, Texas A&M; Diplomate 1990, American Col. of Vet. Internal Medicine. (\*)

**McWILLIAMS, DONALD D.**, Co. Extension Agricultural Agent Emeritus, Wallace Co., Sharon Springs (1956). BS 1948, Kansas St. U.

**MEDLIN, ROGER C.**, Prof. Emeritus; Extension Publications Coord. (1967). BS 1948, MS 1969, Kansas St. U.

**MEEK, MARY E.**, Co. Extension Home Economist Emerita, Geary Co., Junction City (1953). BS 1924, Emporia St. U.; MS 1938, Kansas St. U.

**MEEK, JOSEPH C., JR.**, Adjunct Asst. Prof. of Dietetics (1987). AB 1954, MD 1957, U. of Kansas.

**MEIREIS, CLIFFORD L.**, Co. Extension Agricultural Agent Emeritus, Norton Co., Norton (1955). BS 1953, Kansas St. U.; MEd 1962, Colorado St. U.

**MEISNER, ROBERT G.**, Prof., Education (1969). BS 1948, Oklahoma A&M Col.; MS 1957, Oklahoma St. U.; EdD 1967, U. of California, Berkeley. (\*)

**MELHEM, HANI G.**, Asst. Prof. of Civil Engineering (1991). BS 1981, Cairo U.; MS 1987, PhD 1989, U. of Pittsburg. (\*)

**MELOAN, CLIFTON E.**, Prof. of Chemistry (1959). BS 1953, Iowa St. U.; PhD 1959, Purdue U. (\*)

**MELTON, AUSTIN C.**, Assoc. Prof. of Computing and Information Sciences (1984). BA 1971, Friends U.; MS 1974, PhD 1980, Kansas St. U. (\*)

**MENDENHALL, BURNEY L.**, Asst. Prof. of Modern Languages (1965). BA 1950, Washburn U.; MS 1953, Emporia St. U.; PhD 1964, U. of Kansas. (\*)

**MENGARELLI, JIMMIE J.**, Co. Extension Agent, 4-H, Crawford Co., Girard (1985). BS 1976, Kansas St. U.

**MERKLIN, JOSEPH FREDERICK**, Prof. of Nuclear Engineering (1967). BS 1957, Manhattan Col. of New York; PhD 1963, U. of Minnesota. (\*)

**MERRIMAN, SCHARON V.**, Co. Extension Agent, Home Economics, Reno Co., Hutchinson (1971). BS 1970, MS 1977, Kansas St. U.

**MESSENHEIMER, ALVA ERNEST**, Assoc. Prof. Emeritus of Mechanical Engineering (1942). BS 1924, Kansas St. U.; Professional Engineer, 1948.

**METZLER, CHRISTINE L.**, Research Asst. of Psychology (1983). MA 1979, Villanova U.

**MEYER, GENE M.**, Instr.; Extension Specialist, Small Business Energy (1981). BS 1971, U. of Kansas.

**MEYER, SALLY K.**, Instr. of Human Dev. and Family Studies (1989). BA 1986, MS 1989, S. Dakota St. U.

**MICHAELS, CHARLES L.**, Asst. Prof. of Animal Sciences and Industry; In Charge KABSU, Agr. Exp. Sta. (1965). BS 1959, Kansas St. U.

**MICHIE, ARUNA NAYYAR**, Assoc. Prof. of Political Science (1976). AB 1966, Smith Col.; MA 1969, PhD 1975, Michigan St. U. (\*)

**MIKESELL, MERREL E.**, Assoc. Prof. of Agronomy; Extension Specialist, Crops and Soils, Northwest (1978). BS 1969, MS 1971, PhD 1973, Kansas St. U.

**MILBOURN, MAX W.**, Assoc. Prof. Emeritus of Journalism and Mass Communications (1949). BA 1938, Wichita St. U.

**MILEY, JAMES D.**, Asst. Prof. of Sociology (1970). BA 1959, Millsaps Col.; MA 1963, Louisiana St. U.; PhD 1970, Tulane U. (\*)

**MILLER, ANITA K.**, Co. Extension Agent, 4-H Youth, Dickinson Co., Abilene (1984). BS 1984, MS 1991, Kansas St. U.

**MILLER, BERKELEY**, Asst. Prof. of Sociology (1988). BA 1974, U. of California—Santa Cruz; MA 1979, PhD 1986, Brown U. (\*)

**MILLER, CAROL LYNN**, Asst. Prof. of Modern Languages (1968). BA 1958, MA 1959, Vanderbilt U.; PhD 1963, Washington U. (\*)

**MILLER, CECIL H.**, Prof. Emeritus of Philosophy (1945). AB 1930, U. of Kansas; MA 1939, U. of California. (\*)

**MILLER, CHARLES L., JR.**, Co. Extension Agent, Horticulture, Saline Co., Salina (1985). BS 1969, MS 1981, Kansas St. U.

**MILLER, DELBERT D.**, Asst. Football Coach (1988). BA 1972, Central Col.; MA 1975, North Iowa U.

**MILLER, DIANE M.**, Co. Extension Agent, 4-H; Leavenworth Co., Leavenworth (1990). BS 1990, Chadron St. Col.

**MILLER, ELSIE LEE**, Asst. Prof. Emerita; Extension Specialist, Food Science and Meal Management (1941). BS 1934, MS 1942, Kansas St. U.

**MILLER, FORREST R.**, Prof. of Mathematics (1968). BS 1962, U. of Oklahoma; MA 1965, PhD 1968, U. of Massachusetts. (\*)

**MILLER, GERALD DALE**, Asst. Prof. Emeritus of Grain Science and Industry (1946). BS 1924, U. of Nebraska; MS 1953, Kansas St. U.

**MILLER, JUDITH L.**, Head and Prof. of Hotel, Restaurant, Institution Management and Dietetics (1989). BS 1967, Ouachita Baptist U.; MBA 1984, Southern Illinois U.; PhD 1986, Texas Womens U. (\*)

**MILLER, KENT B.**, Farm Management Association Fieldman (1983). BS 1980, Oklahoma St. U.

**MILLER, MICHAEL H.**, Asst. Prof. of Computing and Information Sciences (1960). BS 1958, MS 1960, Iowa St. U.

**MILLER, RICHARD A.**, Co. Extension Agent, Agr., Johnson Co., Olathe (1983). BS 1982, Lincoln U.

**MILLER, RICHARD B.**, Asst. Prof. of Human Dev. and Family Studies (1988). BS 1982, MS 1984, Brigham Young U.; PhD 1989, U. of Southern California. (\*)

**MILLER, WILLIAM C.**, Head and Prof. of Arch. (1977). BArch 1968, U. of Oregon; MArch 1970, U. of Illinois; Registered Architect. (\*)

**MILLERET, ROY J.**, Assoc. Prof. Emeritus, Diagnostic Lab; Research Pathologist (1960). DVM 1944, MS 1959, Kansas St. U.

**MILLERHASKI, BRUCE E.**, Co. Ext. Agent, Agr., Gray County, Cimarron (1992). BS 1987, Kansas St. U.

**MILLIKEN, GEORGE A.**, Prof. of Statistics (1969). BS 1965, MS 1968, PhD 1969, Colorado St. U. (\*)

**MILLS, ROBERT B.**, Prof. Emeritus of Entomology; Research Entomologist, Stored Product Insects, Agr. Exp. Sta. (1963). BS 1949, Kansas St. U.; MEd 1953, U. of Colorado; PhD 1964, Kansas St. U. (\*)

**MINGLE, JOHN O.**, Prof. Emeritus of Architectural Engineering and Construction Science (1960). BS 1953, MS 1958, Kansas St. U.; PhD 1960, Northwestern U.; JD Law 1980, Washburn U. (\*)

**MINOCHA, HARISH C.**, Prof. of Virology, Dept. of Pathology and Microbiology; Acting Assoc. Dean for Research; Research Virologist (1969). BVSc 1955, Punjab U., India; MS 1963, PhD 1967, Kansas St. U. (\*)

**MINTERT, JAMES R.**, Assoc. Prof. of Agricultural Economics; Extension Agricultural Economist, Marketing (1986). BS 1978, MS 1982, Purdue U.; PhD 1986, U. of Missouri. (\*)

**MINTERT, SUSAN M.**, Staff Asst., Extension Communications (1988). BA 1985, Indiana U. at Bloomington.

**MINTON, J. ERNEST**, Assoc. Prof. of Animal Sciences and Industry (1983). BS 1977, Western Kentucky U.; MS 1980, PhD 1983, Oklahoma St. U. (\*)

**MIRT, LINDA J.**, Co. Extension Agent, Home Economics, Sumner Co., Wellington (1976). BS 1972, Kansas St. U.; MEd 1975, Pennsylvania St. U.

**MITCHELL, JAMES C.**, Prof. of Psychology (1966). BS 1957, MA 1959, PhD 1962, Ohio St. U. (\*)

**MITCHELL, HOWARD LEE**, Prof. Emeritus of Biochemistry (1946). BS 1938, Oklahoma St. U.; PhD 1946, Purdue U. (\*)

**MITHEN, JEROME A.**, Adjunct Research Asst., Grain Science and Industry; Amer. Inst. of Baking (1977). BS 1972, Loyola U.

**MIXER, VIRGINIA K.**, Instr., Education (1975). BS Ed. 1969, Pittsburg St. U.; MS 1975, Kansas St. U.

**MIZUNO, MASAOKI**, Assoc. Prof. of Computing and Information Sciences (1987). BS 1978, Keio U., Japan; MS 1982, Pennsylvania St. U.; PhD 1987, Iowa St. U. (\*)

**MOCK, DONALD E.**, Prof. of Entomology, Extension Specialist, Livestock Entomology (1973). BA 1959, Western St. Col.; PhD 1974, Cornell U. (\*)

**MOCK, JAMES B.**, Sr. Prod./Dir., Kansas Regents Educ. Comm. Center (1992). BA 1980, Indiana U.

**MOEDER, LAWRENCE E.**, Dir., Student Financial Assistance, (1977). BS 1977, MS 1980, Kansas St. U.

**MOILLER, LARRY D.**, Staff Physician, Lafene Health Cntr. (1983) MD 1977, U. of Nebraska–Omaha.

**MOHR, CYNTHIA**, Asst. Prof. of Clothing, Textiles, and Interior Design (1990) BAE 1972, MS 1977, Oklahoma St. U.

**MOLINEUX, BARRY R.**, Instr. of Speech (1970). BS 1966, MA 1968, Kansas St. U.

**MOLT, MARY**, Asst. Dir., Housing and Dining Services (1973) BS 1971, U. of Nebraska–Kearney; MS 1977, Oklahoma St. U.

**MOI Z, DIXIE I.**, Co. Extension Home Economist Emerita, Stafford Co., St. John (1953). BS 1944, Northwestern St. U.

**MOLZEN, SHARON B.**, Co. Extension Agent, Home Economics, Harvey Co., Newton (1969) BS 1969, MS 1989, Kansas St. U.

**MONTELONE, BETH A.**, Assoc. Prof. of Biology (1988). BS 1976, Rensselaer Polytechnic Inst., MS 1978, PhD 1982, U. of Rochester. (\*)

**MONTGOMERY, JOSEPH**, KSDB-FM Station Manager (1989). BS 1984, Kansas St. U.

**MOORE, BONNIE RUSH**, Asst. Prof., Equine Medicine (1993) DVM 1989, MS 1993, The Ohio St. U.

**MOORE, CHARLES**, Assoc. Prof. of Mathematics (1990). BA 1978, Washington U.; MA 1980, U. of California–Santa Barbara; PhD 1986, U. California–Los Angeles. (\*)

**MOORE, HUGH C.**, Adjunct Clinical Assoc. of Med. Tech. (1979). BS 1955, Texas Christian; MD 1959, U. of Texas.

**MOORE, MARK S.**, President, KSU Foundation (1979). BS 1974, Kansas St. U.

**MOORE, WALTER ASHTON**, Asst. Prof. Emeritus of Agronomy (1943). BS 1944, Kansas St. U.

**MOORE, WILLIAM E.**, Prof. of Pathology and Microbiology, Research Clinical Pathologist (1968) BS 1956, DVM 1958, Cornell U.; PhD 1968, U. of Minnesota; Diplomate 1972, American Col. of Vet. Pathologists. (\*)

**MORCOS, MEDHAT M.**, Assoc. Prof., Electrical and Computer Engineering (1986). BS 1966, MS 1978, Cairo U.; PhD 1984, U. of Waterloo. (\*)

**MORELAND, RACHEL S.**, Microcomputer Support, Libraries (1971). BS 1955, U. of Arizona; MS 1970, Kansas St. U.; MLS 1988, U. of Missouri.

**MORGAN, JOHN MARK**, Assoc. Prof. in Horticulture, Forestry and Recreation Resources (1993). PhD 1987, Texas A&M U.

**MORGAN, PHILLIP D.**, Asst. Baseball Coach (1988). BSE 1976, Missouri Southern St. U.

**MORGAN, STEVE**, Senior Agricultural Editor (1982). BA 1965, U. of Omaha; MA 1968, U. of Nebraska.

**MORGAN, THOMAS D.**, Research Asst. of Entomology (1980). BS 1977, MS 1979, U. of Missouri.

**MORNINGSTAR, WILLIAM S.**, Instr. of Sociology (1982). MA 1979, West Virginia U.

**MORRICAL, CARLA M.**, Co. Extension Agent, Home Economics, Ellis Co., Hays (1983). BS 1982, Kansas St. U.

**MORRILL, JAMES L., JR.**, Prof. of Animal Sciences and Industry; Dairy Cattle Research Nutritionist, Agr. Exp. Sta. (1962). BS 1958, Murray St. Col.; MS 1959, U. of Kentucky; PhD 1963, Iowa St. U. (\*)

**MORRIS, MAX B.**, Assoc. Specialist Emeritus, Ark Valley Area Commercial Horticulture Agent, South Central (1989). BS 1959, Kansas St. U.

**MORRISON, FRANK D.**, Prof. of Horticulture; Extension State Leader, Horticulture Program (1966). BS 1951, MS 1959, U. of Idaho; PhD 1966, Michigan St. U. (\*)

**MORROW, SHARON M.**, Dir. of U. Publications (1986). BS 1975, Ball St. U.

**MORSE, REED FRANKLIN**, Prof. Emeritus of Civil Engineering (1923). BA 1921, Cornell Col.; BS 1923, Iowa St. U.; MS 1933, Kansas St. U.; PhD 1941, Cornell U.; Professional Engineer, 1939.

**MORSE, RICHARD L. D.**, Prof. Emeritus of Human Dev. and Family Studies (1955) BA 1938, U. of Wisconsin; PhD 1942, Iowa St. U. (\*)

**MORTENSON, GARY C.**, Assoc. Prof. of Music (1989). BME 1978, Augustana Col., MM 1981, Ithaca Col. DM 1984 U. of Texas. (\*)

**MORTVEDT, MARJORY M.**, Prof.; Coord., Extension Staff and Program Dev. (1979). BS 1962, MS 1967, PhD 1971, Iowa St. U.

**MOSER, HERBERT CHARLES**, Prof. Emeritus of Chemistry (1957). BA 1952, San Jose St. U.; PhD 1957, Iowa St. U. (\*)

**MOSER, PATRICIA**, Adjunct Instr. of Dietetics (1986). BS 1982, Kansas St. U.

**MOSER, STEVEN C.**, Instr. of Architectural Engineering and Construction Science (1988) BS 1980, Kansas St. U.; MS 1988, U. of Colorado, Boulder. Professional Engineer.

**MOSES, WILLIAM R.**, Prof. Emeritus of English (1950). BA 1932, MA 1933, PhD 1939, Vanderbilt U. (\*)

**MOSHER, ROBIN A.**, Instr. of English (1983). BA 1975 Washburn U.; MA 1983, Kansas St. U.

**MOSIER, DEREK A.**, Assoc. Prof. of Pathology (1990). DVM 1978, Kansas St. U.; PhD 1985, Oklahoma St. U.; Diplomate 1986, American Col. of Vet. Pathologist. (\*)

**MOSIER, JACOB E.**, Prof. Emeritus of Clinical Sciences (1945). DVM 1945, MS 1948, Kansas St. U.; Diplomate 1972, American Col. of Vet. Internal Medicine. (\*)

**MOSIER, NANCY K.**, Interim Dept. Head and Asst. Prof. of General Engineering (1981). BA 1967, Wichita St. U.; MS 1987, Kansas St. U.

**MOSIMAN, CAROLYN S.**, Co. Extension Agent, Home Economics; Hodgeman Co., Jetmore (1991). BS 1990, Emporia St. U.

**MOSSMAN, THIRZA ADELINE**, Assoc. Prof. Emerita of Mathematics (1922). BA 1916, U. of Nebraska; MA 1922, U. of Chicago. (\*)

**MOTAZ, ALHOURANI**, Program Coord., International Student Ctr. (1993). BS 1989, Iowa St. U.; MA 1993, MBA 1993, Kansas St. U.

**MOTT, MARDE**, Inst. of Speech Pathology (1993). BS 1989, U. Nebraska–Lincoln; MA 1991, Ohio U.

**MOXLEY, VIRGINIA M.**, Assoc. Dean of Human Ecology; Acting Head of Clothing, Textiles, and Interior Design; Prof. of Human Dev. and Family Studies (1985) BS 1968, MS 1969, PhD 1977, Kansas St. U. (\*)

**MOYER, JOSEPH L.**, Assoc. Prof.; Forage Crops Research Agronomist, SE Kansas Branch Agr. Exp. Sta. (1978). BS 1968, MS 1969, PhD 1971, Kansas St. U.

**MOYER, WENDELL A.**, Prof. Emeritus; St. Leader, Animal Sciences and Industry Program (1941). BS 1941, MS 1955, Kansas St. U.

**MROZEK, DONALD J.**, Prof. and Head of History (1972). BA 1966, Georgetown U.; MA 1968, PhD 1972, Rutgers U. (\*)

**MUELLER, DELBERT D.**, Assoc. Prof. of Biochemistry; Assoc. Biochemist, Agr. Exp. Sta. (1968). BS 1962, PhD 1966, U. of Oklahoma. (\*)

**MUENZENBERGER, THOMAS B.**, Assoc. Prof. of Mathematics (1973). BS 1965, MS 1967, U. of Florida, PhD 1972, U. of Wyoming. (\*)

**MUGLER, DAVID J.**, Assoc. Dean and Prof. of Agr.; Dir. of Resident Instruction (1965). BS 1959, Kansas St. U.; MS 1962, U. of Wisconsin; PhD 1969, Kansas St. U. (\*)

**MUILENBURG, GRACE E.**, Assoc. Prof. Emerita (1969). BS 1947, U. of Kansas; MA 1969, U. of Missouri, Columbia.

**MUIR, WILLIAM L.**, Dir. of Economic Dev., KSU Foundation (1987). BS 1977, Kansas St. U.

**MUNCE, JAMES C.**, Assoc. Prof. of Art (1972). BEA 1966, Minneapolis School of Art; MFA 1971, Indiana U. (\*)

**MUNSON, DEANNA M.**, Asst. Prof. of Clothing, Textiles, and Interior Design; Extension Specialist, Textiles (1967). BS 1966, MS 1967, PhD 1980, Kansas St. U. (\*)

**MUNTZ, PAMELA L.**, Co. Extension Agent, Home Economics; Kiowa Co., Greensburg (1990). BS 1970, Kansas St. U.

**MURPHY, CARLIN T.**, Co. Extension Agent, Wabaunsee Co., Alma (1989). BS 1985, Kansas St. U.

**MURPHY, DIANE I.**, Academic Advisor, Education (1989). BS 1983, Northern St. U.; MS 1986, Kansas St. U.

**MURPHY, JAMES PATRICK**, Prof. of Agricultural Engineering; Extension State Leader, Agricultural Engineering Program (1979). BS 1968, MS 1970, Kansas St. U.; Professional Engineer, 1972.

**MURPHY, MARTHA E.**, Instr., Co. Extension Home Economist, EFNEP; Crawford Co., Girard (1991). BS 1974, Kansas St. U.

**MURPHY, SANDRA D.**, Asst. Instr. of Biochemistry (1983). BS 1960, U. of Missouri.

**MURPHY, STEPHEN M.**, Head and Prof. of Interior Arch. (1968). BS 1968, Kansas St. U.; MEd 1974, U. of Missouri.

**MURPHY, THOMAS**, Adjunct Assoc. Prof. of Human Dev. and Family Studies (1990). BA 1964, Westminster Col.; MD 1968, U. of Oklahoma School of Medicine.

**MURRAY, ANN D.**, Assoc. Prof. of Human Dev. and Family Studies (1988). BS 1967, Hollis Col.; MA 1971, Catholic U.; PhD 1978, Macquarie U. (\*)

**MURRAY, BEVERLY R.**, Asst. Prof. of Journalism and Mass Communications (1992). BA 1988, Virginia Polytechnic Inst and St. U.; JD 1991, Col. of William and Mary.

**MURRAY, CHANDRA**, Co. Ext. Agent, 4–H youth; Reno Co., Hutchinson (1991). BS 1991, U. of Nebraska.

**MURRAY, DEBORAH A.**, Instr. of English (1988). BA 1983, Central St. U., MA 1986, Kansas St. U.

**MURRAY, JOHN P.**, Head and Prof. of Human Dev. and Family Studies (1985). BA 1965, John Carroll U.; MA 1967, PhD 1970, The Catholic U. of America. (\*)

**MURRAY, JOSEPH S.**, Asst. Prof. of Biology; Immunologist, Agr. Exp. Sta. (1991). BS 1982, Emporia St. U.; PhD 1987, U. of Kansas. (\*)

**MURRAY, THOMAS E.**, Assoc. Prof. of English (1988). BA 1978, U. of Missouri, St. Louis; MA 1980, PhD 1982, Indiana U. (\*)

**MURRAY-ROSS, CARMIN**, Dir. for Employee Relations for Admin. and Finance (1993). BA 1985, JD 1988, Ohio St. U.

**MUSCH, TIMOTHY L.**, Assoc. Prof., Kinesiology (1993). BA 1972, MA 1974, U. of Calif.–Berkeley; PhD 1981, U. of Wisconsin–Madison. (\*)

**MUSSELMAN, MICHAEL L.**, Co. Ext. Agent, Republic Co., Belleville (1992). BS 1992, Kansas St. U.

**MUTHUKRISHNAN, SUBBARATNAM**, Prof. of Biochemistry; Assoc. Biochemist, Agr. Exp. Sta. (1980). BSc 1963, MSc 1965, Madras; PhD 1970, Indian Inst. of Sci. (\*)

**MYERS, ESTHER F.**, Adjunct Asst. Prof. of Hotel, Restaurant, Institution Management and Dietetics (1990). BS 1975, N. Dakota St. U.; MS 1980, Ohio St. U.; PhD 1989, Kansas St. U.

**NAFZIGER, ESTEL WAYNE**, Prof. of Economics (1966). BA 1960, Goshen Col.; MA 1962, U. of Michigan; PhD 1967, U. of Illinois. (\*)

**NAGARAJA, TIRUVOOR G.**, Prof. of Animal Sciences and Industry; Dairy Cattle Research Nutritionist, Agr. Exp. Sta. (1980). BS 1970, MS 1972, U. of Agric. Sci., India; PhD 1977, Kansas St. U. (\*)

**NAGY, GABRIEL**, Asst. Prof. of Mathematics (1992). PhD 1992, U. of California–Berkeley. (\*)

**NAJJAR, YACOB, Asst. Prof. of Civil Engineering (1993).** BS 1983, Yarmouk U.; MS 1986, PhD 1990, U. of Oklahoma. (\*)

**NAUGHTON, GARY G.,** District Forester, Northeast (1966). BS 1959, Utah St. U.; MS 1969, U. of Missouri; LLB 1972, LaSalle U.

**NAVARETTE, LORI,** Asst. Prof., Education (1993). BA 1984, MA 1985, PhD 1992, U. of New Mexico.

**NEAL, MARGARET A.,** Co. Extension Agent, Home Economics, Cowley Co., Winfield (1977). BS 1967, MS, Kansas St. U.

**NECHOLS, JAMES R.,** Assoc. Prof. of Entomology, Biological Control, Horticultural Entomology (1984). BS 1973, Baldwin-Wallace Col.; MS 1977, PhD 1980, Cornell U. (\*)

**NEEDHAM, HAROLD V.,** Research Asst. of Physics (1985). BS 1982, MS 1984, Kansas St. U.

**NEELY, ERMA M.,** Co. Extension Home Economist Emerita, Trego Co., WaKeeney (1950). BS 1942, Kansas St. U.

**NEELY, MARGERY A.,** Prof., Education (1974). AB 1955, Southwest Missouri St. U.; MEd 1968, PhD 1971, U. of Missouri, Columbia. (\*)

**NEIBERGALL, JOHN D.,** R. M. Seaton Distinguished Prof. of Journalism and Mass Communications (1990). BA 1971, U. of Iowa; MS 1989, Iowa St. U.

**NEIER, ROBERT I.,** Co. Extension Agent, Horticulture, Sedgwick Co., Wichita (1979). BS 1979, Kansas St. U.

**NEILL, JAMES W.,** Assoc. Prof. of Statistics; Statistical Consultant, Agr. Exp. Sta. (1986). BS 1971, Eastern Illinois U.; MS 1973, U. of Missouri–Rolla; PhD 1982, Kansas St. U. (\*)

**NEILS, KENNETH E.,** Asst. Agricultural Economist, Agricultural Economics; Grain Marketing Specialist (1988). BS 1972, St. Olaf Col., Minnesota; MS 1983, U. of Maryland; PhD 1989, Texas A&M U.

**NELLIS, M. DUANE,** Assoc. Dean of Arts and Sciences and Prof. of Geography; Dir. of Inst. for Social and Behavioral Research (1980). BS 1976, Montana St. U.; MS 1977, PhD 1980, Oregon St. U. (\*)

**NELSEN, CHERI D.,** Co. Extension Agent, Agr., Wilson Co., Fredonia (1993). BS 1990, Oklahoma St. U.

**NELSON, BONNIE A.,** Assoc. Prof. of English (1983). BA 1965, City Col. of New York; MAT 1967, City U. of New York; PhD 1981, Pennsylvania St. U. (\*)

**NELSON, CHERI D.,** Co. Ext. Agent, Agr., Wilson Co., Fredonia (1993). BS 1990, Oklahoma St. U.

**NELSON, LYELL,** Research Asst. of Animal Sciences and Industry (1989). BS 1984, Kansas St. U.

**NELSON, MARK E.,** Assoc. Prof.; Extension Ag. Economist, Northwest (1986). BS 1983, MS 1986, Kansas St. U.

**NELSON, NANCY E.,** Co. Extension Agent, Jackson Co., Holton (1978). BS 1977, Kansas St. U.

**NELSON, PAUL I.,** Prof. of Statistics (1983). BS 1963, Queens Col., City U., New York; MS 1965, PhD 1969, Rutgers U. (\*)

**NELSON, PEGGY B.,** Instr. of Speech (1984). BA 1974, St. Olaf Col.; MA 1982, Kansas St. U.

**NELSON, RICHARD G.,** Asst. Prof.; Extension Specialist, Energy (1989). BS 1981, MS 1982, PhD 1989, Oklahoma St. U.

**NELSON, ROSS M.,** Co. Extension Agricultural Agent Emeritus, Ellis Co., Hays (1957). BS 1957, Kansas St. U.

**NELSON, THAYER (Gene) E.,** Assoc. Student Health Physician, Lafene Health Ctr. (1991). MD 1968, U. of Kansas.

**NELSON, WILLARD J.,** Instr., Education (1971). AA 1952, Luther Jr. Col.; BA 1954, Bethany Col.; MS 1976, Kansas St. U.

**NELSEN, JIM L.,** Assoc. Prof. of Animal Sciences and Industry; Extension Specialist, Swine (1983). BS 1978, MS 1980, Kansas St. U.; PhD 1983, U. of Nebraska. (\*)

**NESMITH, DWIGHT ALVIN,** Assoc. Prof. Emeritus of Mechanical Engineering (1948). BS 1948, Northwestern U.; MS 1952, Kansas St. U.; Professional Engineer, 1962.

**NEUFELD, DOROTHY H.,** Prof. Emerita; Area Extension Home Economist (1957). BS 1950, Texas Technological Col.; MS 1964, Kansas St. U.

**NEUMANN, PAUL,** Research Assoc. of Grain Science and Industry; Extrusion Tech. Research Scientist (1990). BS 1981, MS 1984, U. of Nebraska.

**NEUSCHWANDER, OCIE A.,** Co. Extension Home Economist Emerita, Greeley Co., Tribune (1958). BS 1943, Kansas St. U.

**NEWBY, FRANCES ANN,** Asst. Prof. Emerita of Clothing, Textiles, and Interior Design (1963). BFA 1961, Kansas City Art Inst.; March 1970, Kansas St. U.

**NEWCOMER, GLENN A.,** Co. Extension Agent, Agr., Bourbon Co., Fort Scott (1965). BS 1965, Kansas St. U.

**NEWDIGGER, GLENN E.,** Co. Extension Agent, Barber Co., Medicine Lodge (1988). BS 1986, Kansas St. U.

**NEWELL, KATHLEEN,** Prof. Emerita of Foods and Nutrition; Agr. Exp. Sta. (1962). BS 1944, Kansas St. U.; MS 1951, U. of Wisconsin; PhD 1973, U. of Tennessee. (\*)

**NEWHOUSE, BARBARA S.,** Assoc. Dir., Academic Programs, Kansas Regents Educational Communications Cntr.; Asst. Prof., Education (1974). BS 1967, Western Michigan U.; MS 1974, PhD 1985, Kansas St. U.

**NEWHOUSE, ROBERT C.,** Prof. of Education, Education (1972). BS 1967, MA 1969, Western Michigan U.; PhD 1972, U. of Oregon. (\*)

**NEWSOME, BOB W.,** Prof.; Area Extension Dir. (1955). BS 1951, Oklahoma St. U.; MS 1962, Kansas St. U.; EdD 1965, Oklahoma St. U.

**NEWTON, FRED B.,** Dir. of U. Counseling Services; Prof., Education (1980). BA 1965, Muskingum Col., Ohio; MA 1967, Ohio St. U.; PhD 1972, U. of Missouri–Columbia. (\*)

**NGUYEN, DAN,** Asst. Specialist, Libraries (1991). BS 1991, Wichita St. U.

**NICHOLLS, PETER J.,** Dean of Arts and Sciences and Prof. of Mathematics (1991). BSc Hons., 1967, London U., England; PhD 1970, Cambridge U., England. (\*)

**NICHOLS, DAVID A.,** Assoc. Prof. of Animal Sciences and Industry (1981). BS 1976, Purdue U.; MS 1979, PhD 1981, Kansas St. U.

**NICHOLS, MARY,** Instr. of Speech.

**NICHOLSON, LEIGH ANNE,** Campus News Coord., News Services (1993). BJ 1991, U. of Missouri–Columbia.

**NICHOLSON, ROBERT A.,** Prof. Biological Science (Range Research), Fort Hays St. U. (1973). BS 1967, MS 1968, Fort Hays St. U.; PhD 1972, Colorado St. U. Adjunct appt.

**NICKEL, DUANE F.,** Assoc. Projects Manager, Computing and Telecommunications Activities (1970). BS 1967, Kansas St. U.

**NIEHOFF, BRIAN P.,** Assoc. Prof. of Management (1988). BS 1977, St. Joseph's Col.; MBA 1986, PhD 1988, Indiana U. (\*)

**NIELSON, DIANE A.,** Co. Extension Agent, Atchison Co., Effingham (1984). BS 1981, Northwest Missouri St. U.

**NIETFELD, JEROME,** Asst. Prof., Diagnostic Pathology (1993). DVM 1979, Kansas St. U.; MS 1987, PhD 1989, U. of Georgia. (\*)

**NIGHSWONGER, JAMES J.,** Prof. of Forestry; Urban and Community Forestry Program Leader (1961). BS 1960, MLA 1970, Kansas St. U.

**NIKKEL, JANICE,** Conference Coord. (1985). BS 1985, Kansas St. U.

**NOBLE, M. LARRY,** Prof. of Kinesiology (1972). BS 1966, Eastern Kentucky U.; MS 1968, U. of Maryland; PhD 1970, U. of Texas. (\*)

**NOBLE, WILLIAM D.,** Asst. Prof. of Statistics (1991). BA 1977, U. of California–Berkeley; MS 1981, U. of Missouri–Rolla; PhD 1991, Michigan St. U. (\*)

**NOBLETT, DUANE P.,** Assoc. Prof. of Art (1973). BFA 1966, Minncapolis Col. of Art and Design; MA 1970, MFA 1972, U. of Iowa. (\*)

**NOLFI, PATRICIA S.,** Coord. of Student Activities (1993). BS 1987, MEd 1989, Ohio St. U.

**NOONAN, JOHN P.,** Assoc. Dean Emeritus of Grad. School; Prof. of English (1947). BS 1947, Rockhurst Col.; MS 1950, Kansas St. U.; PhD 1955, Denver U. (\*)

**NOORDSY, JOHN L.,** Prof. Emeritus of Surgery (1960). BS 1943, S. Dakota St. Col.; DVM 1946, MS 1962, Kansas St. U. (\*)

**NORBY, OSCAR W.,** Prof. Emeritus; Asst. Dir., Community Resource Dev. (1942). BS 1942, Kansas St. U.; MS 1959, PhD 1961, U. of Wisconsin. (\*)

**NORDIN, PHILIP,** Prof. Emeritus of Biochemistry (1954). BS 1949, MS 1950, U. of Saskatchewan, Canada; PhD 1953, Iowa St. U. (\*)

**NORMAN, BRET L.,** Research Asst. of Plant Pathology (1983). BS 1981, MS 1987, Kansas St. U.

**NORMAN, DAVID W.,** Prof. of Agricultural Economics; Research Agr. Econ., International Agr. Dev., Agr. Exp. Sta. (1968). BS 1961, Wye Col.; MS 1963, PhD 1965, Oregon St. U. (\*)

**NORRIS-BAKER, CAROLYN,** Prof. of Arch.; Dir. KSU Cntr. for Aging (1982). BA 1971, BArch 1972, Rice U.; MA 1978, PhD 1980, U. of Houston. (\*)

**NORTON, CHARLES L.,** Prof. Emeritus, Animal Sciences and Industry; Research Dairy Scientist, Agr. Exp. Sta. (1958). BS 1940, U. of Illinois; PhD 1944, Cornell U. (\*)

**NORVELL, WAYNE,** Prof. of Marketing; Dir. of International Trade Inst. (1974). BS 1964, Arkansas Polytechnic Col.; MBA 1965, U. of Arkansas; DBA 1973, Mississippi St. U. (\*)

**NORWOOD, CHARLES A.,** Assoc. Prof.; Research Agronomist, Dryland Soils, SW Research–Extension Cntr. (1972). BS 1961, Texas A&I; MS 1969, PhD 1971, Oklahoma St. U.

**NOSS, T. RENEE,** Admissions Representative (1993). BA 1993, Kansas St. U.

**NUS, ANN,** Research Asst. of Plant Pathology (1985). BS 1977, Iowa St. U.

**NYBERG, BENJAMIN M.,** Prof. of English (1965). BA 1955, U. of Wichita; MA 1958, U. of Arizona; PhD 1965, U. of Colorado. (\*)

**NYHART, SYLVESTER,** Co. Extension Agent, Agr., Leavenworth Co., Leavenworth (1958). BS 1959, MS 1972, Kansas St. U.

**OAKLIEF, CHARLES R.,** Prof., Education (1974). BS 1959, MS 1962, Ohio St. U.; PhD 1970, Wisconsin St. U. and Ohio St. U. (\*)

**OARD, DARRELL L.,** Research Asst. of Agricultural Engineering (1972). BS 1968, Emporia St. U.

**OBERST, RICHARD D.,** Asst. Prof. of Pathology and Molecular Biology (1987). DVM 1983, Oklahoma St. U.; PhD 1987, U. of California. (\*)

**O'BRIEN, PATRICIA J.,** Prof. of Anthropology (1967). BA 1962, BMA 1966, PhD 1969, U. of Illinois. (\*)

**O'CONNER, NANCY T.,** Dir. of Marriage and Family Therapy Clinic; Instr. of Human Development and Family Studies (1990). BA 1981, St. Bonaventure U.; MS 1985, Kansas St. U.

**O'DEA, DYNA,** Medical Technologist, Lafene Health Ctr. (1978). BS 1978, Kansas St. U.

**ODLE, MARY LOU.,** Co. Extension Agent, Home Economics, Saline Co., Salina (1970). BS 1970, Fort Hays St. U.; MS 1981, Kansas St. U.

**ODOM, DANIEL G.,** Adjunct Assoc. of Medical Tech. (1994). BS 1969, Tarleton State Col.; PhD 1973, U. of Houston; MD 1984, U. of Miami.

**OEHME, FREDERICK W.**, Prof. of Toxicology, Medicine, and Physiology; Research Toxicologist (1959). BS 1957, DVM 1958, Cornell U.; MS 1962, Kansas St. U.; DMV 1964, Justus Liebig U.; Diplomate 1968, American Board of Vet. Toxicology; PhD 1969, U. of Missouri; Diplomate 1980, American Board of Toxicology; Diplomate 1982, Acad. of Toxicological Sciences. (\*)

**OGG, ROSELLA A.**, Asst. Prof. of Art (1965). BA 1958, MA 1963, Kansas St. U.

**O'HAIR, RICHARD A.J.**, Asst. Prof. of Chemistry (1994). BS 1985; BS Honors 1986; PhD 1991, U. of Adelaide (Australia).

**OHLENBUSCH, PAUL D.**, Assoc. Prof. of Agronomy; Extension Specialist, Range and Pasture Management (1975). BS 1963, S.W. Texas St.; MS 1965, PhD 1975, Texas A&M.

**OHLSSEN, ROBERT L.**, Assoc. Prof. Emeritus, Education (1976). BA 1952, Ottawa U.; ME 1957, Wichita U.; EdD 1963, U. of Kansas. (\*)

**OHNO, MITSUGI**, Asst. Instr. of Chemistry (1960).

**OLDFATHER, MICHAEL**, Assoc. Prof. of Economics (1983). BA 1962, Oberlin Col.; MA 1969, U. of Nebraska–Lincoln; PhD 1980, Ohio U.

**OLDHAM, BELINDA K.**, Co. Extension Agent, Home Economics, Wichita Co., Leoti (1989). BS 1974, Kansas St. U.

**OLEN, ALICE M.**, Co. Extension Home Economist Emerita, Seward Co., Liberal (1956). BS 1926, Oklahoma St. U.; MS 1932, Iowa St. U.

**OLSEN, CHARLOTTE SHOUP**, Dir., Educational Supportive Services (1981). BS 1969, MS 1979, PhD 1993, Kansas St. U.

**OLSON, EDWIN G.**, Assoc. Prof. of Economics (1968). BA 1956, MA 1960, U. of California; PhD 1971, U. of Washington. (\*)

**OLSON, CAROLYN**, Adjunct Asst. Prof. of Agronomy (1992). BS 1974, Syracuse U.; MA 1977, PhD 1979, Indiana U. (\*)

**OLSON, JERALD E.**, Co. Extension Agent, 4–H, Lyon Co., Emporia (1989). BS 1983, Kansas St. U.

**OLSON, KENNETH C.**, Assoc. Prof. Range Research, Fort Hays Branch Agr. Exp. Sta. (1986). BS 1978, MS 1982, Montana St. U.; PhD 1986, Utah St. U. (\*)

**OLSON, WILLARD G.**, Extension Asst., Live Animal Evaluations (1977). BS 1970, Kansas St. U.

**O'MARA, JUDITH L.**, Instr. of Plant Pathology; Extension Diagnostician (1989). BS 1984, MS 1987, New Mexico St. U. (\*)

**O'NEIL, MICHAEL P.**, Asst. Prof. of Philosophy (1973). BA 1965, MA 1966, Miami U.; PhD 1972, U. of Edinburgh, Scotland. (\*)

**O'NEILL, CAROL**, Math Skills Specialist, Academic Assistance Cntr.; Instr. of Mathematics (1982). BS 1960, MS 1967, Kansas St. U.

**OPHEIM, ALICIA**, Asst. Prof. Emerita of Modern Languages (1983). PhD 1979, Kansas St. U.

**OPPERUD, SARA**, Computer Information Specialist, Educational and Personal Dev. Programs (1985). BA 1983, BBA 1983, Washburn U.

**ORAZEM, FRANK**, Prof. Emeritus of Agricultural Economics; Research Agr. Econ., Production Economics; Regional and Community Dev., Agr. Exp. Sta. (1956). Cand. Rer. Pol., Dr. Rer. Pol., 1949, Karl Franzens U., Graz, Austria; MS 1953, Kansas St. U.; PhD 1956, Iowa St. U. (\*)

**ORBACH, HAROLD L.**, Assoc. Prof. of Sociology (1969). BS 1951, The City Col. of New York; PhD 1974, The U. of Minnesota. (\*)

**ORLOCK, VERA A.**, Asst. Prof. of Dance (1993). BS 1973, MFA 1978, Case Western Reserve.

**ORNELAS, WENDY**, Asst. Prof. of Arch. (1989). BSArch 1980 Cal. Poly. U.; MArch 1989, Oklahoma St. U. Registered Architect.

**OROPESA, SALVADOR A.**, Asst. Prof. of Modern Languages (1992). BA 1982, MA 1984, Universidad de Granada; PhD 1990, Arizona St. U. (\*)

**ORR, V. BRYCE**, Co. Extension Agricultural Agent Emeritus, Sedgwick Co., Wichita (1952). BS 1952, Kansas St. U.

**ORWIG, THOMAS W.**, Asst. Prof. Emeritus; Extension Specialist, Livestock Production, South Central (1955). BS 1949, Oklahoma St. U.; MS 1974, Kansas St. U.

**O'SHEA, JOHN WILLIAM**, Asst. Prof. of Art (1956). BFA 1954, Denver U.; MFA 1956, St. U. of Iowa. (\*)

**O'SHEA, MICHAEL J.**, Assoc. Prof. of Physics (1983). BA 1977, U. of East Anglia, England; PhD 1980, U. of Sussex, England. (\*)

**OSSAR, MICHAEL**, Prof. of Modern Languages (1971). AB 1961, Cornell U.; MS 1963, MA 1967, PhD 1973, U. of Pennsylvania. (\*)

**OSSAR, NAOMI**, Instr., English Language Program (1990). BA 1962, Brown U.; MA 1983, PhD 1989, Kansas St. U.

**OTT, JOHN**, Dir., Facilities Services (1994). BS 1979, Ohio St. U.

**OTT, RICHARD L.**, Assoc. Prof. of Accounting (1986). BA 1969, U. of St. Thomas; MBA 1980, U. of Houston at Clear Lake City; MAcc 1982, PhD 1986, Texas Tech U.; CPA 1989, Kansas. (\*)

**OTTE, CHARLES E.**, Co. Extension Agent, Geary Co., Junction City (1982). BS 1979, MS 1981, U. of Nebraska.

**OTTE, ERIC T.**, Co. Extension Agent, 4–H Youth, Sedgwick Co. (1982). BS 1969, MS 1975, U. of Nebraska.

**OTTENHEIMER, HARRIET J.**, Prof. of Anthropology; Dir. of American Ethnic Studies (1969). BA 1962, Bennington Col.; PhD 1973, Tulane U. (\*)

**OUKROP, CAROL E.**, Dir. and Prof. of Journalism and Mass Communications (1969). BA 1956, U. of N. Dakota; MA 1965, PhD 1969, U. of Iowa. Accredited Public Relations Professional, APR. (\*)

**OVERLEY, CARL BENJAMIN**, Assoc. Prof. Emeritus of Agronomy (1946). BS 1946, Kansas St. U.; MS 1967, U. of Nebraska.

**OVERLEY, FRANK L.**, Asst. Prof. Emeritus; Extension Economist, Northwest (1960). BS 1950, Kansas St. U.; MS 1957, Michigan St. U.

**OVERLEY, VICKY L.**, Co. Extension Agent, Home Economics, Phillips Co., Phillipsburg (1979). BS 1966, Fort Hays St. U.

**OVIATT, CHARLES G.**, Assoc. Prof. of Geology (1985). BS 1973, MS 1977, U. of Wyoming; PhD 1984, U. of Utah. (\*)

**OWENS-WILSON, GWEN**, Assoc. Prof. of Arch.; Dir., Environmental Design Studies (1982). BA 1959, U. of Oklahoma; BArch 1972, Howard U.; MS 1980, PhD 1982, U. of Tennessee; Registered Architect. (\*)

**OWENSBY, CLENTON E.**, Prof. of Agronomy; Range Management Research Agronomist, Agr. Exp. Sta. (1964). BS 1964, New Mexico St. U.; PhD 1969, Kansas St. U. (\*)

**PACE, DAVID W.**, Co. Extension Agent, Agr., Lyon Co., Emporia (1983). BS 1973, MS 1982, Oklahoma St. U.

**PACEY, CAROL A.**, Inst. of Biology (1988). BS 1974, MS 1985, Kansas St. U.

**PACEY, DAVID A.**, Assoc. Prof. of Mechanical Engineering (1978). BS 1974, MS 1979, PhD 1989, Kansas St. U.; Professional Engineer, 1981. (\*)

**PADY, STUART MCGREGOR**, Prof. Emeritus of Biology; Mycologist, Agr. Exp. Sta. (1945). AB 1928, MA 1929, McMaster U.; PhD 1933, U. of Toronto. (\*)

**PAGE, LEROY EARL**, Assoc. Prof. Emeritus of History (1969). BS 1951, U. of Arkansas; BS 1955, MChemEng 1958, PhD 1963, U. of Oklahoma. (\*)

**PAGE, ROBERT L.**, Prof. of Landscape Arch. (1971). BSLA 1963, Kansas St. U.; MLA 1965, Harvard U.; Registered Landscape Architect. (\*)

**PAHWA, ANIL**, Prof. of Electrical and Computer Engineering (1983). BS 1975, Birla Inst. of Tech.; MS 1979, U. of Maine; PhD 1983, Texas A&M. (\*)

**PAIR, JOHN C.**, Prof. of Horticulture; Research Horticulturist in Charge, Horticulture Research Cntr.–Wichita, Agr. Exp. Sta. (1971). BS 1959, New Mexico St. U.; MS 1961, PhD 1971, Kansas St. U. (\*)

**PALLETT, WILLIAM H.**, Dir. of Educational Advancement (1982). BA 1971, Doane Col.; MA 1975, U. of Nebraska; PhD 1984, Kansas St. U.

**PALMER, RACHEL F.**, Co. Extension Home Economist, Emerita, Sedgwick Co., Wichita (1941). BS 1941, Kansas St. U.

**PANKRATZ, LARRY P.**, Dir. of Continuing Education, Col. of Tech. (1987). BS 1979, MS 1986, Kansas St. U.

**PARDUN, CAROL J.**, Asst. Prof. of Journalism and Mass Communications (1992). BA 1977, MA 1988, Wheaton Col.; PhD 1992, U. of Georgia.

**PARILLO, MARK P.**, Asst. Prof. of History. BA 1978, Notre Dame U.; MA 1981, PhD 1987, Ohio State U.

**PARISII, THOMAS S.**, Prof., Education (1976). BA 1968, Northern Illinois U.; MA 1969, Illinois St. U.; PhD 1972, U. of Illinois. (\*)

**PARK, JINWOO**, Asst. Prof. of Finance (1990). BA 1981, Hankuk U. of Foreign Studies; MBA 1985, U. of Illinois–Chicago; PhD 1990, U. of Iowa. (\*)

**PARKER, C. ELBURN**, Research Asst. of Plant Pathology (1981). USDA.

**PARKER, CRAIG B.**, Assoc. Prof. of Music (1983). BM 1973, U. of Georgia; MM 1976, PhD 1981, U. of California–Los Angeles. (\*)

**PARKER, LEONARD C.**, Prof. Emeritus; Administrator, Farm Management Association Program (1956). BS 1952, MS 1967, Kansas St. U.

**PARKER, WILLARD A.**, Assoc. Prof. of Mathematics (1970). BA 1960, U. of Oregon; MDiv 1964, Fuller Theological Seminary; MA 1966, PhD 1970, U. of Oregon. (\*)

**PARKS, JULIE A.**, Co. Extension Agent, 4–H, Wyandotte Co., Kansas City (1989). BS 1989 Kansas St. U.

**PARMLEY, DIANNA L.**, Academic Outreach Coord. (1989). BS 1975, Southwestern Col.; MS 1976, PhD 1990, Kansas St. U.

**PARMLEY, JOHN D.**, Assoc. Prof., Education (1980). BS 1968, MEd 1974, Colorado St. U.; PhD 1980, Ohio St. U. (\*)

**PARRISH, DONALD B.**, Prof. Emeritus of Biochemistry, Agr. Exp. Sta. (1943). BS 1935, MS 1938, PhD 1949, Kansas St. U. (\*)

**PARSONS, KARLA**, Research Asst. of Animal Sciences and Industry (1985). BS 1983, Kansas St. U.

**PARSONS, PAUL F.**, Prof. of Journalism and Mass Communications (1985). BA 1974, Baylor U.; MA 1983, U. of Arkansas at Little Rock; PhD 1987, U. of Tennessee. (\*)

**PASCHAL, JOANN A.**, Co. Extension Agent, Home Economics, Russell Co., Russell (1976). BS 1976, Kansas St. U.

**PATTEE, SHERRILL**, Information Specialist; Research and Sponsored Programs (1992). BS 1981, Kansas St. U.; MLS 1989, U. of Washington.

**PATTON, DENNIS L.**, Co. Extension Agent, Horticulture and 4–H, Johnson Co., Olathe (1983). BS 1982, Kansas St. U.

**PAUKSTELIS, JOSEPH V.**, Prof. of Chemistry (1966). BS 1960, U. of Wisconsin; PhD 1964, U. of Illinois. (\*)

**PAUL, BIMAL K.**, Asst. Prof. of Geography (1990). BS 1970, MS 1973, U. of Dhaka; MA 1980, U. of Waterloo; PhD 1988, Kent State U. (\*)

**PAUL, ROBERT J.**, Prof. of Management (1978). BBA 1954, U. of Wisconsin; MS 1962, Oklahoma St. U.; PhD 1966, U. of Arkansas. (\*)

**PAULI, ROSS IRWIN**, Asst. Prof. Emeritus of Mechanical Engineering (1947). BA 1941, Westmar Col.; MS 1947, Pittsburg St. U.

**PAULSEN, GARY M.**, Prof. of Agronomy; Crops Research Physiologist, Agr. Exp. Sta. (1965). BS 1961, MS 1963, PhD 1965, U. of Wisconsin. (\*)

**PAULSEN, AVELINA Q.**, Instr. of Biology (1974). BS 1959, MS 1962, U. of Philippines; PhD 1967, U. of Wisconsin. (\*)

**PAYNE, STEPHEN D.**, Captain U.S. Army, Asst. Prof. of Military Science (1991). BS 1983, U.S. Military Academy at West Point.

**PEARCE, R. CHARLES**, Assoc. Prof. of Journalism and Mass Communications (1986). BFA 1972, MA 1975, U. of Alabama; PhD 1984, U. of Tennessee. (\*)

**PEARCE MELANY**, Coord. of Career Services and Non-Traditional Recruitment (1994). BA 1981, MALS 1983, Wichita St. U.

**PEARSON, MEREDITH N.**, Asst. Prof. of Foods and Nutrition; Ext. Spec., EFNEP (1989). BS 1968, U. of Wisconsin; MS 1973, Northern Michigan U.; PhD 1988, Kansas St. U.

**PEARSON, JOHN M.**, Asst. Prof. of Management (1989). BA 1977, MS 1985, St. Cloud St. U.; DBA 1991, Mississippi.

**PECAR, MARINA**, Asst. Prof. of Arch. (1989). Eng. of Arch 1980, U. of Sarajevo, Yugoslavia.

**PECK, ERNEST G.**, Assoc. Prof. Emeritus; Extension Instructional Media Specialist (1955). BS 1950, MS 1965, Kansas St. U.

**PEDERSEN, JOHN R.**, Prof. of Grain Science and Industry; Stored Grain Research Entomologist, Agr. Exp. Sta. (1968). BS 1954, MS 1959, PhD 1979, Kansas St. U. (\*)

**PELLETIER, LAWRENCE JR.**, Adjunct Asst. Prof. of Dietetics (1985). BA 1964, Bowdoin Col.; MD 1968, Columbia U.

**PELLER, VLADIMIR**, Prof. of Mathematics (1993). PhD 1985, Leningrad U. (\*)

**PELLETIER, PAUL**, Asst. Prof. Emeritus (1989). BA 1949, Sacred Heart Seminary; STL 1953, Gregorian U.; MSW 1958, Catholic U. of America.

**PELTON, MARION HERFORT**, Assoc. Prof. Emerita of Music (1928). BM 1927, U. of Wisconsin; BS 1932, Kansas St. U.; MA 1957, Columbia U. (\*)

**PENCE, JOHN T.**, Assoc. Dir. of Housing and Dining Services; Dietitian; Instr. (1963). BS 1963, Purdue U.; MS 1970, Kansas St. U.

**PENCE, KAREN T.**, Asst. Dean and Instr. of Human Ecology (1977). BSE 1971, Emporia St. U.; MS 1972, Kansas St. U.

**PENNER, KAREN P.**, Prof. of Foods and Nutrition; Extension Specialist, Food Science (1973). BS 1971, MS 1972, Kansas St. U.; PhD 1981, Michigan St. U. (\*)

**PERCHELLET, JEAN-PIERRE H.**, Assoc. Prof. of Biology (1982). BS 1968, MS 1970, PhD 1974, Faculty and Sciences, U. of Paris VI. (\*)

**PERKINS, CHARLES C., JR.**, Prof. Emeritus of Psychology (1969). BA 1941, Harvard; MA 1942, PhD 1946, St. U. of Iowa. (\*)

**PERKINS, SHELBY S.**, Co. Extension Agent, Home Economics, Elk Co., Howard (1986). BS 1981, Kansas St. U.

**PERL, MICHAEL F.**, Assoc. Prof., Education (1976). BA 1966, St. Mary's Col., Minnesota; MS 1970, Winona St. Col., Minnesota; PhD 1976, U. of South Carolina. (\*)

**PERNG, SHIAN-KOONG**, Prof. of Statistics (1968). BS 1954, Chung-Hsien U., Taiwan; MS 1961, Virginia Poly. Inst.; PhD 1967, Michigan St. U. (\*)

**PERNG, JONG-I.**, Research Asst. of Agricultural Economics (1976). BS 1960, Taiwan; MS 1964, U. of New Hampshire.

**PESCI, PATRICK**, Instr., Hotel, Restaurant, Institution Management and Dietetics (1975). BS 1973, Indiana U. of Pennsylvania; MS 1981, Kansas St. U.

**PETERS, CHESTER E.**, Prof. and VP Emeritus for Student Affairs (1947). BS 1947, MS 1950, Kansas St. U.; PhD 1953, U. of Wisconsin.

**PETERS, DAWN L.**, Assoc. Unclassified Affirm. Action Officer (1993). BS 1980, MS 1985, Iowa St. U.

**PETERS, PAULA K.**, Asst. Prof. of Foods and Nutrition; Extension Specialist, Nutrition (1990). BS 1977, MS 1985, S. Dakota St. U.; PhD 1990, Ohio St. U.

**PETERSON, DALLAS E.**, Assoc. Prof. of Agronomy; Extension Specialist, Weed Science (1989). BS 1981, MS 1983, Kansas St. U.; PhD 1987, N. Dakota St. U. (\*)

**PETERSON, EDMUND J.**, Admin. Asst. and Asst. to the Dir., Business and Finance (1966). BS 1959, Kansas St. U.

**PETERSON, MARY DON**, Assoc. Prof. of Clothing, Textiles, and Interior Design (1968). BS 1958, MS 1959, U. of Tennessee; EdD 1975, Oklahoma St. U. (\*)

**PETERSON, SUSAN**, Asst. to the President for Governmental Relations (1989). BS 1976, Kansas St. U.; MA 1982, U. of Kansas.

**PETERSON, TIMOTHY**, Dir. of TELENET (1992). BA 1975, U. of N. Iowa; MED 1978, Texas A&M; EDS 1987, George Washington U.; PhD 1991, U. of Maryland.

**PETRACEK, MARIAN H.**, Co. Extension Home Economist Emerita, Barton Co., Great Bend (1953). BS 1928, Kansas St. U.

**PETRILLOSE, MICHAEL J.**, Instr. of Hotel, Restaurant, Institution Management and Dietetics (1990). BS 1980, MPS 1990, Cornell U.

**PETTIJOHN, LINDA K.**, Co. Extension Agent, Home Economics and Horticulture, McPherson Co., McPherson (1971). BS 1965, MS 1969, Kansas St. U.

**PEVERILL, RANAE**, Instr., English Language Program (1988). MA 1982, Marion Col.; MA 1988, Oklahoma St. U.

**PEVERILL, TIM**, Instr., English Language Program (1989). BA 1985, Asbury Col.; MA 1989, U. of Iowa.

**PFANNENSTIEL, TERRY**, Adjunct Asst. Prof. of Human Dev. and Family Studies (1988). BS 1973, MS 1975, Fort Hays St. U.; PhD 1986, Kansas St. U.

**PFENDER, WILLIAM F.**, Assoc. Prof. of Plant Pathology; Research Microbial Ecologist, Agr. Exp. Sta. (1983). BS 1971, U. of Michigan; MS 1976, U. of Arizona; PhD 1981, U. of Wisconsin-Madison. (\*)

**PHARES, E. JERRY**, Prof. Emeritus of Psychology (1955). BA 1951, U. of Cincinnati; MA 1953, PhD 1955, Ohio St. U. (\*)

**PHEBUS, RANDALL K.**, Asst. Prof. of Animal Sciences and Industry (1992). BS 1985, MS 1988, PhD 1992, U. of Tennessee. (\*)

**PHILLIPS, ANNE K.**, Asst. Prof. of English. BA 1984, MA 1986, U. of Nevada; PhD 1993, U. of Connecticut. (\*)

**PHILLIPS, MARGARET E.**, Assoc. Prof.; Extension Home Economist, South Central (1986). BS 1972, MS 1978, Kansas St. U.

**PHILLIPS, RICHARD**, Prof. of Agricultural Economics; Research Agr. Econ., International Agr. Dev., Agr. Exp. Sta. (1970). BS 1948, MS 1949, PhD 1952, Iowa St. U. (\*)

**PHILLIPS, ROBERT M.**, Prof. Emeritus of Veterinary Diagnostic Investigation; Research Virologist (1975). DVM 1951, Kansas St. U.; PhD 1972, U. of Georgia. (\*)

**PHILLIPS, WILLIAM M.**, Prof. Emeritus; Head, Fort Hays Branch Agr. Exp. Sta.; Research Agronomist, Weed Control. (1952). BS 1947, MS 1949, Kansas St. U.

**PICKAR, JOEL**, Asst. Prof., Cell Physiology (1993). BA 1973, Brown U.; DC 1977, Palmer Co. of Chiropractic; PhD 1990, U. of Calif.-Davis. (\*)

**PICKERT, MICHELLE J.**, Dietitian, Housing and Dining Services (1989). BS 1988, U. of Wyoming.

**PICKRELL, JOHN A.**, Assoc. Prof. of Toxicology (1988). DVM 1965; PhD 1968, U. of Illinois-Urbana; Diplomate 1983, American Board of Toxicology. (\*)

**PICKETT, LEAH B.**, Special Asst., Biology (1993). BA 1984, Oral Roberts U.; MBA 1993, Oklahoma City U.

**PIEPER, LAURIE**, Asst. Prof. of Philosophy (1994). BA 1985, Clark U.; MA 1989, PhD 1993, UCLA.

**PIERSON, GARY**, Asst. Dir., New Student Services (1991). BA 1980, MA 1981, Adams St. College.

**PIERZYNSKI, GARY M.**, Asst. Prof. of Agronomy (1989). BS 1982, MS 1985, Michigan St. U.; PhD 1989, Ohio St. U. (\*)

**PIGNO, ANTONIA**, Instr. of Modern Languages (1975). BA 1968, SUNY at Stony Brook; MA 1971, Kansas St. U.

**PIGNO, LOUIS**, Head and Prof. of Mathematics (1969). BS 1961, Poly. Inst. of Brooklyn; MA 1965, U. of Connecticut; PhD 1969, SUNY at Stony Brook. (\*)

**PINE, WILFRED HAROLD**, Prof. Emeritus of Agricultural Economics (1934). BS 1934, MS 1938, Kansas St. U.; PhD 1948, U. of Minnesota. (\*)

**PINEAU, LOIS**, Asst. Prof. of Philosophy (1989). Women's Studies Faculty.

**PINKERTON, LESTER R.**, Prof. of Forestry; Forest Management Program Leader (1964). BS 1964, MS 1967, Colorado St. U.

**PITTENGER, THAD H.**, Prof. Emeritus of Biology (1959). BS 1947, PhD 1951, U. of Nebraska. (\*)

**PLOGER, MARK O.**, Co. Ext. Agent, Agr., Edwards Co., Kinsley (1992). BS 1973, Kansas St. U.

**PLUGGE, BRENT L.**, Co. Extension Agent, Agr., Gove Co., Gove (1989). BS 1987, MS 1989, U. of Nebraska.

**POLICH, GERALD**, Assoc. Prof. of Music (1966). BME 1961, MME 1966, U. of Colorado. (\*)

**POLSON, CHERYL J.**, Assoc. Prof., Education (1976). BS 1976, MS 1978, PhD 1983, Kansas St. U. (\*)

**PONTE, JOSEPH G.**, Prof. of Grain Science and Industry; Baking Tech. Research Scientist, Agr. Exp. Sta. (1975). AB 1956, Northwestern U.; MS 1958, U. of Minnesota. (\*)

**POOL, KEVIN C.**, Asst. Instr. of Animal Sciences and Industry (1991). BS 1990, Kansas St. U.

**POPE, RONALD V.**, Research Asst. of Animal Sciences and Industry (1977). MS 1976, Texas A&M.

**PORESKY, ROBERT H.**, Assoc. Prof. of Human Dev. and Family Studies; Agr. Exp. Sta. (1972). AB 1963, MS 1967, PhD 1969, Cornell U. (\*)

**POSLER, GERRY L.**, Prof. and Head of Agronomy; Forage Crops Research, Agr. Exp. Sta. (1974). BS 1964, MS 1966, U. of Missouri; PhD 1969, Iowa St. U. (\*)

**POSNER, ELIESER**, Assoc. Prof. of Grain Science and Industry (1983). BS 1969, MS 1970, PhD 1985, Kansas St. U. (\*)

**POWELL, G. MORGAN**, Prof. of Agricultural Engineering; Extension Natural Resource Engineer (1977). BS 1965, Kansas St. U.; MS 1967, U. of Missouri; PhD 1973, Utah St. U.; Professional Engineer, 1976.

**POWELL, SHERYL A.**, Unit Dietitian, Housing and Dining Services (1984). BS 1978, MS 1980, Washington St. U.

**POWELL, WILLIAM B.**, Prof. Emeritus of Civil Engineering Tech. (1971). BS 1950, Kansas St. U.; MS 1971, Oklahoma St. U.; Professional Engineer.

**PRAEGER, HERMAN A.**, Research Assoc. Emeritus of Agronomy (1978). BS 1941, MS 1947, PhD 1977, Kansas St. U.

**PRATHER, CAROLE G.**, Asst. Prof. of Human Dev. and Family Studies (1988). BS 1966, St. Mary Col.; MS 1971, PhD 1987, Kansas St. U.

**PRAWL, WARREN L.**, Prof. Emeritus, Extension Specialist, Staff Dev. and Education (1952). BS 1954, Kansas St. U.; MS 1958, EdD 1962, Cornell U. (\*)

**PRETZER, CAROLYN A.**, Dir. of Krider Visual Resource and Learning Cntr., Arch. and Design (1983). BS 1954, Kansas St. U.

**PRICE, FLOYD HAMILTON**, Prof., Education (1963). AB 1951, Friends U.; MEd 1957, Wichita St. U.; EdS 1960, George Peabody Col.; EdD 1965, U. of Oklahoma. (\*)

**PRICE, MARJORIE E.**, Co. Extension Home Economist Emerita, Coffey Co., Burlington (1957). BS 1931, Kansas St. U.

**PRICE, MARY GAYLE**, Asst. Prof.; Extension Home Economist, Southeast (1989). BS 1981, Oklahoma St. U.; MS 1989, Pittsburg St. U.

**PRINCE, PAUL**, Assoc. Prof. of Journalism and Mass Communications (1978). BS 1961, Stanford U.; PhD 1971, U. of Utah. (\*)

**PRINS, HARALD E.L.**, Assoc. Prof. of Anthropology (1991). BA 1972, Doctoral 1976, Catholic U., Netherlands; MA 1979, PhD 1988, New School for Social Research. (\*)

**PROCTER, DAVID E.**, Assoc. Prof. and Interim Head of Speech (1987). BS 1977, MA 1980, Kansas St. U.; PhD, 1989, U. of Nebraska–Lincoln. (\*)

**PROCTER, SANDRA B.**, Dietitian, Housing and Dining Services (1987). BS 1977, MS 1991, Kansas St. U.

**PROEHL, RICHARD J.**, Co. Ext. Agent, Labette Co., Altamont (1988). BS 1967, MS 1991, Kansas St. U.

**PRUETT, THERESA I.**, Instr., English Language Program (1987). BA 1976, Western Illinois U.; MA 1982, Northern Illinois U.

**PRUETT, TYLER**, Asst. Dir. Student Financial Assistance (1994). MPA 1994, Brigham Young U.

**PUJOL, ELLIOTT**, Prof. of Art (1973). BA 1968, MFA 1971, Southern Illinois U. (\*)

**PULASKI, BERT M.**, Senior Business and Finance Officer, Office of Dean; Dir. of Agr. Exp. Sta. (1985). BA 1977, Michigan St. U.

**PUNTNEY, LINDA S.**, Asst. Dir., Student Publications; Asst. Prof. of Journalism and Mass Communications (1989). BS 1966, U. of Missouri; MA 1981, Central Missouri St. U.

**QAROONI, JALAL**, Research Assoc. of Grain Science and Industry (1990). BS 1978, U. of Basra, Iraq; MS 1982, Strathclyde, U.K.; PhD 1988, U. of New South Wales.

**QUADRI, S. KALEEM**, Prof. of Physiology; Research Endocrinologist and Reproductive Physiologist (1977). MS 1966, Kansas St. U.; MS 1970, PhD 1973, Michigan St. U. (\*)

**QUINLAN, LEON REED**, Prof. Emeritus of Landscape Arch.; Ornamental Horticulturist and Landscape Architect, Agr. Exp. Sta. (1927). BS 1921, Colorado St. U.; MLA 1925, Harvard U. (\*)

**QUIRING, VIRGINIA M.**, Assoc. Dean Emerita for Library Dev., Libraries (1971). BA 1943, Ottawa U.; MLS 1971, MS 1978, Emporia St. U.

**RADCLIFFE, PAMELA**, Asst. Prof. of Clothing, Textiles and Interior Design (1990). BS 1980, U. of West Florida; PhD 1990, Florida St. U. (\*)

**RADCLIFFE, DAVID**, Computer Information Specialist; Graduate School (1991).

**RADKE, GARY A.**, Research Asst. of Biochemistry (1981). BS 1979, Kansas St. U.

**RAGAN, JAMES F., JR.**, Head and Prof. of Economics (1977). BA 1971, Missouri U.; MA 1972, PhD 1975, Washington U. (\*)

**RAHMAN, TALAT SHAHNAZ**, Prof. of Physics (1983). BS 1968, MS 1969, Karachi U.; MPhil 1970, Islamabad U.; PhD 1977, U. of Rochester. (\*)

**RAHMATULLAH, MOHAMMED**, Research Assoc. of Biochemistry (1982). PhD 1981, U. of Hong Kong.

**RAILSBACK, LEE T.**, Prof. Emeritus of Clinical Sciences (1961). BS 1936, DVM 1937, Kansas St. U.

**RAINBOLT, HARRY R.**, Assoc. Prof. of Speech (1966). BS 1960, Southern Illinois U.; MS 1962, PhD 1965, U. of Indiana. (\*)

**RAJASHEKAR, CHANNA B.**, Assoc. Prof. of Horticulture (1983). BS 1971, MS 1974, U. of Agricultural Sciences; PhD 1980, Colorado St. U. (\*)

**RAMM, ALEXANDER G.**, Prof. of Mathematics (1981). MS 1961, Leningrad St. U.; PhD 1964, Moscow St. U.; DSci 1972, Academy of Science, Minsk. (\*)

**RAMUNDO, BRUCE A.**, Assoc. Scientist, Plant Pathology (1981). BA 1974, Southwestern Col., Kansas.

**RANEY, ROBERT J.**, Assoc. Prof. Emeritus of Agronomy; Research Agronomist in Charge, Irrigation Experimental Field–Scandia, Agr. Exp. Sta. (1953). BS 1952, MS 1954, Kansas St. U.

**RANHOTRA, GURBACHAN**, Adjunct Prof. of Foods and Nutrition (1977). BVS 1958, MS 1960, Agra U., India; PhD 1964, U. of Minnesota. (\*)

**RANKIN, CHARLES I.**, Prof., Education (1978). BA 1964, ME 1968, Wichita St. U.; PhD 1973, Kansas St. U. (\*)

**RANKIN, DONALD G.**, Instr. of Aviation Maintenance Tech. (1990). A&P Certificate 1973, Kansas Tech. Inst.; Federal Aviation Administration: Inspection Authorization, Designated Mechanic Examiner.

**RANKIN, MARY M.**, Instr. of English (1988). BA 1973, Kansas St. U.

**RANSOM, MICHEL D.**, Assoc. Prof. of Agronomy; Research Soil Scientist, Agr. Exp. Sta. (1984). BS 1974, MS 1976, U. of Arkansas; PhD 1984, Ohio St. U. (\*)

**RANSOM, NORA E.**, Instr. of English (1984). BA 1973, MA 1976, U. of Arkansas.

**RAPPOPORT, LEON H.**, Prof. of Psychology (1964). BA 1953, New York U.; MA 1962, PhD 1963, U. of Colorado. (\*)

**RASMUSSEN, ALBIE C.**, Asst. Prof. Emerita of Family Economics (1966). BS 1962, U. of Alaska; MS 1964, Kansas St. U.

**RASMUSSEN, TODD A.**, Hall Dir., Housing and Dining Services (1991). BA 1987, Western Michigan U.; MEd 1991, Kent St. U.

**RASSMAN, NEAL**, Assoc. Prof. of Landscape Arch. (1982). BA 1971, Washington and Lee; MLA 1977, Texas A&M; Registered Landscape Architect.

**RATCLIFFE, LAMAR CECIL**, Instr. Emeritus of Mathematics (1964). BS 1933, U.S. Military Academy; MAT 1964, Duke U.

**RATHBONE, DONALD E.**, Dean of Engineering; Prof. of Electrical and Computer Engineering (1973). BS 1951, Purdue U.; MS 1956, Northwestern U.; PhD 1962, U. of Pittsburgh; Professional Engineer. (\*)

**RATHBUN, ARTHUR J.**, Counselor, U. Counseling Services (1991). MDIV 1962, MS 1988, Kansas St. U.

**RATLIFF, TERRY D.**, Asst. Prof., Head of Circulation, Libraries (1990). BA 1968, Kansas St. U.; MLS 1975, Emporia St. U.

**RATZLOFF, KEITH L.**, Controller (1988). AA 1968, Hutchinson Comm. Junior Col.; BBA 1970, Washburn U.

**RAUB, RANDEL H.**, Asst. Prof. of Animal Sciences and Industry; Equine Specialist (1989). BS 1980, MS 1983, U. of Illinois; PhD 1987, U. of Kentucky. (\*)

**RAUPP, W. JOHN**, Assoc. Sci. of Plant Pathology (1980). BS 1976, MS 1979, Eastern Illinois U.

**RAVINDRAN, KALIAPPA**, Asst. Prof. of Computing and Information Sciences (1989). BET 1976, MS 1978, Indian Inst. of Tech., PhD 1987, U. of British Columbia. (\*)

**RAWSON, THOMAS M.**, VP for Administration and Finance (1990). BS 1965, MS 1967, MS 1970, Kansas St. U.; PhD 1975, U. of New Mexico.

**RAYBURN, VERNON L.**, Master Sergeant, U.S. Army, Instr. of Military Science (1989).

**REAGAN, BARBARA**, Prof. of Clothing, Textiles, and Interior Design; Agr. Exp. Sta. (1976). BS 1968, Syracuse U.; MS 1972, PhD 1976, Purdue U. (\*)

**REAGAN, CHARLES E.**, Exec. Asst. to the Pres.; Prof. of Philosophy (1967). AB 1964, Holy Cross Col.; MA 1966, PhD 1967, U. of Kansas. (\*)

**REALS, WILLIAM J.**, Adjunct Clinical Assoc. of Med. Tech. (1976). BS 1944, MD 1945, MS (Med) 1949, Creighton U.

**REAY, NEVILLE W. (BILL)**, Distinguished Prof. of Physics (1993). BA 1957, Occidental Col.–Los Angeles; PhD 1962, U. of Minnesota–Minneapolis.

**RECTOR, RALPH B.**, Co. Extension 4–H Agent Emeritus, Leavenworth Co., Leavenworth (1956). BS 1952, MS 1969, Kansas St. U.

**REDDI, LAKSHMI**, Asst. Prof. of Civil Engineering (1992). BTech 1982, J.N.T. U., India; MS 1984, PhD 1988, Ohio St. U. (\*)

**REDDY, P. G.**, Temp. Asst. Prof. of Physiology (1989). BVSc 1967, Tirupathi, India; MVSc 1971, Pantnagar, India; PhD 1986, Kansas St. U.

**REDDY, P. V.**, Instr. of Grain Science and Industry (1989). BS 1970, Sri Venkateswara U., India; MS 1982, Kansas St. U.

**REDIKER, JANET B.**, Co. Extension Agent, Home Economics, Lyon Co., Emporia (1966). BS 1958, Emporia St. U.; MS 1981, Kansas St. U.

**REDMAN, ALICE LOIS**, Prof. Emeritus; Extension Specialist, 4–H Youth Programs (1978). BS 1953, U. of Missouri; MS 1959, U. of Maryland.

**REECK, GERALD R.**, Prof. of Biochemistry (1974). BA 1967, Seattle Pacific Col.; PhD 1971, U. of Washington. (\*)

**REED, CARL**, Research Assoc. of Grain Science and Industry (1978). BS 1971, MS 1975, Michigan St. U.; PhD 1987, Kansas St. U. (\*)

**REES, JOHN O.**, Prof. of English (1965). BA 1947, Amherst Col.; MFA 1957, PhD 1965, U. of Iowa. (\*)

**REESE, JOHN C.**, Prof. of Entomology; Research Entomologist, Physiology of Plant–Insect Interactions, Agr. Exp. Sta. (1982). BA 1969, MS 1971, U. of Missouri; PhD 1975, U. of Wisconsin. (\*)

**REEVES, ROBERT D.**, Prof., Foods and Nutrition; Agr. Exp. Sta. (1977). BA 1964, MS 1965, Texas Tech. U.; PhD 1971, Iowa St. U. (\*)

**REGEHR, CAROL**, Research Assoc. of Physics (1985). BA 1977, Sterling Col.; MS 1985, Kansas St. U.

**REGEHR, DAVID**, Prof. of Agronomy; Extension Specialist, Weed Science (1981). BS 1964, MS 1968, PhD 1975, U. of Illinois. (\*)

**REGNIER, ROGER E.**, Prof. Emeritus; Extension Specialist, Resource Dev. (1934). BS 1924, MS 1932, Kansas St. U.

**REICHMAN, JESSICA L.**, Instr. of Art; Asst. Curator of U. Permanent Collections (1983). BA 1974, U. of Louisville; MS 1977, California St. U.–Fullerton.

**REICHMAN, O. JAMES**, Prof. of Biology; Animal Ecologist, Agr. Exp. Sta. (1981). BA 1968, MS 1970, Texas Tech. U.; PhD 1974, Northern Arizona U. (\*)

**REID, WILLIAM R.**, Instr. of Horticulture, Research Horticulturist in Charge, Pecan Experimental Field–Chetopa, Agr. Exp. Sta. (1981). BS 1978, Rutgers; MS 1980, North Carolina St. U.

**REISS, JOANN F.**, Coor., Publications (1993). BS 1959, Ohio U.; MEd 1985, U. of Illinois.

**REIST, DEANNA K.**, Co. Extension Agent, Home Economics, Clay Co., Clay Cntr. (1974). BS 1974, Kansas St. U.

**RELIGA, ANN M.**, Co. Extension Agent, 4–H Youth, Harvey Co., Newton (1986). BS 1985, Kansas St. U.

**REMPE, DAVID H.**, Farm Management Association Fieldman (1982). BS 1980, U. of Nebraska.

**RENK, MICHAEL F.**, Dir. of Fiscal Affairs, Col. of Tech. (1980). BA 1974, Kansas Wesleyan U.

**RENZ, AMY BUTTON**, Assoc. Dir., KSU Alumni Association (1977). BS 1976, MPA 1986, Kansas St. U.

**REPLOGLE, RENATA J.**, Asst. Prof. of Art (1966). BA 1963, MA 1964, Northern Colorado U.

**REPLOGLE, REX**, Assoc. Prof. of Art (1966). BFA 1964, MFA 1967, U. of Kansas. (\*)

**REYNOLDS, MARVIN D.**, Co. Extension Agent, Agr. and Community Dev.; Pratt Co., Pratt (1991). BS 1982, MS 1991, Colorado St. U.

**RIAT, LARRY D.**, Co. Extension Agent Emeritus, Agr., Dickinson Co., Abilene (1961). BS 1961, MS 1969, Kansas St. U.

**RIBLETT, CARL O.**, Asst. Prof. of Architectural Engineering and Construction Science (1989). BS 1984, Kansas St. U.; MS 1993, Texas A&M

**RIBLETT, LOREN**, Asst. Dean and Prof. of General Engineering Tech. (1981). BS 1957, Kansas St. U.; MS 1961, Emporia St. U.; PhD 1980, Kansas St. U.

**RICE, CHARLES W.**, Assoc. Prof. of Agronomy (1988). BS 1977, Northern Illinois U.; MS 1980, PhD 1983, U. of Kentucky. (\*)

**RICE, EDWARD D.**, Dir. of Facilities Management (1987). BS 1972, U. of Nebraska—Omaha.

**RICE, FRED**, Instr. of Management; Dir. of Small Business Dev. Cntr. (1986). BA 1958, Ohio Wesleyan U.; MBA 1965, U. of Cincinnati.

**RICE, MARION**, Research Asst. of Grain Science and Industry (1988). BS 1959, U. of Wisconsin.

**RICE, TRUDY M.**, Co. Ext. Agent, Home Economics, Douglas Co., Lawrence (1993). BS 1973, Kansas St. U.

**RICHARD, PATRICK**, Distinguished Prof. of Physics; Dir. of J.R. Macdonald Lab (1972). BS 1961, U. of Southwestern Louisiana; PhD 1964, Florida St. U. (\*)

**RICHARDS, VERLYN D.**, Prof. Emeritus of Finance (1965). BS 1956, MS 1960, Kansas St. U.; CPA 1961, Kansas; PhD 1967, U. of Illinois. (\*)

**RICHARDSON, DANIEL C.**, Adjunct Assoc. Prof. of Clinical Sciences (1991). BS 1975, DVM 1977, Kansas St. U.; Diplomate 1983, American Col. of Vet. Surgeons.

**RICHARDSON, DRAYTFORD**, Prof. Emeritus of Animal Sciences and Industry (1951). BS 1938, Clemson Agricultural Col.; MS 1950, PhD 1951, Iowa St. U. (\*)

**RICHMOND, MARY FRANCES**, Co. Extension Agent, Home Economics, Osage Co., Lyndon (1975). BS 1973, Pittsburg St. U.

**RICHOLSON, RONALD**, Assoc. Prof. of Electronic Engineering Tech. (1985). BA 1968, Southwestern Col.; BS 1976, MS 1985, U. of Wyoming.

**RICHTER, LINDA K.**, Prof. of Political Science (1982). BA 1964, Willamette U.; MA 1966, U. of Hawaii; PhD 1980, U. of Kansas. (\*)

**RICHTER, WILLIAM LOUIS**, Prof. and Head of Political Science (1966). BA 1961, Willamette U.; MA 1963, PhD 1968, U. of Chicago. (\*)

**RICKABAUGH, DARRELL PAUL**, Co. Extension Agent, Agr., Comanche Co., Coldwater (1989). BS 1983, Kansas St. U.

**RIDLEY, ROBERT K.**, Prof. of Parasitology, Dept. of Pathology and Microbiology; Research Parasitologist (1981). MS 1960, U. of Kentucky; PhD 1967, Florida St. U.; DVM 1978, Kansas St. U. (\*)

**RIGGS-ROWLISON, MARILYN J.**, Co. Ext. Agent, Home Economics, Sheridan Co., Hoxie (1992). BS 1967, Ft. Hays St. U.; MS 1986, Kansas St. U.

**RILEY, JACK G.**, Prof. and Head of Animal Sciences and Industry; Beef Cattle Research Scientist, Agr. Exp. Sta. (1971). BS 1962, MS 1963, PhD 1968, U. of Missouri. (\*)

**RILEY, JOHN B.**, Prof. of Agricultural Economics; Asst. Dir., Resident Instruction (1973). BS 1969, MS 1971, Virginia Poly. Inst. and St. U.; PhD 1974, Oklahoma St. U. (\*)

**RILEY, MERRILL J.**, Asst. Prof. Emeritus of Management (1966). BS 1951, John Brown U.; MBA 1955, U. of Arkansas.

**RINGLER, WILBER E.**, Prof. Emeritus; Assoc. Dir. of Extension (1957). BS 1948, MS 1949, U. of Nebraska; PhD 1958, U. of Wisconsin. (\*)

**RINTOUL, DAVID A.**, Assoc. Prof. of Biology; Molecular Biologist, Agr. Exp. Sta. (1980). BA 1972, U. of Kansas; PhD 1978, Stanford U. (\*)

**RIORDAN, CHARLES G.**, Asst. Prof. of Chemistry (1993). BS 1986, Col. of the Holy Cross; PhD 1990, Texas A&M. (\*)

**RIQUELME, MARCIAL ANTONIO**, Assoc. Prof. of Sociology, Dir. of Latin American Studies (1990). LLD 1962, Universidad National Asuncion, Paraguay; MA 1965, U. of Minnesota; PhD 1975, U. of California—Santa Barbara. (\*)

**RISEMAN, LOUIS**, Asst. Prof. Emeritus of Geology (1946). BS 1934, MS 1936, Tufts U. (\*)

**RO-TROCK, LAURENCE G.**, Adjunct Asst. Prof. of Human Dev. and Family Studies (1984). PhD 1978, U. of Missouri—KC.

**ROACH, FAITH RUSSELL**, Assoc. Prof. Emerita of Hotel, Restaurant, Institution Management and Dietetics (1965). BS 1947, MS 1966, PhD 1973, Kansas St. U. (\*)

**ROBBINS, BENNY S.**, Prof.; Area Extension Dir. (1967). BS 1966, MS 1971, Oklahoma St. U.

**ROBBINS, JAMES A.**, Asst. Prof. of Horticulture; Research Horticulturist, Woody Ornamentals, Agr. Exp. Sta. (1986). BS 1978, U. of Wisconsin; MS 1981, U. of Georgia; PhD 1985, U. of California, Davis. (\*)

**ROBEL, BARBARA K.**, Greek Affairs Advisor (1974). BA 1965, Kansas St. U.

**ROBEL, RAYDON H.**, Dir., Recreational Services (1970). BS 1965, MS 1970, Kansas St. U.

**ROBEL, ROBERT JOSEPH**, Prof. of Biology; Wildlife Conservationist, Agr. Exp. Sta. (1961). BS 1956, Michigan St. U.; BMS 1959, U. of Idaho; PhD 1961, Utah St. U. (\*)

**ROBERT, DAVID**, Adjunct Instr. of Human Dev. and Family Studies (1990). MRE 1972, MDiv. 1975, Covenant Theological Seminary; MA 1984, California Family Study Cntr.

**ROBERTS, CAROLYN V.**, Asst. Dean of Vet. Medicine (1977). BS 1955, U. of Colorado; MS 1976, Kansas St. U.

**ROBERTS, HAROLD A.**, Assoc. Prof. Emeritus of Animal Science and Industry; In charge, Dairy Foods Processing Ctr. and Dairy Foods Research Technologist, Agr. Exp. Sta. (1963). BS 1959, MS 1967, Kansas St. U.

**ROBERTS, THOMAS C.**, Asst. Dean of Engineering and Assoc. Prof. of Architectural Engineering and Construction Science (1993). BS 1970, MS 1972, Kansas St. U.

**ROBERTS, RITA**, Coordinator of Testing, Academic Assistance Cntr., (1988). BS 1985, Kansas St. U.

**ROBERTSON, DIANA L.**, Area Coord., Housing and Dining Services (1990). BS 1986, Buena Vista Col.; MS 1990, Western Illinois U.

**ROBERTSON, JOHN M.**, Psychologist, U. Counseling Services (1989). MA 1986, PhD 1989, U. of California—Santa Barbara.

**ROBINSON, ELSIE C.**, Co. Extension Home Economist Emerita, Decatur Co., Oberlin (1969). BS 1942, Fort Hays St. U.

**ROBSON, GARY S.**, Asst. Prof. of Accounting (1989). BA 1973, M.Ed. 1983, PhD 1990, U. of Arizona.

**ROCHE, THOMAS E.**, Prof. and Head of Biochemistry; Biochemist, Agr. Exp. Sta. (1974). BS 1966, Regis Col., Denver; PhD 1970, Washington St. U. (\*)

**RODDY, DENNIS W.**, Farm Management Association Fieldman (1989). BS 1986, MS 1990, Oklahoma St. U.

**RODDY, PRISCILLA**, System Coord. (1991). BS 1986, Oklahoma St. U.

**RODGERS, LAWRENCE R.**, Asst. Prof. of English (1989). BA 1982 U. of Oklahoma; MA 1984 U. of Iowa; PhD 1989, U. of Wisconsin. (\*)

**ROGERS, DANNY H.**, Prof. of Agricultural Engineering; Extension Irrigation Engineer (1977). BS 1976, MS 1977 Kansas St. U.; PhD 1988, Oklahoma St. U.; Professional Engineer, 1981. (\*)

**ROGERS, DEBORAH E.**, Adjunct Asst. Prof. of Grain Science and Industry (1981). BS 1976, MS 1981 PhD 1987, Kansas St. U. (\*)

**ROHDE, DONNA M.**, Assoc. Dir. of Graduate Studies, Business Administration, BS 1985, Fort Hays St. U.; MPA 1989, Kansas St. U.

**ROHLES, FREDERICK H.**, Prof. Emeritus of Psychology (1963). BS 1942, Roosevelt U.; MA 1950, PhD 1956, U. of Texas. (\*)

**ROLLEY, STEPHANIE A.**, Asst. Prof. and Assoc. Head, Dir. of Landscape Arch. Graduate Studies (1988). BLA 1982, Kansas St. U.; MCP 1987, Massachusetts Inst. of Tech. Registered Landscape Architect. Certified Planner. (\*)

**ROMSTAD, TAMMIE**, Asst. Women's Basketball Coach (1993). BS 1982, Kansas St. U.

**RONCEK, DENNIS W.**, Assoc. Prof. of Sociology (1983). BA 1969, MA 1972, U. of Illinois; PhD 1975, U. of Illinois. (\*)

**ROONEY, WILLIAM L.**, Asst. Prof. of Agronomy (1992). PhD 1992, U. of Minnesota. (\*)

**ROOS, MAUREEN E.**, Adjunct Asst. Prof. of Dietetics (1983). MD 1978, U. of Kansas.

**ROOZEBOOM, KRAIG L.**, Asst. Agronomist of Agronomy; Agr. Exp. Sta. (1990). BA 1985, Dordt Col.; MS 1990, Iowa St. U.

**ROPER, JAMES E.**, Instr. of English (1986). BA 1978, BS 1986, Kansas St. U.

**ROSENBERG, JERRY P.**, Asst. Prof. of Political Science (1984). AB 1970, U. of Illinois—Chicago; AM 1974, U. of Illinois—Urbana; PhD 1977, U. of Illinois. (\*)

**ROSS, CHRISTOPHER R.**, Asst. Prof. of Pharmacology (1990). BS 1977, DVM 1981, PhD 1990, U. of Missouri. (\*)

**ROSS, LYNNE S.**, Asst. Prof. of Speech (1978). BS 1968, Nebraska Wesleyan U.; MA 1975, Kansas St. U.

**ROUFA, DONALD J.**, Prof. of Biology; Molecular Biologist, Agr. Exp. Sta. (1975). AB 1965, Amherst Col.; PhD 1970, The Johns Hopkins U. (\*)

**ROUSH, JAMES K.**, Asst. Prof. of Small Animal Surgery (1989). DVM 1983, Purdue U.; MS 1988, U. of Wisconsin; Diplomate 1990, American Col. of Vet. Surgeons. (\*)

**ROUTSON, ROGER**, Asst. Prof. of Art (1978). BFA 1974, Cleveland Inst. of Art; MFA 1978, U. of Illinois. (\*)

**ROVELTO, CLIFFORD L.**, Asst. Track Coach (1988). BS 1978, U. of Kansas.

**ROWE, SAMUEL S., JR.**, Co. Extension Agricultural Agent, Emeritus, Sumner Co., Wellington (1965). BS 1940, MS 1952, U. of Missouri.

**ROWELL, COLIN P.**, Farm Management Assoc. Fieldman (1990). BS 1984, MS 1987, Kansas St. U.

**ROWLAND, JACK J.**, Assoc. Prof.; District Forester, Southeast (1969). BS 1968, MS 1970, U. of Missouri.

**ROWLAND, JEAN R.**, Co. Extension Agent, Home Economics, Labette Co., Altamont (1974). BS 1974, Kansas St. U.

**ROWLETT, JANE**, Asst. Prof., Education; Dir. of Unclassified Affairs and University Compliance (1977). BS 1970, MS 1977, PhD 1981, Kansas St. U.

**ROYSE, DAVID**, Asst. Prof. of Music and Education (1990). BS 1981, MM 1983, Austin Peay U.; PhD 1989, Kent St. U. (\*)

**ROYSE, MARY PITTS**, Asst. Prof., Libraries (1990). BA 1979, MA 1980, Samford U.; MLS 1984, U. of North Carolina.

**RUDY, JEFFREY**, Instr. of Kinesiology (1993). BS 1987, MS 1992, U. of Pittsburgh.

**RULIFFSON, WILLARD S.**, Prof. Emeritus of Biochemistry (1953). BS 1940, Buena Vista Col.; PhD 1953, U. of Iowa. (\*)

**RUMSEY, DEBORAY J.**, Asst. Prof. of Statistics (1994). BS 1984, U. of Wisconsin-LaCrosse; MS 1987, Illinois St. U.; PhD 1993, Ohio St. U.

**RUSS, OLIVER G.**, Prof. Emeritus of Agronomy (1949). BS 1950, MS 1953, Kansas St. U. (\*)

**RUSSELL, LEROY W.**, Co. Extension Agent, 4-H; Shawnee Co., Topeka (1990). BS 1977, MS 1978, Kansas St. U.

**RUSSELL, EUGENE R.**, Prof. of Civil Engineering (1974). BSCE 1958, U. of Missouri, Rolla; MS 1965, Iowa St. U.; PhD 1974, Purdue U.; Professional Engineer, 1962. (\*)

**RUSSELL, RAYMOND L.**, Dir., Hill's Practice Management (1991). BS 1956, DVM 1956, Kansas St. U.; MS 1983, U. of Phoenix.

**RUSSELL, CANDYCE S.**, Prof. of Human Dev. and Family Studies; Agr. Exp. Sta. (1974). BS 1968, Cornell U.; MA 1972, PhD 1975, U. of Minnesota. (\*)

**RYS, ANDREW**, Assoc. Prof. of Electrical and Computer Engineering (1983). BS 1976, MS 1978, Technical U. of Wroclan, Poland; PhD 1983, Texas Tech. U. (\*)

**RYS, MALGORZATA J.**, Asst. Prof. of Industrial Engineering (1989). BS 1979, MS 1979, Technical U. of Wroclaw; MS 1985, PhD 1989, Kansas St. U. (\*)

**SAAL, CATHERINE**, Arts and Sciences Advisor (1992). BS 1968, U. of Rochester; MS 1984, Kansas St. U.

**SAAL, FRANK E.**, Head and Prof. of Psychology (1976). BA 1968, U. of Rochester; MS 1973, Rensselaer Poly. Inst.; PhD 1976, Pennsylvania St. U. (\*)

**SACHS, DAVID H.**, Assoc. Prof. of Arch. (1988). BS 1974, Stetson U.; MArch 1977, Rice U., DArch 1986, U. of Michigan. Registered Architect. (\*)

**SAEKI, SADAHIRO**, Distinguished Prof. of Mathematics (1982). BS 1965, Waseda U.; MS 1967, PhD 1970, Tokyo Met. U., Japan. (\*)

**SAINT-JEAN, GUY**, Asst. Prof. of Food Animal Surgery (1989). DVM 1983, U. of Montreal; MS 1988, Ohio St. U.; Diplomate 1991, American Col. of Vet. Surgeons. (\*)

**SALERO, WILLIAM A.**, Pharmacist, Lafene Health Ctr. (1964). BS 1949, U. of Kansas.

**SALMON, CLARENCE R.**, Assoc. Prof.; Asst. Dir. of 4-H Youth Programs (1983). BS 1967, MS 1968, EdD 1982, Texas A&M.

**SALVA ROMERO, CAROLINE T.**, Instr. of Speech (1987). BA 1984, Queen's Col.; MA 1986, Kansas St. U. (\*)

**SAMELSON, FRANZ**, Prof. Emeritus of Psychology (1957). Diploma in Psychology 1952, U. of Munich, Germany; PhD 1956, U. of Michigan. (\*)

**SANDERS, WILLIAM H.**, Prof. Emeritus of General Engineering Tech. (1973). BS 1951, MS 1957, U. of Oklahoma.

**SANDERSON, REBECCA A.**, Psychologist, Asst. Dir., Training, U. Counseling Services (1989). MA 1975, Northeast Missouri St. U.; PhD 1988, U. of Missouri-Columbia.

**SANNER, ALBERT E.**, Assoc. Prof. Emeritus of Arch. (1963). BS Arch 1948, BS Arch Engg. 1950, U. of Illinois; MArch 1966, U. of Nebraska. Registered Architect. (\*)

**SAUER, DAVID B.**, Adjunct Asst. Prof. of Plant Pathology; Research Stored Grain Plant Pathologist, USDA SEA-AR (1967). BA 1961, Kentucky St. U.; MS 1964, PhD 1967, U. of Minnesota. (\*)

**SAUTER, SILVIA I.**, Asst. Prof. of Modern Languages. BA 1979, MA 1981, U. of Oregon; PhD 1988, U. of Texas at Austin. (\*)

**SCHAAKE, SCOTT L.**, Asst. Prof. of Animal Sciences and Industry; International Livestock Programs and Live Animal Evaluation (1992). BS 1984, Kansas St. U.; MS 1986, Clemson U.; PhD 1991, U. of Kentucky.

**SCHAFER, DAVID E.**, Prof. of Animal Sciences and Industry; Extension Specialist, Meats (1972). BS 1963, U. of Minnesota; MS 1968, S. Dakota St. U.; PhD 1972, Kansas St. U.

**SCHAFER, VERNON A.**, Asst. Agronomist of Agronomy, Foundation Seed Production, Agr. Exp. Sta. (1987). AS 1979, Pratt Comm. Col.; BS 1981, Kansas St. U.

**SCHAFER, JAMES A.**, Assoc. Prof. and Head of SW Research-Extension Cntr. (1988). BS 1971, S. Dakota St. U.; MS 1978, PhD 1981, Kansas St. U.

**SCHALLES, DIANNA**, Instr. of Hotel, Restaurant, Institution Management and Dietetics (1993). BS 1983, Baker U.; MS 1985, Kansas St. U.

**SCHALLES, ROBERT R.**, Prof. of Animal Sciences and Industry; Animal Breeding Research Scientist, Agr. Exp. Sta. (1966). BS 1963, Colorado St. U.; MS 1966, PhD 1966, Virginia Poly. Inst. (\*)

**SCHAPPAUGH, WILLIAM T.**, Prof. of Agronomy; Research Soybean Geneticist, Agr. Exp. Sta. (1978). BS 1975, MS 1977, Iowa St. U.; PhD 1979, Purdue U. (\*)

**SCHAPLOWSKY, TERRY W.**, Research Assoc. of Horticulture (1980). BS 1979, Kansas St. U.

**SCHARMANN, LAWRENCE C.**, Assoc. Prof., Education (1988). BS 1978, MEd 1980, U. of Nebraska; PhD 1985, Indiana U. (\*)

**SCHATZ, NEAL A.**, Co. Extension Agent, Agr., Harper Co., Anthony (1989) BS 1989, Northwest Missouri St. U.

**SCHAUB, RODNEY L.**, Co. Extension Agent, Agr., Osage Co., Lyndon (1990). BS 1980, Kansas St. U.

**SCHEELE, JOHN O.**, Asst. Instr. of Animal Sciences and Industry (1986). BS 1966, Kansas St. U.

**SCHEER, RICHARD K.**, Assoc. Prof. of Philosophy (1968). AB 1950, U. of Nebraska; MA 1951, U. of Florida; PhD 1958, U. of Nebraska. (\*)

**SCHEIDT, RICK JAMES**, Assoc. Prof. of Human Dev. and Family Studies (1976). BA 1967, MA 1969, California St. U.; PhD 1973, U. of Nebraska. (\*)

**SCHELL, LEO M.**, Prof., Education (1966). AB 1955, Bethany Col.; MS 1962, U. of Kansas; PhD 1964, U. of Iowa. (\*)

**SCHELLHARDT, THOMAS G.**, Asst. VP for Administration and Finance (1986). BS 1967, Southern Illinois U.; MS 1975, Purdue U.

**SCHENCK-HAMLIN, WILLIAM**, Assoc. Prof. of Speech (1976). BS 1969, MA 1971, Kansas St. U.; PhD 1976, U. of Oregon. (\*)

**SCHENCK-HAMLIN, DONNA C.**, ISSA Librarian (1983). BA 1975, MLS 1976, U. of Oregon; MM 1984, Kansas St. U.

**SCHENEMAN, C. STEPHEN**, Asst. Prof.; Coordinator, Extension Professional and Organizational Dev. (1989). BS 1970, MS 1971, U. of Missouri; PhD 1980, Ohio St. U.

**SCHEULE, BARBARA**, Administrative Dietitian, Housing and Dining Services (1981). BS 1980, U. of Nebraska-Lincoln; MS 1985, Kansas St. U.

**SCHILTZ, DAVID A.**, Instr. of Aviation Maintenance Tech. (1990). A&P 1981, Lake Area Vocational Tech. School; Licenses: MD 500 factory-approved pilot/mechanic in helicopter, commercial single, multi-fixed wing rotorcraft, A&P with inspection authorization.

**SCHINDLER, DALE E.**, Assoc. Prof. Emeritus; Extension Architect (1955). BArch 1953, MS 1960, Kansas St. U.; Registered Architect.

**SCHLAGECK, SARAH L.**, Instr. of Architectural Engineering and Construction Science (1989). BS 1977, Auburn U.; MS 1987, Kansas St. U.

**SCHLEGEL, ALAN J.**, Assoc. Prof., Agronomist in Charge, Tribune Field, SW Research-Extension Cntr. (1986). BS 1980, Kansas St. U.; MS 1983, PhD 1985, Purdue U. (\*)

**SCHLENDER, JOHN R.**, Prof. Emeritus of Agricultural Economics; Extension Agricultural Economist, Farm Management (1951). BS 1951, Kansas St. U.; MS 1960, Oregon St. U.; PhD 1969, Purdue U.

**SCHLESENER, NORMAN E.**, Co. Extension Agricultural Agent Emeritus, Kingman Co., Kingman (1956). BS 1956, MS 1963, Kansas St. U.

**SCHLUP, JOHN R.**, Assoc. Prof. of Chemical Engineering (1983). BS 1975, Kansas St. U.; PhD 1981, California Inst. of Tech. (\*)

**SCHMIDT, DAVID A.**, Prof. of Computing and Information Sciences (1986). BA 1975, Fort Hays St. U.; MS 1977, PhD 1981, Kansas St. U. (\*)

**SCHMIDT, TERESA TEMPERO**, Asst. Prof. of Art (1972). BA 1963, MA 1971, Central Washington St. Col.; MFA 1972, Washington St. U. (\*)

**SCHNEIDER, HAROLD WILLIAM**, Assoc. Prof. Emeritus of English (1961). BA 1950, U. of Minnesota.

**SCHNEIDER, MARY WILLIS**, Prof. Emerita of English (1964). BA 1949, MA 1952, St. U. of Iowa.; PhD 1964, U. of Minnesota. (\*)

**SCHOEFF, ROBERT W.**, Prof. Emeritus of Grain Science; St. Leader, Grain Science and Industry Program (1960). BS 1942, MS 1947, PhD 1952, Purdue U. (\*)

**SCHOFIELD, EILEEN**, Assoc. Agricultural Editor (1982). MA 1966, Columbia U.

**SCHONEWEIS, DAVID A.**, Prof. of Food Animal Medicine (1966). BS 1956, DVM 1956, MS 1971, Kansas St. U. (\*)

**SCHONING, POLLY**, Assoc. Prof. of Pathology, Dept. of Pathology and Microbiology; Research Pathologist (1979). DVM 1964, MS 1970, PhD 1979, Kansas St. U.; Diplomate 1982, American Col. of Vet. Pathologists. (\*)

**SCHOPE, WAYNE**, Research Asst., Grain Science and Industry (1986). BS 1986, Park Col.

**SCHRADER, CHARLES C.**, Asst. Prof. of Landscape Architecture (1991). BS 1973, MLA 1987, Kansas St. U. (\*)

**SCHRENK, WILLIAM G.**, Prof. Emeritus of Chemistry (1938). AB 1932, Westmar Col.; MS 1936, PhD 1945, Kansas St. U. (\*)

**SCHROCK, MARK DAVID**, Prof. of Agricultural Engineering (1973). BS 1969, Kansas St. U.; MS 1971, U. of Illinois; PhD 1978, Kansas St. U.; Professional Engineer, 1980. (\*)

**SCHROEDER, DOROTHEA A.**, Co. Extension Home Economist Emerita, Wyandotte Co., Kansas City (1942). BS 1940, Bethel Col.

**SCHROEDER, MARY M.**, Assoc. Prof. Emerita; Area Extension Home Economist (1961). BS 1938, MS 1968, Kansas St. U.

**SCHROEDER, TED**, Assoc. Prof. of Agricultural Economics (1986). BS 1982, U. of Nebraska; PhD 1986, Iowa St. U. (\*)

**SCHRUBEN, LEONARD WILLIAM**, Prof. Emeritus of Agricultural Economics; Research Agr. Econ. Grain Marketing, Agr. Exp. Sta. (1949). BS 1939, Kansas St. U.; MS 1940, U. of Illinois; MPA 1948, MA 1949, PhD 1949, Harvard U. (\*)

**SCHULER, JULIE K.**, Business Admin. Advisor (1994). BS 1986, MS 1992, Kansas St. U.

**SCHULER, MARK K.**, Co. Ext. Agent, Agr., Linn Co., Mound City (1992). BS 1980, Kansas St. U.

**SCHULEY, MARCIA**, Asst. Dir., Career and Employment Services (1990). BS 1961, MS 1976, PhD 1980, Kansas St. U.

**SCHULTZ, LaDONNA A.**, Co. Extension Agent, Home Economics, Trego Co., Wakarusa (1989). BS 1986, MS 1989, Kearney St. Col.

**SCHULTZE, HANS-PETER**, Adjunct Prof. of Geology (1988). BS 1958, Freiberg; MS 1962, PhD 1965, Tubingen, West Germany. (\*)

**SCHUMM, WALTER R.**, Prof. of Human Dev. and Family Studies; Agr. Exp. Sta. (1979). BS 1972, The Col. of William and Mary; MS 1976, Kansas St. U.; PhD 1979, Purdue U. (\*)

**SCHURLE, BRYAN W.**, Prof. of Agricultural Economics; Research Agr. Econ., Farm Management Production, Agr. Exp. Sta. (1977). BS 1972, Emporia St. U.; MS 1974, PhD 1977, Ohio St. U. (\*)

**SCHUSTER, NANCY D.**, Co. Extension Agent, Home Economics, Anderson Co., Garnett (1972). BS 1972, Fort Hays St. U.

**SCHWAB, A. PAUL**, Assoc. Prof. of Agronomy; Research Soil Chemist, Agr. Exp. Sta. (1983). BS 1976, Colorado School of Mines; MS 1978, PhD 1981, Colorado St. U. (\*)

**SCHWARZENTRAUB, MARK A.**, Farm Management Assoc. Fieldman (1980). BS 1976, MS 1980, U. of Missouri.

**SCHWENK, FRED W.**, Prof. and Head of Plant Pathology; Research Soybean Pathologist, Agr. Exp. Sta. (1969). BS 1960, MS 1964, N. Dakota St. U.; PhD 1969, U. of California. (\*)

**SCHWENKE, JAMES R.**, Assoc. Prof. of Statistics; Statistical Consultant, Agr. Exp. Sta. (1986). BA 1973, MA 1977, U. of S. Florida; PhD 1982, Kansas St. U. (\*)

**SCHWULST, FRANK J.**, Assoc. Prof. of Animal Sciences and Industry; Sheep Research Scientist, NW Research-Extension Cntr. (1974). BS 1961, U. of Wisconsin; MS 1966, PhD 1968, U. of Nebraska. (\*)

**SCOBY, RICHARD K.**, Research Asst. of Animal Sciences and Industry (1987). BS 1966, Emporia St. Teachers Col.

**SCOTT, ANN**, Assoc. Prof., Arch. and Design, Libraries (1973). BA 1964, MA 1970, Kansas St. U.

**SCOTT, SUSAN S.**, Assoc. Dean of Students; Asst. Prof., Education (1979). BS 1973, MS 1974, Emporia St. U.; PhD 1982, Kansas St. U.

**SCOVILLE, ORLIN J.**, Prof. Emeritus of Agricultural Economics (1966). BS 1931, MS 1933, Colorado St. U.; PhD 1949, Harvard U. (\*)

**SCRANTON, BONNIE J.**, Dir. of College Advancement, Col. of Tech. (1991). BS 1972, MS 1987, New Mexico St. U.

**SEAMON, DAVID R.**, Prof. of Arch. and Planning; Adjunct Prof. of Geography (1983). BA 1970, SUNY; MA 1974, PhD 1977, Clark U. (\*)

**SEARS, ROLLIN G.**, Prof. of Agronomy; Research Wheat Geneticist, Agr. Exp. Sta. (1980). BS 1972, MS 1974, Montana St. U.; PhD 1979, Oregon St. U. (\*)

**SEATON, RICHARD H.**, U. Attorney (1971). AB 1959, Harvard Col.; LLB 1963, Harvard Law School.

**SEDLACEK, KENT**, Asst. Dir. of Planned Giving, KSU Foundation (1989).

**SEEDLE, C. DONALD**, Assoc. Prof. of Epidemiology; Research Epidemiologist (1984). DVM 1963, Colorado St. U.; MS 1968, U. of Maryland; Diplomate 1986, American Col. of Vet. Preventative Medicine.

**SEGO, R. JEAN**, Asst. Dean of Human Ecology; Instr. of Human Ecology (1967). BA 1960, Friends U.; MS 1967, Kansas St. U.

**SEIB, PAUL A.**, Prof. of Grain Science and Industry; Research Biochemist, Agr. Exp. Sta. (1970). BS 1958, PhD 1965, Purdue U. (\*)

**SEIFERS, DALLAS L.**, Assoc. Prof. of Plant Pathology; Research Plant Pathologist, Fort Hays Branch Agri. Exp. Sta. (1982). BS 1974, U. of Missouri; MS 1976, PhD 1980, Mississippi St. U. (\*)

**SEITZ, LARRY M.**, Assoc. Prof. of Grain Science and Industry; USDA Grain Marketing Research Cntr. (1979). BS 1962, Kansas St. U.; MS 1965, PhD 1966, U. of Illinois. Adjunct appt. (\*)

**SELF, HUBER**, Prof. Emeritus of Geography (1947). BS 1941, Central Oklahoma St. Col.; MS 1947, Oklahoma St. U. (\*)

**SELFRIDGE, O. JOHN**, Assoc. Prof. of Arch. (1969). BA 1959, U. of Kansas; MCP 1964, Yale U. (\*)

**SELIGSON, THEODORE H.**, Adjunct Prof. of Architecture (1991). BArch 1953, Washington U.

**SELL, PHILIP L.**, Co. Extension Agent, Horticulture, Shawnee Co., Topeka (1978). BS 1970, MS 1971, Kansas St. U.

**SELTZER, KATHRYN N.**, Assoc. Prof. of English (1983). BS 1972, U. of Missouri, MA 1981, Kansas St. U.

**SENIOR, ANDREW J.**, Assoc. Dir., Coordination, Kansas Regents Educational Communications Cntr. (1990). BA 1976, MA 1979, U. of Kansas.

**SESLER, WILLIAM H.**, Dir., Purchasing (1956). BS 1954, Kansas St. U.

**SETSER, CAROLE S.**, Prof. of Foods and Nutrition; Agr. Exp. Sta. (1976). BS 1962, U. of Missouri; MS 1964, Cornell U.; PhD 1971, Kansas St. U. (\*)

**SETSER, DONALD W.**, Distinguished Prof. of Chemistry (1963). BS 1956, MS 1958, Kansas St. U.; PhD 1961, U. of Washington. (\*)

**SEYFERT, RONALD J.**, Co. Extension Agent, Ottawa Co., Minneapolis (1969). BS 1968, Kansas St. U.

**SEYLER, H. L.**, Assoc. Prof. of Geography (1970). BA 1963, MA 1967, Kansas St. U.; PhD 1971, Indiana U. (\*)

**SHAFFER, KAREN**, Publications Asst., KSU Alumni Association (1989). BS 1987, Kansas St. U.

**SHANKLIN, CAROL**, Prof. of Hotel, Restaurant, Institution Management and Dietetics (1990). BS 1973, MS 1974, PhD 1976, U. of Tennessee. (\*)

**SHANKS, SHANE**, Publications Editor, U. Publications (1989). BA 1987, Baker U.; Postgraduate Diploma in Journalism Studies 1988, U. of Wales at Cardiff.

**SHANTEAU, JAMES C.**, Interim Assoc. Vice Provost for Research; Prof. of Psychology (1971). BA 1966, San Jose St. Col.; PhD 1970, U. of California, San Diego. (\*)

**SHARP, JAMES**, Asst. Prof. of Anatomy and Physiology. DVM 1983, Univ. of California-Davis; PhD 1987, Univ. of California-Davis. (\*)

**SHAW, BRADLEY A.**, Head and Assoc. Prof. of Modern Languages (1974). BA 1968, Lewis & Clark Col.; MA 1969, Northwestern U.; PhD 1974, U. of New Mexico. (\*)

**SHELKE, KANTHA**, Instr. of Grain Science and Industry (1987). BS 1976, Central Col., Bangalore U., India; MS 1982, PhD 1986, N. Dakota St. U.

**SHELLEY, JILL A.**, Research Asst. of Agricultural Economics, Writer (1989). BA 1978, Bethany Col.; MS 1981, Kansas St. U.

**SHELTON, LEWIS E.**, Assoc. Prof. of Speech (1973). BA 1963, Taylor U.; MA 1965, Indiana U.; MA 1968, PhD 1971, U. of Wisconsin. (\*)

**SHENKEL, CLAUDE WESLEY, JR.**, Prof. Emeritus of Geology (1949). BS 1941, Kansas St. U.; MS 1947, PhD 1952, U. of Colorado. (\*)

**SHENOY, CATHERINE**, Asst. Prof. of Finance (1991). BS 1979, MBA 1983, PhD 1991, U. of Kansas.

**SHEROW, JAMES E.**, Assoc. Prof. of History. MA 1976; MA 1978, Wichita St. U.; PhD 1987, Univ. of Colorado. (\*)

**SHERWOOD, PETER M. A.**, Prof. of Chemistry (1985). BSc 1967, St. Andrews U.; MA 1970, PhD 1970, Cambridge U.; CChem 1970; FRSC 1982. (\*)

**SHEU, CHWEN**, Asst. Prof. (1990). BS 1978, National Chung-Hsing U.; MS 1985, Iowa St. U.; PhD 1990, Ohio St. U. (\*)

**SHIELDS, SANDRA A.**, Co. Extension Agent, Ottawa Co., Minneapolis (1965). BS 1965, Kansas St. U.

**SHIRLEY, JOHN E.**, Assoc. Prof. of Animal Sciences and Industry, Dairy Cattle Nutrition and Management (1985). BS 1968, MS 1970, Western Kentucky U.; PhD 1973, Michigan St. U.

**SHOEMAKER, LORI L.**, Co. Extension Agent, Home Economics and 4-H, Rice Co., Lyons (1983). BS 1983, Kansas St. U.

**SHOGREN, MERLE**, Adjunct Assoc. Prof. of Grain Science and Industry; USDA (1971). BS 1951, Bethany Col.; MS 1954, Kansas St. U. (\*)

**SHOOP, ROBERT J.**, Prof., Education (1976). BA 1968, MDiv 1972, Wittenberg U.; PhD 1974, U. of Michigan. (\*)

**SHORT, DANIEL G.**, Dean of Business Administration; Prof. of Accounting (1992). BS 1967, Boston U.; MBA 1974, U. of Michigan; PhD 1977, U. of Michigan. (\*)

**SHOULBERG, DONALD J.**, Adjunct Asst. Prof. of Human Dev. and Family Studies (1983). PhD 1975, U. of Kansas. (\*)

**SHREVES, DENNIS D.**, Assoc. Prof. of Civil Engineering Tech. (1973). AT 1972, Kansas Tech. Inst.; BS 1976, Kansas St. U.; Registered Land Surveyor, Kansas.

**SHROYER, JAMES P.**, Prof. of Agronomy, Extension Specialist, Crop Production (1980). BS 1974, MS 1977, Oklahoma St. U.; PhD 1980, Iowa St. U. (\*)

**SHROYER, MARGARET G.**, Asst. Prof., Assoc. Project Dir., Education (1987). BA 1975, U. of California; MS 1984, PhD 1987, Kansas St. U.

**SHRYOCK, SAM**, Dir. of Information Systems, KSU Alumni Assoc. (1993). BS 1986, Ferris St. College, Michigan.

**SHULL, PAUL**, Prof. Emeritus of Music (1960). BME 1950, MME 1951, U. of Colorado; DMA 1966, Eastman School of Music, U. of Rochester. (\*)

**SHULT, ERNEST E.**, Distinguished Regents Prof. of Mathematics (1974). BA 1958, MA 1961, Southern Illinois U.; PhD 1964, U. of Illinois. (\*)

**SHULTIS, J. KENNETH**, Prof. of Nuclear Engineering; Dir., Inst. for Computational Research in Engineering and Science (1969). BAsc 1964, U. of Toronto; MS 1965, PhD 1968, U. of Michigan (\*)

**SIDDALL, WILLIAM R.**, Prof. of Geography (1962). AB 1950, Harvard U.; MA 1955, PhD 1959, U. of Washington. (\*)

**SIDORFSKY, FRANK M.**, Assoc. Prof. of Music (1965). BME 1952, Emporia St. U.; MM 1957, DMA 1974, Eastman School of Music, U. of Rochester. (\*)

**SIDWELL, RONALD A.**, Assoc. Research Prof. of Physics (1993). BA 1966, U. of Maryland; PhD 1970, Indiana U.

**SIEBERT, JAY D.**, Asst. Prof.; International Agricultural Programs (1982). BA 1969, Tabor Col.; MS 1976, Kansas St. U.; PhD 1982, U. of Georgia.

**SIEPL-COATES, SUZANNE**, Assoc. Prof. of Arch. (1984). Dipl. Ing. 1979, U. of Hannover, West Germany; MArch 1982, U. of California at Berkeley. (\*)

**SIGLE, NADINE J.**, Co. Ext. Agent, Home Economics, Osborne Co., Osborne (1992). BS 1978, MS 1980, Kansas St. U.

**SIGLER, CAROLYN**, Asst. Prof. of English. BA 1978, U. of Wisconsin-Milwaukee; MA 1986, PhD 1992, Florida St. U.

**SILLS, JACK L.**, Dir., K-State Union (1962). AB 1958, Kansas Wesleyan U.

**SIM, THOMAS IV**, Adjunct Asst. Prof. of Plant Pathology; Survey Plant Pathologist, Kansas State Board of Agr. (1984). MS 1975, Oklahoma St. U.

**SIMMONDS, GAIL**, Asst. Prof. of Computer Science Tech. (1982). BS 1966, Fort Hays St. U.

**SIMMS, DANNY D.**, Prof. of Animal Sciences and Industry; Livestock Production (1979). BS 1967, California St. U.; PhD 1974, Oregon St. U. (\*)

**SIMON, MADLEN**, Asst. Prof. of Arch. (1992). BA 1974, MArch 1977, Princeton. Registered Architect.

**SIMONS, CLAY J.**, Co. Ext. Agent, Agr., Meade County, Meade (1992). BS 1985, Texas A&M.

**SIMONS, ELIZABETH A.**, Asst. Prof., Education (1978). BS 1970, U. of Nebraska; MS 1980, PhD 1990, Kansas St. U.

**SIMONS, GALE G.**, Assoc. Dean of Research and Dir. of Engineering Exp. Sta.; Prof. of Nuclear Engineering (1977). BS 1962, MS 1965, PhD 1969, Kansas St. U. (\*)

**SINGH, GURDIP**, Asst. Prof. of Computing and Information Sciences (1991). BET 1986, Indian Inst. of Tech.; MS 1989, PhD 1991, SUNY, Stonybrook (\*)

**SINN, MELINDA L.**, Public Information Coord. (1981). AA 1978, Colleyville Com. Col.; BS 1980, MS 1985, Kansas St. U.

**SINNETT, E. ROBERT**, Prof., Education (1967). BA 1948, U. of Iowa; MA 1950, PhD 1953, U. of Michigan. (\*)

**SISK, ENSLEY J.**, Assoc. Prof.; Extension Specialist, Organization and Leadership Dev. (1960). BS 1954, MS 1968, Kansas St. U.

**SISSON, MALLEY**, Food Service Dir., K State Union (1980). BS 1971, U. of Missouri-Columbia.

**SIXBURY, GLENN R.**, Asst. Dir. for Computing, Cntr. for Faculty Evaluation and Dev. (1988). BS 1986, Kansas St. U.

**SJO, JOHN B.**, Prof. Emeritus of Agricultural Economics; Research Agr. Economics, Regional and Community Dev., Agr. Exp. Sta. (1953). BS 1949, MS 1952, Kansas St. U.; PhD 1960, Michigan St. U. (\*)

**SKIDMORE, EDWARD L.**, Adjunct Prof. of Agronomy; Research Soil Scientist, Wind Erosion Research Unit, USDA ARS (1963). BS 1958, Utah St. U.; PhD 1963, Oklahoma St. U. (\*)

**SKINNER, BRYAN E.**, Asst. Dir. for Intramurals and Special Events, Recreational Services (1992). BS 1990, U. of South Dakota; MS 1992, U. of Nebraska-Lincoln.

**SKINNER, DANIEL Z.**, Adjunct Asst. Prof. of Agronomy; Research Alfalfa Geneticist (1990). BA 1978, Saint Cloud St. U.; MS 1983, PhD 1987, Kansas St. U. (\*)

**SLACK, EARL REX**, Assoc. Prof. Emeritus of Arch. (1965). BArch 1952, U. of Oklahoma. Registered Architect.

**SLINKMAN, ZOE E.**, Prof. Emerita of Clothing, Textiles, and Interior Design; Extension Specialist, Cultural Arts (1967). BS 1947, Greeley, Colorado St. Col.; MS 1970, Kansas St. U.

**SLOAT, FLOYD B.**, Assoc. Prof. Emeritus of Mathematics (1946). BA 1938, Ouachita Col.; MA 1941, U. of Arkansas.

**SLOCOMBE, JOHN W.**, Prof. of Agricultural Engineering (1985). BS 1977, MS 1979, Kansas St. U.; PhD 1983, Iowa St. U. (\*)

**SLODERBECK, PHILLIP E.**, Assoc. Prof. of Entomology, Extension Specialist, Entomology, Southwest (1981). BS 1974, MS 1977, Purdue U.; PhD 1981, U. of Kentucky. (\*)

**SLOOP, JEAN C.**, Prof. of Music (1959). BA 1953, Gettysburg Col.; MA 1956, DMA 1974, Eastman School of Music, U. of Rochester (\*)

**SLOVER, RANDY**, Dir., Facilities Building Maint. (1992).

**SMAIL, VIRGIL**, Adjunct Asst. Prof. of Agronomy (1991). BA 1974, Earlham Col.; MS 1980, PhD 1981, Montana St. U. (\*)

**SMETHERS, J. STEVEN**, Instr. of Journalism (1983). BS 1976, Kansas St. U.

**SMIT, ANN B.**, Assoc. Prof. of Speech (1987). BA 1966, Calvin Col.; MA 1969, U. of Iowa; PhD 1980, U. of Maryland. (\*)

**SMIT, DAVID W.**, Assoc. Prof. of English (1988). BA 1975, Samford U.; MA 1977, MA 1986, PhD 1984, U. of Iowa. (\*)

**SMITH, ANN S.**, Assoc. Prof. of Biology (1970). BS 1958, Augustana Col.; MS 1960, U. of Colorado, PhD 1982, Northern Arizona U. (\*)

**SMITH, BEN A.**, Assoc. Prof. of Education; Adjunct Assoc. Prof. of Geography (1988). BS 1962, East Tennessee St. U.; MEd 1976, EdD 1986, U. of Georgia. (\*)

**SMITH, BOB LEE**, Prof. Emeritus of Civil Engineering (1948). BS 1948, MS 1953, Kansas St. U.; PhD 1963, Purdue U.; Professional Engineer, 1953. (\*)

**SMITH, BRENT**, Prof. of Mathematics (1989). BA 1971, Reed Col.; PhD 1977 Louisiana St. U. (\*)

**SMITH, C. MICHAEL**, Prof. and Head of Entomology; Plant Resistance to Insects (1990). BS 1971, MS 1973, PhD 1976, Mississippi St. U. (\*)

**SMITH, CAROLYN J.**, Humanities Reference Bibliographer, Libraries (1979). BM 1968, U. of Tennessee; MM 1978, Kansas St. U.

**SMITH, CHARLES A.**, Prof. of Human Dev. and Family Studies; Extension Specialist, Human Dev. (1978). BS 1968, U. of Dayton; MS 1970, PhD 1972, Purdue U.

**SMITH, CHARLES W.**, Co. Extension Agricultural Agent Emeritus, Cowley Co., Winfield (1955). BS 1950, Kansas St. U.; MS 1966, Colorado St. U.

**SMITH, CHRISTOPHER C.**, Prof. of Biology (1970). BA 1960, U. of Colorado; MA 1963, PhD 1965, U. of Washington. (\*)

**SMITH, DAVID R.**, Farm Management Association Fieldman (1976). BS 1970, Kansas St. U.

**SMITH, EDGAR FITZHUGH**, Prof. Emeritus of Animal Sciences and Industry; Beef Cattle Research Scientist and Range Management Research, Agr. Exp. Sta. (1946). BS 1941, Texas A&M, MS 1947, Kansas St. U.; PhD 1956, Texas A&M. (\*)

**SMITH, FLOYD W.**, Prof. Emeritus of Agronomy (1946). BS 1942, Kansas St. U.; MS 1946, PhD 1949, Michigan St. U. (\*)

**SMITH, GUY M.**, Chief of Staff, Lafene Health Cntr. (1980). MD 1971, U. of Virginia

**SMITH, J. SCOTT**, Asst. Prof. of Animal Sciences and Industry (1989). BS 1972, Brescia Col., Kentucky; MS 1975, Kansas St. U.; PhD 1981, Pennsylvania St. U. (\*)

**SMITH, JENELL M.**, Co. Extension Agent, 4-H Youth, Sedgwick Co., Wichita (1971). BS 1971, Kansas St. U.

**SMITH, JOSEPH E.**, Prof. and Head of Pathology and Microbiology; Research Pathologist (1969). BS 1959, DVM 1961, Texas A&M, PhD 1964, U. of California; Diplomate 1972, American Col. of Vet. Pathologists. (\*)

**SMITH, JOHN E.**, Co. Extension Agricultural Agent Emeritus, Leavenworth Co., Leavenworth (1956). BS 1953, Kansas St. U. MS 1970, Colorado St. U.

**SMITH, JOSEPH M.**, Co. Extension Agent, Agr., Montgomery Co., Independence (1967). BS 1967, Oklahoma St. U.

**SMITH, KATHY A.**, Co. Extension Agent, Home Economics; Ellsworth Co., Ellsworth BS 1990, Chadron St. Col.

**SMITH, MEREDITH**, Assoc. Prof. Emerita of Foods and Nutrition, Agr. Exp. Sta. (1981). BS 1970, Trinity U.; PhD 1978, Virginia Poly. Inst. and St. U. (\*)

**SMITH, OTHELLO D.**, Adjunct Clinical Assoc. of Medical Tech. (1979). AB 1947, MD 1951, U. of Kansas.

**SMITH, ROBIN**, Prof. of Philosophy (1974). BA 1968, U. of Tennessee at Chattanooga; PhD 1974, Claremont (\*)

**SMITH, RONALD C.**, Instr. of Aviation Maintenance Tech. (1981). Licenses: FAA Aviation Maintenance Technician (A&P), FAA Inspection Authorization, FAA Designated Written Test Examiner.

**SMITH, RONALD W.**, Asst. Prof. of Arch. (1987). BArch 1970, Kansas St. U. Registered Architect.

**SMITH, TOYNIA**, Asst. Controller, Accounting (1990). BS 1984, Northeast Missouri St. U.

**SMITH, WALTER H.**, Prof. Emeritus of Animal Sciences and Industry; Animal Research Geneticist and Horse Husbandry Research, Agr. Exp. Sta. (1948). BS 1943, MS 1949, Kansas St. U. (\*)

**SNEAD, BRUCE C.**, Instr., Kansas Industrial Extension Service (1982). BA 1974, California St. U.

**SNELL, RICHARD C.**, Co. Extension Agent, Agr., Barton Co., Great Bend (1981). BS 1977, Kansas St. U.

**SNELL, ROBERT ROSS**, Prof. of Civil Engineering (1957). BS 1954, MS 1960, Kansas St. U.; PhD 1963, Purdue U.; Professional Engineer, 1959. (\*)

**SNYDER, BILL D.**, Head Football Coach (1988). BA 1963, William Jewell Col.; MA 1965, Eastern New Mexico U.

**SOBERING, FREDERIC D.**, Prof. Emeritus; Dir. of Extension (1977). BS 1950, U. of Manitoba; MS 1963, N. Dakota St. U.; PhD 1966, Oklahoma St. U.

**SOCOLOFSKY, HOMER E.**, Prof. Emeritus of History (1946). BS 1944, MS 1947, Kansas St. U.; PhD 1954, U. of Missouri. (\*)

**SOIBELMAN, IAKOV**, Assoc. Prof. of Mathematics (1993). PhD 1983, Rostov U.

**SOLDAN, DOROTHY B.**, Dir., Education (1990). BS 1969, MS 1976, PhD 1980, Kansas St. U.

**SOLDAN, DAVID L.**, Prof. and Head of Electrical and Computer Engineering (1976). BS 1969, MS 1976, PhD 1980, Kansas St. U. (\*)

**SOLL, DEANNA L.**, Co. Extension Agent, Home Economics; Logan Co., Oakley (1990). BS 1988, Wayne St. Col.

**SOMERS, MICHAEL A.**, Asst. Prof., Libraries (1991). MA 1989, Purdue U.; MLS 1991, U. of Michigan.

**SORENSEN, EDGAR LAVELL**, Adjunct Prof. Emeritus of Agronomy; Research Alfalfa Geneticist, USDA, SEA-AR (1955). BS 1941, MS 1952, Utah Agricultural Col.; PhD 1955, U. of Wisconsin. (\*)

**SORENSEN, CHRISTOPHER M.**, Prof. of Physics (1977). BS 1969, U. of Nebraska; MS 1973, PhD 1976, U. of Colorado. (\*)

**SORENSEN, LEONARD ORLO**, Prof. Emeritus of Agricultural Economics; Research Agr. Econ., Transportation and Marketing, Agr. Exp. Sta. (1955). BA 1951, MS 1953, PhD 1963, U. of Minnesota. (\*)

**SOSA, CARMEN**, Asst. Prof. of Education (1994). BS 1974, U. of Puerto Rico; MS 1987, PhD 1993, U. of Iowa.

**SPAETH, CLIFFORD W.**, Prof. of Animal Sciences and Industry; Extension Specialist, Sheep (1974). BS 1965, Texas A&M; PhD 1974, Kansas St. U.

**SPAFFORD, DAVID**, Athletics Fundraiser (1994). BS 1990, Kansas St. U.

**SPARKE, ANN B.**, Co. Extension Agent, Morris Co., Council Grove (1977). BS 1977, MS 1980, Kansas St. U.

**SPAULDING, PAM M.**, Pharmacist, Lafene Health Ctr. (1993). BS 1988, U. of Texas; BS 1980, Kansas St. U.

**SPEARS, JACQUELINE**, Asst. Prof. of Education; Co-Dir. of Rural Clearinghouse for Lifelong Education and Dev. (1984). BS 1969, MS 1972, PhD 1988, Kansas St. U. (\*)

**SPEARS, MARIAN C.**, Prof. Emerita of Hotel, Restaurant, Institution Management and Dietetics; Agr. Exp. Sta. (1975). BS 1942, MS 1947, Western Reserve U.; PhD 1971, U. of Missouri. (\*)

**SPENCER, ALBERT E.**, Co. Extension Agricultural Agent Emeritus, Pottawatomie Co., Westmoreland (1960). BS 1959, Kansas St. U.

**SPIKES, W. FRANKLIN**, Prof., Education (1990). BS 1971, MS 1973, EdD 1975, Northern Illinois U. (\*)

**SPILLMAN, CHARLES KENNARD**, Prof. of Agricultural Engineering; Agr. Exp. Sta. (1969). AS 1958, Vincennes U.; BS 1960, MS 1963, U. of Illinois; PhD 1969, Purdue U. (\*)

**SPIRE, LYNDA**, Dir., National Conference Office (1987). BA 1971, West Texas St. U.; MA 1978, Kansas St. U.

**SPIRE, MARK F.**, Prof. of Food Animal Medicine (1976). DVM 1974, Texas A&M; MS 1978, Kansas St. U.; Diplomate 1981, American Col. of Theriogenology. (\*)

**SPITZER, PHILLIP**, Research Asst. of Plant Pathology (1985). BS 1984, Kansas St. U.

**SPOONER, BRIAN S.**, Prof. of Biology (1971). BS 1963, Quincy Col.; PhD 1969, Temple U. (\*)

**SPREHE, NANCY K.**, Asst. Prof., Libraries (1992). BS 1970, Concordia Teachers Col.; MLS 1972, Emporia St. U.; MA 1987, Kansas St. U.

**SPURGEON, WILLIAM E.**, Asst. Prof. of SW Research–Extension Cntr. (1988). BS 1981, MS 1983, U. of Nebraska; PhD 1988, Colorado St. U.

**ST. CLAIR, JANICE O.**, Co. Ext. Agent, Home Economics, Comanche Co., Coldwater (1992). BS 1969, Kansas St. U.

**STAGG, BEVERLY D.**, Emeritus, McPherson Co., McPherson (1940). BS 1940, Kansas St. U.

**STAHLMAN, PHILLIP W.**, Assoc. Prof.; Research Agronomist, Fort Hays Branch Agr. Exp. Sta. (1975). BS 1970, Panhandle St. Col.; MS 1973, N. Dakota St. U.; PhD 1989, U. of Wyoming. (\*)

**STAMEY, WILLIAM L.**, Dean Emeritus; Prof. of Mathematics (1953). AB 1947, U. of North Colorado; MA 1949, PhD 1952, U. of Missouri. (\*)

**STANDAGE, ROBERT E.**, Co. Extension Agent, Thomas Co., Colby (1985). BS 1985, U. of Nebraska.

**STANFIELD, SUSAN J.**, Instr. of Speech (1990). BA 1986, Baylor U.; MS 1989, U. of N. Texas.

**STANLEY, RUTH A.**, Fort Riley Advisor (1978). BS 1970, N.W. Oklahoma St. U.; MS 1978, Kansas St. U.

**STANNARD, JOHN C.**, Co. Extension Agent, Agr., Cheyenne Co., St. Francis (1989). BA, Chadron St. Col.

**STANTON, NOEL R.**, Prof. of Physics (1993). BA 1960, Rutgers U.; PhD 1965, Cornell U.

**STARK, MAURICE A.**, Prof. of Accounting (1976). BS 1959, MS 1966, Kansas St. U.; PhD 1972, U. of Missouri; CPA 1961, Kansas; 1968, Michigan. (\*)

**STARKEY, WINONA M.**, Asst. Prof. Emerita; Extension Specialist, Home Furnishings (1944). BS 1947, MS 1954, Kansas St. U.

**STAUFFER, ELLEN M.**, Conference Coord. (1986). BA 1973, Baylor U.

**STAYER, JOHN R.**, Prof., Education (1988). BSEd 1968, Indiana U.; MS 1973, Purdue U.; EdD 1978, Indiana U. (\*)

**STEELE, JAMES L.**, Adjunct Prof. of Agricultural Engineering (1989). BS 1969, MA 1963, PhD 1967, Iowa St. U. (\*)

**STEFFEN, JOHN D.**, Assoc. Prof., Education (1976). BA 1956, Hamline U.; PhD 1968, U. of Minnesota. (\*)

**STEGMEIER, WILLIAM D.**, Assoc. Prof.; Research Agronomist Forage and Specialty Crops, Fort Hays Branch Agr. Exp. Sta. (1958). BS 1956, MS 1959, Colorado St. U.; PhD 1971, S. Dakota St. U.

**STEICHEN, JAMES M.**, Prof. of Agricultural Engineering; Ag. Exp. Sta. (1978). BS 1970, PhD 1974, Oklahoma St. U.; Professional Engineer. (\*)

**STEINBAUER, ROBERT ANDRUS**, Prof. Emeritus of Music (1970). BM 1950, MM 1951, U. of Michigan; Doc. of Music 1959, Indiana U. (\*)

**STELLJES, GEORGE H.**, Major, US Army; Prof. and Head of Military Science (1993). BA 1975, Farmingham St. Col; MA 1989, California U. of Penn.

**STEPHENS, GREGORY F.**, Assoc. Prof. of General Engineering Tech. (1982). AA 1971, Colby Comm. Col.; BS 1973, BA 1980, MS 1981, Fort Hays St. U.

**STEPHENS, JANET F.**, Co. Extension Agent, Home Economics, Greenwood Co., Eureka (1970). BS 1970, Pittsburg St. U.; MS 1978, Kansas St. U.

**STEVENS, ALAN B.**, Asst. Prof.; Extension Specialist, Floriculture and Ornamental Horticulture (1990). BS 1970, MS 1975, New Mexico St. U.; PhD 1990, Texas A&M U.

**STEVENS, ANN**, Administrative Asst., Dean of Human Ecology (1991). BS 1986, New Mexico St. U.

**STEVENSON, JEFFREY S.**, Prof. of Animal Sciences and Industry; Reproductive Physiologist, Agr. Exp. Sta. (1980). BS 1975, Utah St. U.; MS 1977, Michigan St. U.; PhD 1980, North Carolina St. U. (\*)

**STEVENSON, PAUL NELSON**, Assoc. Prof. Emeritus of Agricultural Engineering (1957). BS 1948, U. of Missouri; MS 1957, Iowa St. U.

**STEVENSON, SIDNEY**, Asst. Prof. of Forestry (1987). BS 1975, Emporia St. U.; MA 1977, U. of Northern Colorado; PhD 1987, Colorado St. U.

**STEWART, G. KENT**, Prof., Education (1973). BS 1955, Indiana St. U.; MEd 1958, U. of Illinois; EdD 1964, Indiana U. (\*)

**STEWART, KAY C.**, Asst. Dean and Instr. of Business Administration (1972). BS 1966, West Virginia Inst. of Tech.; MS 1971, Fort Hays St. U.; PhD 1993, Kansas St. U.

**STEWART, PATRICIA L.**, Instr. of English (1983). MA 1954, U. of Colorado.

**STIEGERT, KYLE W.**, Asst. Prof. of Agricultural Economics. (1993). B.S. 1981, M.S. 1989, U. of Nebraska; PhD 1993, Purdue U. (\*)

**STITES, DEANE E.**, Co. Extension Agent, Agr., Crawford Co., Girard (1982). BS 1976, Kansas St. U.

**STITH, MARJORIE MAY**, Prof. Emerita of Human Dev. and Family Studies (1961). BS 1943, Alabama St. Col. for Women; MS 1958, PhD 1961, Florida St. U. (\*)

**STIVERS, MARK**, Adjunct Clinical Assoc. of Medical Tech. (1985). BA 1969, Westminster Col.; MD 1973, U. of Missouri.

**STOCKARD, JOHN R.**, Assoc. Prof. Emeritus; Extension Motion Picture Producer (1966). BS 1955, U. of North Carolina; MS 1969, Kansas St. U.

**STOCKLI, MARTIN P.**, Asst. Research Prof. of Physics (1981). PhD 1978, ETHZ Zurich. (\*)

**STOKES, ROBERT W.**, Assoc. Prof. of Civil Engineering (1991). BA 1976, Antioch College; MS 1978, MCRP 1978, Ohio St. U.; PhD 1984, Texas A&M. (\*)

**STOKKA, GERALD**, Temp. Asst. Prof., Ag. Practices (1992). DVM 1982, Iowa St. U.

**STONE, DARLA J.**, Instr., Education (1987). BS 1969, Oklahoma St. U.; MS 1987, Kansas St. U.

**STONE, LOYD R.**, Prof. of Agronomy; Research Soil Physicist, Agr. Exp. Sta. (1973). BS 1967, MS 1969, Oklahoma St. U.; PhD 1973, S. Dakota St. U. (\*)

**STOOPS, MIKE**, Asst. Football Coach (1992). BS 1986, U. of Iowa.

**STOOPS, ROBERT A.**, Asst. Football Coach (1988). BBA 1983, U. of Iowa.

**STOTESBURY, SIDNEY D.**, Prof. of Arch. (1972). BS 1957, Florida St. U.; MArch 1970, PhD 1975, U. of California at Berkeley. (\*)

**STOUGHTON, ALLEN**, Assoc. Prof. of Computing and Information Sciences (1993). BS 1979, MS 1981, U. of California; PhD 1987, U. of Edinburgh. (\*)

**STOUSE, LAWRENCE D.**, Co. Extension Dir., Johnson Co., Olathe (1966). BS 1963, MS 1982, Kansas St. U.

**STOVER, STEPHEN L.**, Prof. Emeritus of Geography (1964). AB 1940, McPherson Col.; MA 1941, U. of Kansas; MS 1955, PhD 1960, U. of Wisconsin. (\*)

**STOVER, ENID H.**, Learning Skills Specialist, Academic Assistance Cntr. (1983). BS 1942, Northern Colorado U.; MS 1975, Kansas St. U.

**STOWE, BARBARA S.**, Dean of Human Ecology; Prof. of Clothing, Textiles, and Interior Design (1983). BS 1954, U. of Nebraska; MA 1957, Michigan St. U.; PhD 1973, U. of North Carolina–Greensboro and North Carolina St. U.

**STRAFUSS, ALBERT C.**, Prof. Emeritus of Diagnostic Lab.; Research Pathologist (1968). BS 1952, DVM 1954, Kansas St. U.; MS 1958, Iowa St. U.; PhD 1963, U. of Minnesota. (\*)

**STRAIN, JAMES**, Asst. Prof. of Music (1992). BME 1979, Arkansas St. U.; MM 1981, U. of Cincinnati. (\*)

**STRAUSS, WARREN**, Dir. of Internal Auditing (1989). BS 1979, Kansas St. U.

**STRECKER, GEORGE E.**, Prof. of Mathematics (1972). BS 1961, U. of Colorado; PhD 1966, Tulane U. (\*)

**STREETER, JOHN W.**, Assoc. Dir. of Administrative User Services, Computing and Telecommunications Activities (1985). BS 1973, MBA 1974, Kansas St. U.

**STREETER, LINDA L.**, Admin. Asst., Dean of Engineering (1993). BS 1976 Kansas St. U.

**STREETER, RAYMOND**, Assoc. Prof. of Arch. (1984). BArch 1979, Kansas St. U.; MArch 1984, Harvard U. Registered Architect.

**STRICKLER, JOHN K.**, Prof. of Forestry; Extension Forester (1961). BS 1957, U. of Missouri; MS 1967, Kansas St. U.

**STRINE, JAMES H.**, Asst. Prof. of Forestry; District Forester, Northwest (1978). BS 1975, U. of Missouri; MS 1977, Oklahoma St. U.

**STRODA, SALLY L.**, Research Asst., Animal Sciences and Industry (1988). BS 1988, Kansas St. U.

**STROH, CHARLES**, Prof. of Art (1980). BFA 1965, Minnesota School of Art; MS 1971, MFA 1972, U. of Wisconsin–Milwaukee. (\*)

**STROMBERG, KARL R.**, Prof. of Mathematics (1968). BA 1953, MA 1954, U. of Oregon; PhD 1958, U. of Washington. (\*)

**STROUD, NELSON E.**, Co. Extension Agricultural Agent Emeritus, Geary Co., Junction City (1952). BS 1950, MS 1961, Kansas St. U.

**STRUVE, JOHN M.**, Dir. of Budget (1987). BA 1963, Nebraska Wesleyan U.

**STUBBS, LUCILLE**, Co. Extension Home Economist Emerita, Smith Co., Smith Cntr. (1955). BS 1923, Simpson Col.

**STUCKY, TIMOTHY A.**, Farm Management Association Fieldman (1980). BS 1978, MS 1979, Kansas St. U.

**STUCKY, DOUGLAS D.**, Farm Mgmt. Assn. Fieldman (1986). BS 1980, Kansas St. U.

**STUMPEHAUSER, LASZLO**, Prof. of Physical Education and Leisure Studies (1984). PhD 1969, U. of Toledo.

**STUNKEL, EDITH L.**, Asst. Dir., Cntr. for Aging (1981). MSW 1975, U. of California.

**STURDEVANT, JAMES W.**, Farm Management Association Fieldman Emeritus (1983). BS 1948, Kansas St. U.

**STURR, EDWARD**, Prof. of Education and Art (1974). BA 1959, St. Ambrose Col.; MS 1964, Illinois Inst. of Tech.; EdD 1973, Illinois St. U. (\*)

**STUTEVILLE, DONALD L.**, Prof. of Plant Pathology; Research Forage Pathologist, Agr. Exp. Sta. (1964). BS 1959, MS 1961, Kansas St. U.; PhD 1964, U. of Wisconsin. (\*)

**SUDERMAN, ARLAN J.**, Co. Extension Agent, Agr., Sedgwick Co., Wichita (1985). BS 1980, Kansas St. U.

**SULEIMAN, MICHAEL WADIE**, Distinguished Prof. of Political Science (1965). BA 1960, Bradley U.; MS 1962, PhD 1965, U. of Wisconsin. (\*)

**SULLINS, WILLIAM S.**, Prof.; Extension Communications Specialist (1969). BS 1953, U. of Oklahoma; MS 1972, Kansas St. U.

**SULLIVAN, DENISE E.**, Co. Extension Agent, Home Economics, Leavenworth Co., Leavenworth (1989). BS 1983, MS 1984, Kansas St. U.

**SUMMERHILL, R. RICHARD**, Assoc. Operating Systems Specialist, Computing and Telecommunications (1989); Assoc. Prof. of Mathematics (1972). BA 1966, Monmouth Col.; MS 1967, PhD 1969, U. of Iowa. (\*)

**SUNDERMAN, HERBERT D.**, Assoc. Prof.; Soils Research Scientist, NW Research–Extension Cntr. (1975). BS 1965, MS 1967, Kansas St. U.; PhD 1976, Texas A&M.

**SUNDHEIM, RICHARD A.**, Asst. Prof. of Statistics (1978). BS 1971, MS 1974, Kansas St. U.; PhD 1978, Purdue U.

**SUROWSKI, DAVID B.**, Prof. of Mathematics (1977). BA 1971, California St. U. at Fullerton; MS 1972, PhD 1975, U. of Arizona. (\*)

**SUTTON, MARY ELLEN**, Prof. of Music (1974). AA 1960, Graceland Col.; BM 1963, MM 1968, U. of Missouri at Kansas City. DMA 1975, U. of Kansas. (\*)

**SWALLOW, CLARENCE W.**, Prof. of Agronomy; Research Agronomist in charge, Agronomy Research Farms, Agr. Exp. Sta. (1954). BS 1951, MS 1955, Kansas St. U.

**SWAN, FRANK D.**, Co. Extension Agent, Agr., Stanton Co., Johnson (1980). BS 1973, West Texas St. U.

**SWANSON, JANICE C.**, Asst. Prof. of Animal Sciences and Industry; Animal Behavior and International Livestock Programs (1992). BS 1977, MS 1980, U. of Connecticut; PhD 1988, U. of Maryland.

**SWANSON, STEPHEN**, Assoc. Prof. and Section Head of Environ. and Industrial Engineering Tech. (1993). BA 1973, Bethany; MS 1976, U. of Nebraska; PhD 1989, U. of Umea.

**SWARTZ, STUART ENDSLEY**, Head and Prof. of Civil Engineering (1968). BS 1959, MS 1962, PhD 1968, Illinois Inst. of Tech.; Professional Engineer, 1970. (\*)

**SWEAT, DEANNA L.**, Co. Extension Agent, Jewell Co., Mankato (1989). BS 1986, Kansas St. U.

**SWEENEY, DANIEL W.**, Assoc. Prof.; SE Kansas Branch Agr. Exp. Sta. (1983). BS 1974, Kentucky Wesleyan Col.; MS 1978, Purdue U.; PhD 1982, U. of Florida. (\*)

**SWEET, DONNA E.**, Adjunct Asst. Prof. of Dietetics (1987). BS 1970, MS 1972, Wichita St. U.; MD 1979, U. of Kansas.

**SWEGLE, WILLIAM M.**, Research Asst. of Biochemistry (1981). BS 1981, Texas Christian U.

**SWENSON, DANIEL V.**, Assoc. Prof. of Mechanical Engineering (1986). BS 1972, Kansas St. U.; MS 1978, Carnegie-Mellon U.; PhD 1986, Cornell U. (\*)

**SWIHART, JUDSON**, Adjunct Asst. Prof. of Human Dev. and Family Studies (1990). BS 1965, U. of Tucson; MSW 1967, California St. U. at San Diego; PhD 1985, Kansas St. U.

**SWILER, JAMES P.**, Asst. Prof. of Art (1970). BSE 1966, MFA 1970, Wichita St. U. (\*)

**SWISHER, BRIAN A.**, Co. Extension Agent, 4-H, Montgomery Co., Independence (1976). BS 1975, Kansas St. U.

**SWITZER, VERYL A.**, Asst. Prof.; Assoc. Dir. of Athletics/Asst. VP (1969). BS 1954, MS 1974, Kansas St. U.

**SYLVESTER, VIRGINIA M.**, Arts and Sciences Advisor (1989). BA 1974, St. Mary-of-the-Woods Col.; MA 1977, U. of Dayton.

**TABBI, JOSEPH P.**, Asst. Prof. of English (1991). BA, BA 1983, Cornell U.; MA 1984, PhD 1989, U. of Toronto. (\*)

**TABOR, LaRETA M.**, Co. Extension Agent, 4-H, Johnson Co., Olathe (1985). BS 1982, MS 1984, Kansas St. U.

**TAKEMOTO, DOLORES**, Prof. of Biochemistry; Assoc. Biochemist, Agr. Exp. Sta. (1982). BS 1971, Ball St. U.; MS 1973, Colorado St. U.; PhD 1979, U. of Southern California. (\*)

**TAKEMOTO, LARRY J.**, Prof. of Biology (1978). BA 1967, Hartwick Col.; MS 1968, Yale U.; PhD 1974, Colorado St. U., Fort Collins. (\*)

**TALAB, ROSEMARY STURDEVANT**, Assoc. Prof., Education (1984). BA 1971, Wichita St. U.; MA 1975, Arizona St. U.; PhD 1979, U. of Southern California. (\*)

**TARRANT, ANTHONY R.**, Farm Mgmt. Assn. Fieldman (1992). BS 1990, MS 1992, Oklahoma St. U.

**TARRANT, DONALD H.**, Dir. Emeritus of Information Systems, Planning and Evaluation Services (1970). BS 1948, Morningside Col.; MS 1959, Iowa St. U.

**TATARKO, BETH**, Asst. Dir., Kansas Cntr. for Rural Initiatives (1988). BS 1985, MS 1987, Kansas St. U.

**TAUSSIG, ROBERT A.**, Assoc. Prof. Emeritus of Small Animal Medicine (1966). DVM 1945, Colorado St. U.; MS 1970, Kansas St. U.

**TAUSSIG, MARK A.**, Landscape Architect, Facilities Planning (1985). BA 1975, Kansas St. U.

**TAVAKKOL, AMIR**, Asst. Prof. of Finance (1990). BS 1974, Shiraz (Pahlavi) U.; MA 1975, PhD 1979, Kansas St. U.

**TAYLOR, JACK**, Admissions Representative (1993). BA 1993, Kansas St. U.

**TAYLOR, RANDAL K.**, Asst. Prof. of Agricultural Engineering; Extension Specialist, Farm Power and Machinery (1989). BS 1985, MS 1989, Oklahoma St. U.

**TAYLOR, RICHARD J.**, Adjunct Clinical Assoc. of Med. Tech. (1976). BA 1944, U. of California at Berkeley; MD 1949, Creighton U.

**TAYLOR, ROBERT BARTLEY**, Prof. Emeritus of Anthropology (1957). BS 1949, Wheaton Col.; MA 1951, PhD 1960, U. of Oregon. (\*)

**TAYLOR, SUSAN WASHBURN**, Asst. Prof. of Economics (1989). BA 1984, Blue Mountain Col.; MS 1986, PhD 1989, Louisiana St. U. (\*)

**TAYLOR-ARCHER, MORDEAN**, Asst. Provost for Multicultural Affairs (1990). BS 1969, U. of Ozarks; MA 1972, U. of Arkansas; PhD 1979, Brandeis U.

**TEENER, LINDA I.**, Executive Dir., UMF (1990). BS 1974, MS 1977, Kansas St. U.

**TENEYCK, GEORGE ROBERT**, Assoc. Prof. Emeritus of Agricultural Engineering; Superintendent, Sandyland Exp. Field (1964). BS 1951, MS 1970, Kansas St. U.

**TENNANT, MARJORIE A.**, Asst. Prof. Emerita; Asst. Extension Editor, 4-H (1947). BS 1946, MS 1957, Kansas St. U.

**TERHUNE, TERRY N.**, Adjunct Asst. Prof. of Pharmacology (1990). BS 1981, DVM 1983, PhD 1988, Kansas St. U.

**TERRASS, JOYCE J.**, Prof. Emerita, Education (1973). BS 1942, Kansas St. U.; MS 1957, Colorado St. U.; PhD 1969, Purdue U. (\*)

**TERRELL, MILTON D.**, Asst. Prof. of Economics (1991). BS 1986, MS 1986, MA 1986, Millsaps Col., Mississippi; PhD 1991, Duke U. (\*)

**TERRY, RHONDA G.**, Asst. Instr. of Computing and Information Sciences (1976). BS 1974, Brigham Young U.

**TERRY, ROGER V.**, Assoc. Prof.; Extension Computer Coord. (1981). BS 1976, Brigham Young U.; MS 1979, PhD 1981, Kansas St. U.

**THIBODEAU, FRED**, Exec. Dir. of KSU Alumni Association (1988). MDiv 1977, St. Paul School of Theology.

**THIEN, STEPHEN J.**, Prof. of Agronomy; Asst. Head for Teaching; Research Soil Scientist, Agr. Exp. Sta. (1970). BS 1966, Iowa St. U.; MS 1968, PhD 1971, Purdue U. (\*)

**THIERER, JODI L.**, Instr. of Marketing (1984). BS 1980, MBA 1984, Kansas St. U.

**THIERSTEIN, GERALD**, Assoc. Prof. Emeritus of Agricultural Engineering (1984). BS 1957, MS 1963, Kansas St. U.

**THIESSEN, EMIL A.**, Assoc. Prof. Emeritus of Business Administration (1968). AB 1948, Tabor Col.; MS 1951, Emporia St. U.; EdD 1959, Colorado St. Col. (\*)

**THODEN, NADA F.**, Co. Extension Agent, Home Economics, Johnson Co., Olathe (1965). BS 1965, Colorado St. U.

**THOLE, H. THOMAS**, Co. Extension Agent, Horticulture, Barton Co., Great Bend (1965). BS 1965, Oklahoma St. U.

**THOMAN, JACK**, Asst. Dir. and Business Manager, K-State Union (1972). BA 1972, Kansas St. U.

**THOMAS, CHARLES E.**, Dir. of Bramlage Coliseum (1987). BA 1981, U. of South Florida.

**THOMAS, GLENN DINE**, Adjunct Clinical Instr. of Medical Tech. (1989). BA 1958, Baker U.; MT (ASCP) 1959; MS 1978, Kansas St. U.

**THOMAS, JOHN**, Athletic Trainer (1992). BS 1985, U. of Pittsburgh; MS 1992, U. of Nebraska.

**THOMAS, KENNETH E.**, Prof. Emeritus; Head of Extension Information (1951). AB 1951, Southwestern Col.; MS 1952, Kansas St. U.; PhD 1961, U. of Wisconsin. (\*)

**THOMAS, LLOYD B., JR.**, Prof. of Economics (1968). BA 1963, MA 1964, U. of Missouri; PhD 1970, Northwestern U. (\*)

**THOMAS, LYNN R.**, Assoc. Prof. of Accounting (1986). BA 1971, MBA 1973, Kansas St. U.; CPA 1973, Kansas; PhD 1980, U. of Kansas. (\*)

**THOMAS, WILTON B.**, Assoc. Prof. Emeritus; Section Leader and Extension Economist, Farm Management (1946). BS 1937, MS 1960, Kansas St. U.

**THOMPSON, CARLYLE A.**, Asst. Prof.; Soils Research Scientist, Fort Hays Branch Agr. Exp. Sta. (1964). BS 1958, MS 1959, Kansas St. U.

**THOMPSON, CAROLYN**, Asst. Prof. of Interior Arch. (1989). BA 1964, Mt. Holyoke; MA 1971, Cornell U.; MArch 1976, Columbia U.

**THOMPSON, CHARLES P.**, Prof. of Psychology (1965). BS 1958, Wisconsin St. Col.; MS 1960, PhD 1962, U. of Wisconsin. (\*)

**THOMPSON, CURTIS R.**, Asst. Prof.; Ext. Spec., Crops and Soils, Southwest (1993). BS 1978, MS 1983, N. Dakota St. U.; PhD 1993, U. of Idaho.

**THOMPSON, DAVID C.**, Assoc. Prof., Education (1987). BA 1974, Friends U.; MEd 1978, EdS 1983, Wichita St. U.; EdD 1985, Oklahoma St. U. (\*)

**THOMPSON, HUGH E.**, Prof. Emeritus of Entomology; Research Entomologist, Trees, Turf, Ornamental Shrubs, and Forest Insects, Agr. Exp. Sta. (1956). BS 1947, U. of Rhode Island; PhD 1953, Cornell U. (\*)

**THOMPSON, J. GARTH**, Prof. of Mechanical Engineering (1971). BS 1960, Brigham Young U.; MS 1962, PhD 1967, Purdue U. (\*)

**THOMPSON, STEPHEN R.**, Section Head and Assoc. Prof. of Civil Engineering Tech. (1982). BSCE 1972, Kansas St. U.; Professional Engineer.

**THOMPSON, WILLIAM J.**, Farm Management Assoc. Fieldman (1990). BS 1987, Arizona St. U.; MS 1990, Texas A&M.

**THORPE, CHARLES A.**, Instr., Kansas Regents Educational Communications Cntr.; Instr. of Modern Languages/Education (1989). BA 1982, Wichita St. U.

**THORSELL, G. CATHERINE**, Co. Extension Agent, Home Economics, Gray Co., Cimarron (1968). BS 1968, Kansas St. U.

**THORSON, I. EUGENE**, Prof. Emeritus of Architectural Engineering and Construction Science (1948). BS 1940, U. of Washington; Professional Engineer 1948, Washington and Kansas.

**THUMM, UWE**, Asst. Prof. of Physics (1992). BS 1980, MS 1985, PhD 1989, U. of Freiburg, France. (\*)

**THURSTON, LINDA P.**, Assoc. Prof., Education (1987). BS 1967, Baker U.; MS 1975, U. of Texas; PhD 1977, U. of Kansas. (\*)

**TIERNEY, WILLIAM I., JR.**, Assoc. Prof. of Agricultural Economics; Extension Agricultural Economist, Marketing (1983). BS 1972, MA 1977, U. of Missouri; PhD 1983, Michigan St. U.

**TILGHMAN, BENJAMIN R.**, Prof. Emeritus of Philosophy (1967). AB 1950, MA 1954, Washington U.; PhD 1959, U. of Washington. (\*)

**TILLEY, KATHY A.**, Research Asst. of Grain Science and Industry, USDA (1989). BS 1986 Emporia St. U.; MS 1987, Kansas St. U.

**TILLMAN, FRANK AUBREY**, Prof. of Industrial Engineering (1965). BS 1960, MS 1961, U. of Missouri; PhD 1965, St. U. of Iowa; Professional Engineer 1970, California. (\*)

**TILLSON, CELESTE**, Assoc. Mgmt. Info. Spec. for Business Systems (1971). BS 1971, Kansas St. U.

**TIMBERLAKE, MICHAEL F.**, Prof. of Sociology; Head of Sociology, Anthropology and Social Work (1991). BA 1973, U. of Denver, MA 1975, PhD 1979, Brown U. (\*)

**TINKLIN, GWENDOLYN LaVERNE**, Prof. Emerita of Foods and Nutrition; Agr. Exp. Sta. (1943). BS 1940, MS 1944, Kansas St. U. (\*)

**TISSERAT, NED A.**, Assoc. Prof. of Plant Pathology; Extension Specialist, Plant Pathology (1984). BS 1976, Colorado St. U.; MS 1978, Texas A&M; PhD 1982, U. Wisconsin-Madison. (\*)

**TITGEMEYER, EVAN C.**, Asst. Prof. of Animal Sciences and Industry. PhD, Univ. of Illinois. (\*)

**TITUS, RALPH S.**, Prof. Emeritus of Communications; Mgr., Radio Station KKSU (1961). BS 1955, MS 1964, Kansas St. U.

**TODD, TIMOTHY C.**, Instr. of Plant Pathology; Research Plant Nematologist (1982). BS 1980, Northeastern Oklahoma St. U.; MS 1982, Oklahoma St. U. (\*)

**TOELLNER, MARILYN J.**, Co. Extension Agent, Home Economics; Sedgwick Co., Wichita (1990). BS 1965, NW Oklahoma St. U.; MS 1985, U. of Wyoming.

**TOEWS, DUANE A.**, Co. Ext. Agent, Washington Co., Washington (1992). BS 1990, MS 1991, Kansas St. U.

**TOKACH, MICHAEL D.**, Asst. Prof. of Animal Sciences and Industry; Extension Specialist, Livestock Production and Management, Northeast (1991). BS 1986, N. Dakota St. U.; MS 1988, Kansas St. U.; PhD 1991, U. of Minnesota. (\*)

**TOMB, A. SPENCER**, Assoc. Prof. of Biology (1974). BS 1966, U. of the South; PhD 1970, U. of Texas, Austin. (\*)

**TOMICH, JOHN M.**, Assoc. Prof. of Biochemistry. BA 1974, Univ. of Connecticut; MS 1976, Purdue Univ.; PhD 1980, Guelph-Waterloo (Canada) Ctr. for Graduate Work. (\*)

**TONN, STEVEN R.**, Co. Extension Agent, Agr. and 4-H, Marion Co., Marion (1973). BS 1973, MS 1981, Kansas St. U.

**TOOT, JANICE C.**, Co. Extension Agent, Home Economics, Seward Co., Liberal (1966). BS 1966, Kansas St. U.

**TOUT, GARALYN A.**, Medical Technologist, Lafene Health Ctr. (1974). BS 1964, Kansas St. U.

**TOUT, ROBERT C.** (1977). Dir. Emeritus, Student Health; BS 1949, West Texas St. U.; MD 1953, Southwestern Medical School of U. of Texas.

**TOWNSEND, JAMES B.**, Head and Prof. of Management (1977). BS 1945, U.S. Military Acad.; MA 1964, DBA 1976, Georgia Washington U. (\*)

**TRACY, JOHN**, Adjunct Asst. Prof. of Civil Engineering (1989). BS 1980, Colorado St. U.; MS 1986, PhD 1989, U. of California at Davis. (\*)

**TRACZ, FRANK**, Assoc. Prof. of Music (1993). BME 1978, Ohio St. U.; MM 1980, U. of Wisconsin-Madison; PhD 1987, Ohio St. U. (\*)

**TREAT, JAY L.**, Asst. Prof. Emeritus; Area Extension Economist (1960). BS 1949, U. of Arkansas; MA 1952, U. of Missouri.

**TRENARY, ROGER C.**, Instr. of Economics (1983). BA 1968, MA 1972, Wayne St. U.

**TRENNEPOHL, HARLAN JEAN**, Assoc. Prof. Emeritus, Education (1956). BS 1947, MS 1951, Emporia St. U.; EdD 1956, U. of Colorado.

**TRENT, CYNTHIA**, Academic Outreach Coord. (1983). BA 1974, Kansas St. U.; MEd 1981, North Carolina St. U.

**TRIGO-STOCKLI, DIONISIA M.**, Research Assoc. of Grain Science and Industry (1989). BS 1978, Yisayas St. Col. of Ag., Philippines; MS 1981, U. of Philippines; PhD 1988, Kansas St. U.

**TROTTER, MARILYN B.**, Dir. Emerita of New Student Programs (1967). BS 1965, MS 1967, Kansas St. U.

**TROYER, DERYL L.**, Assoc. Prof. of Anatomy and Physiology (1986). DVM 1972, PhD 1985, Kansas St. U. (\*)

**TROYER, RODNEY**, Asst. Prof. of Interior Arch. (1985). BArch 1971, Kansas St. U.; MIntArch 1985, Oregon.

**TRUAX, RUBY C.**, Co. Extension Home Economist Emerita, Sedgwick Co., Wichita (1959). BS 1936, Kansas St. U.

**TRUMBULL, ANNE**, Staff Asst., Housing and Dining Services (1994). BS 1986, Rice U.; MS 1993, U. of Northern Colorado.

**TUCKER, MARY E.**, Prof. Emerita of Clothing, Textiles, and Interior Design; Extension Specialist, Environmental Family Housing (1974). BS 1953, Northwest St. Col., Oklahoma; MS 1959, Oklahoma St. U.; MS 1969, Iowa St. U.

**TUMMALA, KRISHNA**, Prof. of Political Science (1988). MA 1958, Andra U. Waltair, MPA 1969, SUNY Albany; PhD 1974, U. of Missouri, Columbia. (\*)

**TUNSTALL, GEORGE C.**, Assoc. Prof. of Modern Languages (1973). BA 1964, Hamilton Col.; MA 1966, PhD 1968, Princeton U. (\*)

**TURNER, MARGARET**, Program Counselor, Upward Bound Program (1990). BA 1971, Southwestern St. U.

**TURNER, MARILYN S.**, Chair, Bib. Control, Libraries (1984). BA 1973, Michigan St. U.; MS 1984, U. of Texas.

**TURNQUIST, RALPH OTTO**, Prof. Emeritus of Mechanical Engineering (1959). BS 1952, MS 1961, Kansas St. U.; PhD 1965, Case Inst. of Tech. (\*)

**TWISS, NANCY**, Advisor, Arts and Sciences (1968). BA 1954, Colorado Col.; MS 1974, Kansas St. U.

**TWISS, PAGE CHARLES**, Prof. of Geology (1953). BS 1950, MS 1955, Kansas St. U.; PhD 1959, U. of Texas, Austin. (\*)

**UHLARIK, JOHN JEFFERY**, Prof. of Psychology; Assoc. Dir. of American Manufacturing Institute (1970). BS 1965, U. of Wisconsin; MS 1967, PhD 1970, U. of Washington. (\*)

**ULRICH, JOHN M.**, Prof. and Head of Engineering Tech. (1988). MS 1965, Pennsylvania St. U.; Professional Engineer, 1961.

**ULUG, EMIN T.**, Asst. Prof. of Biology; Virologist, Agr. Exp. Sta. (1990). BA 1977, PhD 1984, U. of Texas, Austin. (\*)

**UNDERWOOD, JAMES R., JR.**, Prof. of Geology (1977). BS in Naval Sci. 1948, BS 1949, MA 1956, PhD 1962, U. of Texas, Austin. (\*)

**UNEKIS, JOSEPH K.**, Assoc. Prof. of Political Science (1977). BS 1963, Eastern Illinois U.; MA 1972, PhD 1977, Indiana U. (\*)

**UNGER, ELIZABETH A.**, Assoc. Dean of the Graduate School; Prof. of Computing and Information Sciences (1966). BS 1961, MS 1963, Michigan St. U.; PhD 1978, U. of Kansas. (\*)

**UNRUH, JOHN A.**, Asst. Prof. of Animal Sciences and Industry (1988). BS 1979, MS 1981, Washington St. U.; PhD 1984, Kansas St. U. (\*)

**UNRUH, CHESTER R.**, Prof. Emeritus; Assoc. St. Leader and Extension Editor, Publications (1961). AB 1940, Bethel Col.; MS 1956, Kansas St. U.

**UPSON, DAN W.**, Prof. Emeritus of Pharmacology (1959). DVM 1952, MS 1962, PhD 1969, Kansas St. U.; Fellow 1977, American Col. of Vet. Pharmacology and Therapeutics. (\*)

**UPTON, STEVE J.**, Assoc. Prof. of Biology; Parasitologist, Agr. Exp. Sta. (1986). BS 1975, Oregon St. U.; MS 1981, U. of New Mexico; PhD 1983, Auburn U. (\*)

**URBAN, DIANNE K.**, Attorney, Student Governing Association (1983). JD 1983, Washburn U.

**URBAN, JAMES E.**, Assoc. Prof. of Biology (1970). BA 1965, PhD 1968, U. of Texas. (\*)

**URICK, MAX**, Dir. of Athletics (1993). BA 1961, Ohio Wesleyan; MA 1966, Ohio St. U.

**UTERMOEHLN, RALPH E.**, Assoc. Prof. Emeritus; Extension Specialist, Community Dev., Northeast (1964). BS 1949, Kansas St. U.; MS 1970, U. of Kansas.

**UTHOFF, JOHN S.**, Assoc. Prof. of Speech (1976). BA 1968, MFA 1973, U. of Iowa.

**VALK, ACHMED**, Asst. Prof. of Dance (1992). MFA 1990, U. of California-Irvine; Physical Therapy Graduate (Dutch licensed) 1977 Academy of Paramedical Professions, Amsterdam, NL.

**VAN DE VELDE, BRUCE**, Asst. Athletic Dir. (1992). BS 1980, Iowa St. U.; MS 1990, U. of Iowa.

**VAN DER HOEVEN, GUIDO**, Farm Management Association Fieldman (1989). BS 1980, MS 1989, Kansas St. U.

**VAN DER HOEVEN, GUSTAAF A.**, Prof. of Horticulture; Extension Specialist, Landscape and Environmental Horticulture (1974). HDA, Hawkesbury Agric. Col., N.S.W. Australia; BS 1968, MS 1971, PhD 1976, Virginia Poly. Inst.

**VAN HORN, PAMELA I.**, Co. Ext. Agent, 4-H Youth, Saline Co., Salina (1983). BS 1982, Kansas St. U.

**VAN SWAAY, MAARTEN**, Assoc. Prof. of Computing and Information Sciences (1963). BBS 1953, Drs 1956, Leiden U., Netherlands; PhD 1956, Princeton U. (\*)

**VAN METER, EARL L.**, Prof., Area Extension Dir. (1985). BS 1958, Colorado St. U.; MS 1968, Kansas St. U.

**VAN SKIKE, KEITH P.**, Co. Extension Agent, Agr., Norton Co., Norton (1982). BS 1980, MS 1982, Kansas St. U.

**VAN SKIKE, WILLIAM V.**, Co. Extension 4-H Agent Emeritus, Barton Co., Great Bend (1950). BS 1950, Kansas St. U.; MEd 1965, Colorado St. U.

**VANDER VELDE, JOHN J.**, Special Collections Librarian (1968). BA 1967, ML 1968, Emporia St. U.

**VANDERLIP, RICHARD L.**, Prof. of Agronomy; Crop Production Research Agronomist, Agr. Exp. Sta. (1964). BS 1960, Kansas St. U.; MS 1962, PhD 1965, Iowa St. U. (\*)

**VANDEVEER, MONTE L.**, Asst. Prof.; Extension Agricultural Economist, Northeast (1990). BS 1984, MS 1985, Kansas St. U.; PhD 1989, Purdue U.

**VANINSKY, KIRILL**, Asst. Prof. of Mathematics (1994). PhD 1993, New York U.

**VANSLYKE, THOMAS H.**, Research Asst., Konza Site Manager, Biology (1993). BA 1968, U. of Kansas; BS 1978, Kansas St. U.

**VANZANT, ERIC S.**, Asst. Prof. at Ft. Hays Branch Ag. Experiment Station (1993). BS 1986, Ohio St. U.; PhD 1993, Kansas St. U. (\*)

**VAVRA, PAUL M.**, Captain, US Air Force, Asst. Prof. of Aerospace Studies (1993). BA 1981, U. of Minnesota; MHR 1987, U. of Oklahoma.

**VEATCH, JOHNA K.**, Asst. Prof. of Vet. Diagnostic Investigation (1988). DVM 1984, PhD 1988, Kansas St. U.

**VERSCHULDEN, CIA**, Asst. Prof. of Social Work (1989). BS 1977, Kansas St. U.; MSW 1979, U. of Connecticut; EdD 1984, Harvard.

**VERSER, BRICK A.**, Assoc. Operating Systems Networking Specialist, Computing and Telecommunications Activities (1983). BS 1982, MSEE 1986, Kansas St. U.

**VESTWEBER, JEROME G. E.**, Prof. of Food Animal Medicine (1977). DVM 1964, U. of Minnesota; MS 1970, PhD 1973, Kansas St. U. (\*)

**VETTER, JAMES**, Adjunct Prof. of Grain Science and Industry, Amer. Inst. of Baking (1977). AB 1954, Washington U.; MS 1955, PhD 1958, U. of Illinois. (\*)

**VILLASI, LUDWIG**, Asst. Prof. of Clothing, Textiles, and Interior Design (1975). BS 1968, MS 1975, Wayne St. U. (\*)

**VIN ZANT, WHITNEY L.**, Adjunct Asst. Prof. of Dietetics (1983). MD 1971, U. of Kansas.

**VOGT, JOHN L.**, Assoc. Prof. Emeritus of Art (1963). BFA, Kansas City Art Inst.; MFA 1963, U. of Illinois. (\*)

**VOGT, MICHAEL L.**, Co. Extension Agent, Sheridan Co., Hoxie (1989). BS 1989, Central Methodist St. U.

**VONFELDT, DOUG**, Assoc. Dir., Fiscal Affairs, Kansas Regents Educational Communications Cntr. (1988). BS 1981, Kansas St. U.

**VORHIES, MAHLON W.**, Prof. and Head of Vet. Diagnostic Investigation (1986). DVM 1962, Iowa St. U.; MS 1967, Michigan St. U.

**VRUWINK, DAVID R.**, Assoc. Prof. of Accounting (1982). BS 1973, U. of Wisconsin—Stevens Point; MBA 1976, U. of Wisconsin—Oshkosh; PhD 1982, U. of Arkansas. (\*)

**WAGNER, LARRY E.**, Adjunct Asst. Prof. of Agricultural Engineering, USDA Research Unit (1988). BS 1982, MS 1983, PhD 1988, Kansas St. U. (\*)

**WAHL, RICHARD H.**, Farm Management Association Fieldman (1985). BS 1972, Kansas St. U.

**WAKABAYASHI, ISAAC**, Instr. in Electrical and Computer Engineering (1955). BS 1954, U. of California.

**WALAWENDER, WALTER P.**, Prof. of Chemical Engineering (1969). BA 1963, Utica Col. of Syracuse U.; MS 1967, PhD 1969, Syracuse U. (\*)

**WALKER, C. E. (Chuck)**, Prof. of Grain Science and Industry (1987). BS 1959, Iowa St. U.; PhD 1966, N. Dakota St. U. (\*)

**WALKER, DORIS K.**, Assoc. Prof. of Human Dev. and Family Studies; Extension Specialist, Family Resources and Public Policy (1984). BS 1953, MS 1973, PhD 1975, U. of California.

**WALKER, HUGH SANDERS**, Prof. of Mechanical Engineering (1964). BS 1957, MS 1960, Louisiana St. U.; PhD 1965, Kansas St. U.; Professional Engineer, Louisiana 1958, Kansas 1975. (\*)

**WALKER, MARGARET Y.**, Asst. Prof. Emerita of Music (1971). BM 1970, Kansas St. U., MM 1974, Texas Christian U. (\*)

**WALKER, MARSHALL F., JR.**, Co. Extension Agricultural Agent Emeritus, Grant Co., Ulysses (1949). BS 1950, Kansas St. U.

**WALKER, MILDRED L.**, Prof. Emerita of Agricultural Economics; Extension Specialist, Consumer Marketing (1956). BS 1952, Kansas St. Col.; MS 1961, Iowa St. U.

**WALKER, RODNEY G.**, Prof. of Music (1966). BME 1959, U. of Nebraska; MME 1961, Wichita St. U. (\*)

**WALKER, WARREN VINCENT**, Prof. Emeritus of Music (1948). BA 1946, U. of Washington; MM 1948, Cincinnati Conservatory of Music. (\*)

**WALLACE, REBECCA A.**, Co. Extension Agent, Home Economics, Hamilton Co., Syracuse (1979). BS 1976, Kansas St. U.

**WALLENTINE, VIRGIL E.**, Prof. and Head of Computing and Information Sciences (1972). BS 1965, MS 1970, PhD 1972, Iowa St. U. (\*)

**WALTER, DOUGLAS P.**, Instr.; Extension Specialist, Residential Energy (1981). BS 1979, Kansas St. U.

**WALTER, LINDA K.**, Co. Extension Agent, Home Economics, Stevens Co., Hugoton (1979). BS 1979, Kansas St. U.

**WALTER, TED L.**, Assoc. Prof. Emeritus of Agronomy (1951). BS 1949, U. of Nebraska; MS 1951, Colorado St. U.

**WALTERS, CHARLES P.**, Prof. Emeritus of Geology (1936). BS 1936, MS 1937, Kansas St. U.; PhD 1957, Cornell U. (\*)

**WALTERS, JOHN W.**, Pres., Kansas St. U. Research Foundation; Pres., Kansas Entrepreneurial Cntr.; Adjunct Faculty (1988) BS 1960, Kansas St. U.; MS 1966, Oklahoma St. U.

**WANBERG, CONNIE R.**, Asst. Prof. of Psychology (1992). BS 1988, Moorhead St. U.; MS 1990, PhD 1992, Iowa St. U. (\*)

**WANBERG, DAVID J.**, Asst. Prof. of Landscape Arch. (1992). BArch 1984, North Dakota St. U.; MCRP, MLA 1992, Iowa St. U. Registered Architect.

**WANG, XUEMAN "SAM,"** Asst. Prof. of Biochemistry (1991). BS 1982, Huazhong Agricultural U. at Wuhan, PRC; MS 1984, Ohio St. U. at Columbus; PhD 1987, U. of Kentucky at Lexington. (\*)

**WANSKA, SUSAN K.**, Assoc. Prof. of Human Dev. and Family Studies (1978). PhD 1977, U. of Wisconsin. (\*)

**WARD, ARLIN B.**, Prof. Emeritus of Grain Science and Industry; Milling Tech. Research Scientist, Agr. Exp. Sta. (1961). BS 1942, MS 1951, Kansas St. U. (\*)

**WARD, GEORGE M.**, Prof. Emeritus of Animal Sciences and Industry; Dairy Cattle Research Nutritionist, Agr. Exp. Sta. (1955). BS 1941, U. of Vermont; MS 1947, Rutgers U.; PhD 1950, Michigan St. U. (\*)

**WARD, IRENE**, Asst. Prof. of English, Dir. of Writing Program. BA 1981, U. of Wisconsin—Whitewater; MA 1983, U. of Wisconsin—Milwaukee; PhD 1992, U. of South Florida. (\*)

**WARD, JAMES D.**, Asst. Prof. of Social Work (1978). BA 1967, Marshall U.; MSW 1970, West Virginia U.

**WARD, JOANN**, Adjunct Clinical Instr. (1979). BS 1974, Central Missouri St.

**WARD, JOSEPH EVANS, JR.**, Prof. Emeritus of Electrical and Computer Engineering (1940). BS 1937, The U. of Texas; MS 1940, U. of Illinois; Professional Engineer, 1948.

**WARD, KATHLEEN**, Assoc. Prof.; Extension Communications Specialist (1978). BS 1966, Drury Col.; MS 1977, Kansas St. U.

**WARD, LaSHANNA Z.**, Co. Extension Agent, Home Economics, Sheridan Co., Hoxie (1989). BS 1986, Northwest Oklahoma St. U.; MS 1989, U. of Oklahoma.

**WARMANN, GERALD W.**, Asst. Prof. of Agricultural Economics; Extension Agricultural Economist, South Central (1990). AB 1973, MS 1980, U. of Missouri; PhD 1984, Oklahoma St. U.

**WARMINSKI, NORMAN C.**, Co. Extension Agent, Horticulture, Sedgwick Co., Wichita (1968). BS 1964, Oklahoma St. U.; MS 1968, Texas A&M.

**WARNER, EUGENE D.**, Prof. Emeritus; Extension Editor (1935). BS 1934, Kansas St. U.

**WARNER, STACEY J.**, Co. Extension Agent, Home Economics, Finney Co., Garden City (1976). BS 1976, MS 1982, Kansas St. U.

**WARNER, THOMAS D.**, Prof.; Head of Horticulture, Forestry, and Recreation Resources (1988). BS 1971, Indiana St. U.; MS 1974, PhD 1976, Michigan St. U.

**WARREN, ANN A.**, Instr. of English (1977). BA 1964, Florida Southern Col.; MA 1968, U. of Georgia.

**WARREN, LELAND E.**, Assoc. Dean of the Graduate School; Prof. of English (1976). BA 1966, Emory U.; MA 1968, U. of Georgia; PhD 1976, U. of Illinois. (\*)

**WARY, JOSEPH P.**, Co. Extension Agent, Agr., Ellis Co., Hays (1987). BS 1986, Kansas St. U.

**WARY, RAYMOND E., JR.**, Co. Extension Agent Agr., Cherokee Co., Columbus (1958). BS 1958, Kansas St. U.

**WASSOM, CLYDE E.**, Prof. Emeritus of Agronomy; Corn Research Geneticist, Agr. Exp. Sta. (1954). BS 1949, MS 1951, PhD 1953, Iowa St. U. (\*)

**WATERS, CLARENCE E.**, Assoc. Prof. of Architectural Engineering and Construction Science (1986). BS 1978, MS 1988, Kansas St. U.; PhD 1993, Pennsylvania St. U.

**WATNEY, W. LYNN**, Adjunct Asst. Prof. of Geology (1988). BS 1970, MS 1972, Iowa St. U.; PhD 1985, U. of Kansas. (\*)

**WATSON, BOBBY J.**, Dir. of Facilities Maintenance, Div. of Facilities Management (1967).

**WATSON, FREDERICK D.**, Asst. Prof. of History (1993). BA 1975, MA 1977, U. of Northern Colorado; PhD 1993, U. of Colorado.

**WATTS, CAROL MARTIN**, Assoc. Prof. and Dir. of Graduate Studies in Arch. (1983). BA 1971, Mount Holyoke; MArch 1975, U. of Washington; PhD 1987, U. of Texas—Austin. (\*)

**WATTS, DONALD**, Prof. of Arch. and Planning (1983). BArch 1970, U. of Nebraska; MArch 1971, U. of California at Berkeley. Registered Architect. (\*)

**WATTS, TRANDA W.**, Co. Extension Agent, Gove City, Gove (1972). BS 1972, Fort Hays St. U.

**WAUGH, GLENDA K.**, Co. Extension Agent, Home Economics, Sherman Co., Goodland (1989). BS 1984, Panhandle St. U.

**WAUTHIER, RAYMOND AUGUST**, Assoc. Prof. Emeritus of Physical Education, Dance, and Leisure Studies, and Education (1949). BS 1945, Albion Col.; MS 1947, Drake U. (\*)

**WEAVER, DAVID L.**, Property Manager, KSU Foundation (1983). BS 1970, Kansas St. U.

**WEAVER, ELDON R.**, Asst. Prof. Emeritus; Extension Specialist, 4—H Youth (1968). BS 1951, Kansas St. U.; MS 1975, Colorado St. U.

**WEAVER, MAE K.**, Co. Extension Home Economist, Emerita, Barton Co., Great Bend (1952). BS 1949, Kansas St. U.

**WEAVER, MARSHA K.**, Co. Extension Agent, Home Economics, Dickinson Co., Abilene (1976). BS 1972, MS 1975, Kansas St. U.

**WEAVER, OLIVER LAURENCE**, Prof. of Physics (1970). BS 1965, California Inst. of Tech.; PhD 1970, Duke U. (\*)

**WEAVER, TRESA**, Coord. of Alumni Clubs, KSU Alumni Association (1989). BS 1977, Kansas St. U.

**WEBER, ELLEN M.**, Co. Ext. Agent, Home Economics, Thomas Co., Colby (1993). BS 1992, Washington St. U.

**WEBER, JACOB A.**, Co. Extension Agent, Horticulture, Cherokee Co., Columbus (1988). BS 1974, Kansas St. U.

**WEDGE, KENNETH D.**, Captain, US Army; Inst. of Military Science (1993). BA 1993, Fort Hays St. U.

**WEFALD, JON**, Pres. (1986). BA 1959, Pacific Lutheran U.; MA 1961, Washington St. U.; PhD 1965, U. of Michigan.

**WEIMER, RITA J.**, Asst. Prof. Emeritus, Education (1966). BS 1956, Pittsburg St. U.; MS 1964, EdD 1974, U. of Kansas. (\*)

**WEINMAN, DONALD E.**, Assoc. Prof. Emeritus of Anatomy (1974). DVM 1946, Kansas St. U.; MS 1960, PhD 1967, U. of Georgia. (\*)

**WEIS, JERRY S.**, Interim Dir. and Assoc. Prof. of Biology (1966). AB 1958, Kansas Wesleyan U.; MA 1960, PhD 1964, U. of Kansas. (\*)

**WEISENBURGER, PATRICIA**, Chair, Brance Services, Arch. and Design Librarian (1985). BA 1956, MA 1959, U. of Illinois; MLS 1981, Emporia St. U.

**WEISENBURGER, RAY B.**, Assoc. Dean of Arch. and Design; Prof. of Planning (1964). BArch 1959, U. of Illinois; MRP 1971, Cornell U. Registered Architect; Registered Landscape Architect. (\*)

**WEISKOPH, RONALD W.**, Asst. Prof. of Military Science (1981). BS 1960, U. of Missouri; MS 1963, Southern Illinois U.

**WEISMAN, DENNIS L.**, Asst. Prof. of Economics (1993). BA 1979, MA 1981, U. of Colorado; PhD 1993, U. of Florida. (\*)

**WEISS, MARK L.S.**, Asst. Prof. of Neuroscience (1991). BS 1981, Rensselaer Polytechnic Inst.; PhD 1986, U. of Pennsylvania. (\*)

**WEIXELMAN, TERESA E.**, Research Asst. of Agricultural Economics (1970). BS 1970, Kansas St. U.

**WELCH, DORIS M.**, Co. Extension Agent, Home Economics, Kearny Co., Lakin (1976). BS 1967, Jacksonville St. U.

**WELCH, PAULA D.**, Co. Ext. Agent, Harper Co., Anthony (1993). BS 1993, Pittsburg St. U.

**WELCH, STEPHEN M.**, Prof. of Agronomy, Systems Modelling (1977). BS 1971, PhD 1977, Michigan St. U. (\*)

**WELLS, LAVON L.**, Administrative Asst. to the Provost (1991).

**WELLS, RUTH I.**, Assoc. Prof. Emerita; Extension Specialist, Limited Resources Program (1953). BS 1943, Central Missouri St. Col.; MS 1948, Kansas St. U.

**WELT, RUTH**, Assoc. Prof. of Biology (1985). BSc 1976, U. of Connecticut; PhD 1982, Washington U. (\*)

**WELTON, RICHARD F.**, Prof., Education (1977). BS 1959, MS 1966, Colorado St. U.; PhD 1971, Ohio St. U. (\*)

**WEN, LISA**, Research Asst. of Biochemistry (1983). PhD 1983, Kansas St. U.

**WENDLING, LEO T.**, Prof. Emeritus of Extension Agricultural Engineering (1947). St. Leader 1969; BS 1947, MS 1956, Kansas St. U.

**WENDT, EUGENE G.**, Assoc. Prof. of Arch. (1962). BArch 1959, MArch 1970, Kansas St. U. Registered Architect.

**WEROHA, SEREE**, Coord., Education (1990). BS, Thammsat U.; AM 1974 U. of Michigan; MBA 1980, U. of Kansas.

**WERRING, CHARLES J.**, Dir., Housing and Dining Services (1990). BS 1974, MEd 1975, Kansas St. U.; EdD 1984, U. of Georgia.

**WERTH, KURT A.**, Co. Ext. Agent, Agr., Kiowa Co., Greensburg (1993). BS 1991, Kansas St. U.

**WEST, ALLEN B.**, Captain. U.S. Army, Asst. Prof. of Military Science (1991). BA 1983, U. of Tennessee–Knoxville.

**WEST, ANGELA M.**, Instr. of Marketing (1990). BS 1985, Kansas St. U.; MBA 1990, Long Island U.

**WEST, LOUELLEN**, Instr. of Human Dev. and Family Studies (1977). BS 1966, Harding Col.; MS 1968, U. of Illinois.

**WEST, RONALD R.**, Prof. of Geology (1969). AA 1955, Centralia Jr. Col.; BS 1958, U. of Missouri at Rolla; MS 1962, U. of Kansas; PhD 1970, U. of Oklahoma. (\*)

**WESTENDORF, THOMAS**, Sergeant First Class, U.S. Army, Instr. of Military Science (1992).

**WESTFAHL, STEVEN A.**, Co. Extension Agent, Agr., Sedgwick Co., Wichita (1970). BS 1970, Kansas St. U.

**WESTFALL, JANE A.**, Prof. of Microanatomy; Research Neuroscientist (1957). BA 1950, Col. of Pacific; MA 1952, Mills Col.; PhD 1965, U. of California. (\*)

**WESTMEYER, HERMAN W.**, Prof. Emeritus; Area Extension Dir. (1936). BS 1936, U. of Missouri; MS 1965, Kansas St. U.

**WETTER, ELAINE M.**, Co. Extension Agent, Home Economics, Edwards Co., Kinsley (1990). BS 1987, Kansas St. U.

**WETZEL, DAVID L.**, Prof. of Grain Science and Industry; Research Analytical Chemist, Agr. Exp. Sta. (1973). AB 1956, Augustana Col., Illinois; MS 1962, PhD 1973, Kansas St. U. (\*)

**WEYERTS, ALFRED C.**, Instr. Emeritus of Chemistry (1963). BS 1948, Denver U.

**WHEAT, JOHN D.**, Prof. Emeritus of Animal Sciences and Industry; Animal Research Geneticist, Agr. Exp. Sta. (1954). BS 1942, MS 1951, Texas A&M; PhD 1954, Iowa St. U. (\*)

**WHEATLEY, ALISON E.**, Instr. of English (1986). AB 1974, Barnard Col.; MA 1980, U. of Virginia.

**WHERRY, MARGARET**, Academic Outreach Coord. (1981). BA 1972, U. of Northern Iowa; MA 1974, Kansas St. U.

**WHIPPLE-FRAIN, DARLA L.**, Asst. Graphic Designer, Extension Communications (1988). BFA 1982, Colorado St. U.

**WHIPPS, LOREN E.**, Assoc. Prof. Emeritus; Area Extension Specialist, 4–H Youth (1946). BS 1938, Kansas St. U.; MS 1953, Colorado St. U.

**WHITCHER, MARSUE A.**, Co. Ext. Home Economist, EFNEP; Wyandotte Co., Kansas City (1993). BS 1987, Ft. Hays St. U.

**WHITE, BETTY JO**, Prof. of Clothing, Textiles, and Interior Design (1988). BS 1965, Concordia Col.; MS 1969, Penn St. U.; PhD 1979, Virginia Poly. U. (\*)

**WHITE, E. CHAPPELL**, Prof. Emeritus of Music (1974). BA 1940, Emory U.; BM 1947, Westminster Choir Col.; PhD 1957, Princeton U. (\*)

**WHITE, FRANK F.**, Assoc. Prof. of Plant Pathology; Research Plant Molecular Geneticist, Agr. Exp. Sta. (1985). BS 1974, U. Wisconsin–Madison, MS 1978, PhD 1981, U. of Washington. (\*)

**WHITE, MICHELLE C.**, Academic Counselor, Educational Supportive Services (1992). BS 1976, MS 1984, Kansas St. U.

**WHITE, REBA B.**, Assoc. Head, Area Extension Dir., NW Research–Extension Cntr. (1988). BS 1967, MS 1984, Kansas St. U.

**WHITE, RICHARD S.**, Prof. and Head, NW Research–Extension Cntr. (1987). BS 1966, Humboldt St. U.; MS 1968, Texas Tech U.; PhD 1976, Utah St. U.

**WHITE, STEPHEN E.**, Prof. of Geography (1975). BA 1969, MA 1972, PhD 1974, U. of Kentucky. (\*)

**WHITE, SUSAN M.**, Public Information Coord., TELENET (1990). BS 1979, MS 1984, Kansas St. U.

**WHITE, WARREN J.**, Prof., Education (1981). BS 1973, Fort Hays St. U.; MS 1977, PhD 1980, U. of Kansas. (\*)

**WHITE, WARREN N., JR.**, Assoc. Prof. of Mechanical Engineering (1985). BS 1974, Tulane U.; MS 1977, Rensselaer Polytechnic Inst.; PhD 1985, Tulane U. (\*)

**WHITE-HULING, MARTHA L.**, Instr.; Ext. Spec., 4–H Volunteerism (1993). BS 1967, Northeastern Oklahoma St. Co.; ME 1988, Wichita St. U.

**WHITEHAIR, NORMAN V.**, Prof. Emeritus; Extension Economist, Livestock Marketing and Agricultural Firm Management (1946). BS 1943, MS 1953, Kansas St. U.; PhD 1964, Purdue U. (\*)

**WHITEHILL, DEAN A.**, Co. Extension Agent, Agr., Finney Co., Garden City (1982). BS 1973, MS 1979, Kansas St. U.

**WHITNEY, TODD D.**, Co. Extension Agent, Agr., Logan Co., Oakley (1990). BS 1985, U. of Nebraska.

**WHITNEY, DAVID A.**, Prof. of Agronomy; Extension St. Leader, Agronomy Program (1966). BS 1961, MS 1963, U. of Nebraska; PhD 1966, Iowa St. U. (\*)

**WICK, SANDRA L.**, Co. Extension Agent, Agr., Smith Co., Smith Cntr. (1989). BS 1981, Kansas St. U.

**WIEBE, DWIGHT M.**, Assoc. Prof. and Dir., International Educational Programs, International Trade Inst. (1988). BA 1951, Taylor U.; MS 1954, Purdue U.; PhD 1977, Kansas St. U.

**WIESE, WILLIAM**, Science Reference Bibliographer, Libraries (1988). BA 1983, U. of Northern Iowa; MA 1984, U. of Iowa.

**WIEST, STEVEN C.**, Assoc. Prof. of Horticulture; Research Horticulturist, Agr. Exp. Sta. (1980). BS 1973, MS 1975, PhD 1979, Cornell U. (\*)

**WIGFALL, LA BARBARA**, Asst. Prof. of Landscape Arch. and Planning (1987). BArch 1975, Howard U.; MCRP 1977, Harvard U. (\*)

**WIGGINS, HELEN B.**, Assoc. Prof. Emerita; Extension Home Economist, South Central (1962). BA 1947, U. of Kansas; MS 1969, Kansas St. U.

**WIGGINS, M. CHRISTINE**, Assoc. Prof. Emerita; Extension Specialist, Clothing and Textiles (1930). BS 1929, Kansas St. U.; MA 1938, Columbia U.

**WILLBRANT, FRANCE**, Asst. Controller, Accounting Services (1993). BS 1984, U. of S. Florida.

**WILCOX, ROBERT A.**, Prof. Emeritus; Extension Specialist, Formula Feed Quality Control (1965). BS 1945, MS 1949, PhD 1960, S. Dakota St. U. (\*)

**WILCOXON, GEORGE DENT**, Prof. Emeritus of History (1946). AB 1936, MA 1938, PhD 1941, U. of California at Los Angeles. (\*)

**WILDE, GERALD E.**, Prof. of Entomology; Research Entomologist, Field Crop Insects, Agr. Exp. Sta. (1966). BS 1962, Texas Tech. Col.; PhD 1966, Cornell U. (\*)

**WILDE, LUCY M.**, Humanities Reference Bibliographer, Libraries (1967). BA 1965, Avila Col.; MLS 1967, Rosary Col.; MA 1974, Kansas St. U.

**WILES, DON K.**, Co. Extension Agent Emeritus, Agr., Ford Co., Dodge City (1956). BS 1950, U. of Nebraska; MA 1955, U. of Maryland.

**WILKEN, CHARLES P.**, Farm Management Association Fieldman (1983). BS 1976, MS 1977, U. of Missouri.

**WILKEN, CAROLYN S.**, Asst. Prof. of Human Dev. and Family Studies; Extension Specialist, Adult Dev. and Aging (1990). BS 1973, MEd 1984, PhD 1988, Purdue U.

**WILLARD, GAYLE K.**, Vet. Medicine Librarian (1985). BS 1970, MS 1984, Kansas St. U.; MLS 1987, Emporia St. U.

**WILLEMS, A. E.**, Adjunct Assoc. Prof. Emeritus of Industrial Engineering (1979). BS 1950, McPherson Col.; MS 1962, Kansas St. U.; EdD 1970, Utah St. U.

**WILLIAMS, CAROL A.**, Research Asst. of History (1974). BA 1965, U. of Illinois.

**WILLIAMS, CHRISTOPHER L.**, Co. Ext. Agent, Agr., Ellsworth Co., Ellsworth (1993). BS 1988, MS 1993, Kansas St. U.

**WILLIAMS, CYNTHIA**, Co. Extension Agent, Jefferson County, Oskaloosa (1985). BS 1981, U. of Nebraska.

**WILLIAMS, DUANE D.**, Assoc. Specialist, Extension Specialist, Community Economic Analysis (1986). BS 1981, MS 1983, Oklahoma St. U.

**WILLIAMS, DUDLEY**, Distinguished Regents Prof. Emeritus of Physics (1964). AB 1933, MA 1934, PhD 1936, U. of North Carolina. (\*)

**WILLIAMS, H. RODMAN**, Co. Extension Agent, Agr., Morton Co., Elkhart (1970). BS 1959, MS 1977, Kansas St. U.

**WILLIAMS, JEFFERY R.**, Prof. of Agricultural Economics; Research Agr. Econ. Farm Management, Resource Econ., Agr. Exp. Sta. (1980). BS 1975, Pennsylvania St. U.; MS 1977, PhD 1980, Michigan St. U. (\*)

**WILLIAMS, JENELL K.**, Instr., English Language Program (1991). BA 1974, MA 1991, U. of Kansas.

**WILLIAMS, LARRY G.**, Assoc. Prof. of Biology (1970). BS 1961, MS 1963, U. of Nebraska; PhD 1967, California Inst. of Tech. (\*)

**WILLIAMS, LOU FALKNER**, Asst. Prof. of History (1991). BA 1980, MA 1983, U. of Alabama in Huntsville; PhD 1991, U. of Florida. (\*)

**WILLIAMS, TIMOTHY ALDEN**, Prof. of Political Science (1967). AB 1954, Davidson Col.; PhD 1964, U. of North Carolina. (\*)

**WILLIAMS, WAYNE WATSON**, Prof. Emeritus of Civil Engineering (1965). BS 1951, MS 1953, Iowa St. U.; Professional Engineer. (\*)

**WILLIS, WILLIAM G.**, Prof. Emeritus of Plant Pathology; St. Leader, Plant Pathology (1951). BS 1951, MS 1964, PhD 1967, Kansas St. U. (\*)

**WILSON, ALFRED P.**, Prof., Education (1972). BS 1961, MEd 1965, EdD 1969, Utah St. U. (\*)

**WILSON, C. CARL**, Assoc. Prof. of Industrial Engineering (1977). BS 1959, U. of Toronto; MS 1962, 1965, U. of Michigan; Professional Engineer, 1960, Toronto.

**WILSON, DUANE L.**, Research Asst. of Plant Pathology (1984). BS 1976, Kansas St. U.

**WILSON, FRED E.**, Prof. of Biology (1965). AB 1958, MA 1960, U. of Kansas; PhD 1965, Washington St. U. (\*)

**WILSON, GAIL T.**, Assoc. Scientist, Plant Pathology (1985). BS 1979, Mercyhurst Col., Pennsylvania; MS 1983, Slippery Rock U., Pennsylvania.

**WILSON, JACK H.**, Co. Extension Agricultural Agent Emeritus, Wichita Co., Leoti (1946). BS 1943, MS 1969, Kansas St. U.

**WILSON, MICHAEL**, Assoc. Prof. of Electronic Engineering Tech. (1984). BSEE 1965, California St. U. at San Diego; MSEE 1969, U. of California—Los Angeles.

**WILSON, RON J.**, Dir., Huck Boyd National Inst. for Rural Dev. (1990). BS 1978, Kansas St. U.

**WINEGARDNER, CARROLL**, Asst. Prof. of Art (1966). BFA 1960, Kansas City Art Inst.; MFA 1963, U. of Oklahoma.

**WINGFIELD, JOHN G.**, Assoc. Prof. Emeritus of Grain Science and Industry; Milling Tech. Research Scientist, Agr. Exp. Sta. (1977). BS 1950, MS 1980, Kansas St. U. (\*)

**WINGFIELD, WILLIAM**, Instr. of Music (1988). BM 1974, Eastman School of Music, MM 1983, Kansas St. U.

**WINKLER, KIMBERLY A.**, Hall Dir., Housing and Dining Services (1993). BS 1991, MS 1993, Texas Tech U.

**WINSLOW, WILLIAM P. III**, Assoc. Prof. of Landscape Arch. (1982). BLA 1980, Kansas St. U.; MLA 1982, U. of Michigan. Registered Landscape Architect. (\*)

**WISBEY, SUSAN L.**, Co. Extension Agent; Mitchell Co., Beloit (1990). BS 1971, Fort Hays St. U.

**WISCHER, JEFFREY G.**, Asst. Forester; Forestry Specialist, Nursery Operations (1990). BS 1976, MS 1980, U. of Wisconsin.

**WISE, AARON L.**, Staff Sergeant, U.S. Army, Instr. of Military Science (1992).

**WISSMAN, JANICE R.**, Assoc. Prof., Education (1968). BS 1963, MS 1968, Kansas St. U.; EdD 1981, U. of Kansas. (\*)

**WITHEE, LAURESTON VAN**, Prof. Emeritus of Agronomy (1953). BS 1947, Kansas St. U.; MS 1952, U. of Nebraska; PhD 1963, Kansas St. U. (\*)

**WITT, KIM V.**, Farm Management Assoc. Fieldman (1990). BS 1989, Sterling Col.; MS 1990, Kansas St. U.

**WITT, MERLE D.**, Assoc. Prof.; Research Agronomist, SW Research Extension Cntr. (1969). BS 1967, MS 1969, Kansas St. U.; PhD 1981, U. of Nebraska. (\*)

**WOHLER, ROGER**, Data Processing Manager, KSU Foundation (1988).

**WOLDT, GRACE S.**, Instr. Emerita of Mathematics (1946). AB 1927, Ohio Wesleyan U.

**WOLFE, FRANCES M.**, Co. Extension Home Economist Emerita, Wyandotte Co., Kansas City (1970). BS 1941, Marymount Col.

**WOLFORD, DEBORAH A.**, Hall Dir., Housing and Dining Services (1992). BA 1990, MA 1992, Michigan St. U.

**WONER, ELIZABETH**, Co. Extension Home Economist Emerita, Harper Co., Anthony (1950). BS 1930, Southwestern Col.

**WONG, PETER P.**, Prof. of Biology; Plant Physiologist, Agr. Exp. Sta. (1976). BS 1966, California St. U.; BA 1967, PhD 1971, Oregon St. U. (\*)

**WOOD, BILLY D.**, Co. Extension Agent, Doniphan Co., Troy (1980). BS 1979, Kansas St. U.

**WOOD, BILLY L.**, Co. Extension Agent, Jewell Co., Mankato (1974). BS 1955, MS 1969, Kansas St. U.

**WOOD, JOE NATE**, Prof. Emeritus of Mechanical Engineering (1936). BS 1936, St. U. of Iowa; Professional Engineer, 1948.

**WOOD, MARK A.**, Farm Management Association Fieldman (1986). BS 1982, Kansas St. U.; MS 1987, N. Dakota St. U.

**WOOD, MARY**, Instr., English Language Program (1987). BA 1978, MA 1984, U. of Kansas.

**WOOD, NAOMI J.**, Asst. Prof. of English (1991). BA 1983, North Park Co.; PhD 1991, Duke U. (\*)

**WOODFORD, JOYCE**, Counselor, U. Counseling Services (1991). MS 1975, Kansas St. U.

**WOODS, BRUCE**, Adjunct Asst. Prof. of Human Dev. and Family Studies (1989). BS 1969, Wichita St. U.; MS 1973, PhD 1977, Kansas St. U.

**WOODWARD, GARY L.**, Head and Assoc. Prof. of Art (1971). AB 1961, Northern Colorado U.; MA 1964, U. of Iowa; MFA 1969, U. of Washington. (\*)

**WOODWARD, MARILYN**, Academic Outreach and Conference Coord. (1989). BA 1973, Kansas St. U.; MEd 1975, U. of Arkansas.

**WOOFER, JOHN**, Planned Giving Officer, KSU Foundation (1993). BA 1971, Ft. Hays St. U.

**WOOLARD, MARGARET MAUK**, Co. Extension Home Economist Emerita, Saline Co., Salina (1944). BS 1924, Kansas St. U.

**WOOTTON, RICHARD D.**, Prof. of Horticulture; Assoc. Dean and Assoc. Dir. of Extension (1991). BS 1966, MS 1970, PhD 1977, U. of Maryland.

**WORMAN, FREDERICK**, Asst. Prof. of Agricultural Economics (1985). MA 1965, Northwestern U.; MS 1970, New Mexico St. U.; PhD 1985, Kansas St. U.

**WORTHINGTON, ROY H.**, Instr. of Finance (1983). BA 1967, U. of Colorado; JD 1973, Washburn U.

**WRIGHT, DANA M.**, Research Asst. of Entomology (1983). BS 1983, Kansas St. U.

**WRIGHT, DAVID**, Assoc. Prof. of Human Dev. and Family Studies; Agr. Exp. Sta. (1985). BS 1971, California St. U.; MS 1977, Chapman Col.; PhD 1985, U. of Georgia. (\*)

**WRIGHT, DEANNE D.**, Assoc. Prof.; Extension Specialist, Radio and TV (1970). BS 1959, U. of Kansas; MS 1970, Kansas St. U.

**WRIGHT, EMMETT L.**, Prof. of Education (1984). BS 1963, U. of Kansas; MA 1968, Wichita St. U.; PhD 1974, Pennsylvania St. U. (\*)

**WRIGHT, KATHLEEN A.**, Assoc. Spec.; Ext. Computer Trg. Coord. (1985). BS 1970, California St. U.; MS 1984, U. of Georgia.

**WRIGHT, VALERIE F.**, Adjunct Asst. Prof. of Entomology, Stored Products Insects (1979). BS 1965, Gustavus Adolphus Col.; MS 1973, PhD 1979, U. of Minnesota. (\*)

**WU, CHIH-HANG**, Asst. Prof. of Industrial Engineering (1993). BS 1984, National Cheng Kung U.; MS 1990, PhD 1993, Pennsylvania St. U. (\*)

**WU, FANGBING**, Asst. Prof. of Mathematics (1990). BS 1981, Huazhong Inst. of Tech., PRC; MS 1984, PhD 1989, Ohio St. U. (\*)

**WUELLNER, LORI L.**, Co. Extension Agent, Home Economics, Wyandotte Co., Kansas City (1986). BS 1985, Kansas St. U.

**WYSIN, GARY M.**, Asst. Prof. of Physics (1989). BS 1978, MS 1980, U. of Toledo; PhD 1985, Cornell U. (\*)

**YANG, HUANAN**, Asst. Prof. of Mathematics (1992). PhD 1989, U. of California—Los Angeles. (\*)

**YANG, SHIE-SHIEN**, Prof. of Statistics (1979). BS 1969, MS 1974, PhD 1976, Iowa St. U. (\*)

**YATES, SUSAN A.**, Co. Ext. Agent, Marshall Co., Marysville (1992). BS 1991, BS 1992, U. of Nebraska.

**YAU, DON O.**, Co. Extension Agent, Agr.; Clark Co., Ashland (1991). BS 1961, Panhandle St. U.; MS 1970, Kansas St. U.

**YETTER, DAVID**, Asst. Prof. of Mathematics (1991). BS 1979, Dickinson College; PhD 1984, U. of Pennsylvania. (\*)

**YODER, DAVID D.**, Area Coord., Housing and Dining Services (1976). BS 1973, Kansas St. U.

**YOUNG, CAROL H.**, Assoc. Prof.; Extension Home Economist, Southwest (1966). BS 1966, Emporia St. U.; MED 1971, Wichita St. U.

**YOUNG, PAUL M.**, Prof. Emeritus of Mathematics (1970). AB 1937, Miami U.; MA 1939, PhD 1941, Ohio St. U. (\*)

**YOUNG, ROBERT A.**, Asst. Dir. of Telecommunications, Computing and Telecommunications Activities (1977). BS 1975, MS 1976, Kansas St. U.

**YOUNG, RONALD C.**, Asst. Prof. of Agricultural Economics; Extension Specialist, Local Government (1990). BA 1972, MA 1974, Tulane U.; MPA 1984, U. of Kentucky; PhD 1989, U. of Kentucky.

**YU, KEH-CHIANG**, Asst. Prof. of Management (1989). BA 1974, Tunghai U.; MBA 1980, PhD 1987, U. of Texas at Austin.

**YVORCHUK-ST. JEAN, KATHLEEN**, Temp. Asst. Prof. of Equine Med. (1991). BS 1981, McGill U.; DVM 1985, U. of Montreal; MS 1990, Ohio St. U.

**ZABEL, MARY KAY**, Prof., Education (1979). BA 1969, Grinnell Col.; MAT 1971, National Col. of Ed.; PhD 1977, U. of Minnesota. (\*)

**ZABEL, ROBERT**, Prof., Education (1977). BA 1969, Grinnell Col.; MEd 1973, National Col. of Ed.; PhD 1977, U. of Minnesota. (\*)

**ZAMFIR-BLEYBERG, MARIA**, Assoc. Prof. of Computing and Information Sciences (1986). MS 1960, U. of Bucharest; PhD 1982, U. of California, Los Angeles. (\*)

**ZAYAS, JOSEPH**, Prof. of Foods and Nutrition; Agr. Exp. Sta. (1983). MS 1956, PhD 1962, DSc 1970, Tech. Inst., Moscow. (\*)

**ZHANG, NAIQIAN**, Asst. Prof. of Agricultural Engineering (1991). BS 1970, Beijing Inst. of Agricultural Mechanics; MS 1983, Purdue U.; PhD 1987, Virginia Polytechnic. (\*)

**ZIMMERMAN, JOHN L.**, Prof. of Biology (1963). BS 1953, MS 1958, Michigan St. U.; PhD 1963, U. of Illinois. (\*)

**ZIVANOVIC, JUDITH K.**, Assoc. Dean of Arts and Sciences; Prof. of Speech (1989). BA 1963, U. of Evansville; MA 1967, PhD 1968, U. of Wisconsin. (\*)

**ZOELLNER, KEITH O.**, Prof. of Animal Sciences and Industry; Extension Specialist, Beef (1962). BS 1953, MS 1957, S. Dakota St. U.; PhD 1962, U. of Missouri.

**ZOLLMAN, DEAN ALVIN**, Prof. of Physics (1970). BS 1964, MS 1965, Indiana U.; PhD 1970, U. of Maryland. (\*)

**ZOU, SHAOMING**, Asst. Prof. of Marketing (1994). BS 1983, Sichuan U.; MBA 1989, Michigan St. U.

**ZOU, QISU**, Assoc. Prof. of Mathematics (1987). BS 1966, Peking U.; MSc 1985, PhD 1986, Brown U. (\*)

**ZOUROS, THEO**, Research Assoc. Temp., Physics (1986). PhD 1983, Yale.

**ZSCHOCHE, SUE**, Asst. Prof. of History (1983). BA 1970, Emporia St. U.; MA 1974, East Texas St. U.; PhD 1984, U. of Kansas. (\*)

**ZWEIMILLER, LANNIE W.**, Dir. of Lafene Health Cntr. (1989). BS 1974, Fort Hays St. U., MHA 1981, U. of Minnesota.

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