

UNIVERSITY
CATALOG

OKLAHOMA STATE UNIVERSITY


1999-2000

OKLAHOMA STATE UNIVERSITY

C A T A L O G



1999-2000



This *Catalog* offers information about the academic programs and support services of the University. This *Catalog* is as accurate as possible, but the information may not remain current for all of the academic year. Circumstances may prompt changes in courses, course content, credit, fees, regulations, semester calendar, curriculum, degrees offered, and other University matters. Such changes authorized by the University apply both to prospective students and to those previously enrolled, unless the latter are specifically exempted.

For information, write to Oklahoma State University, Stillwater, OK 74078, or call (405)744-5000; in Oklahoma, call toll free 1-800-233-5019. Send electronic mail requests to cjd5818@okway.okstate.edu. Publications concerning a number of topics are also available upon request.

OSU information is available via the Internet:

Admission: www.okstate.edu/registrar/admiss.html

Catalog: home.okstate.edu/okstate/evp/registrar/coursecat.nsf

Schedule: www.okstate.edu/registrar/scsinfo.html

The summer and fall class schedule books are usually available in February, and the spring class schedule book in October, and may be obtained from the student academic services offices, or through the mail from the Office of the Registrar.

An application packet and viewbook, with information for prospective students on admission, residence halls, financial aid, scholarship, and the Honors Program, is available from the Office of High School and College Relations.

The OSU *Catalog* may be obtained by new students, free of charge from their student academic services offices, at the beginning of their first semester at OSU. Other persons may purchase the *Catalog* through the Student Union Bookstore or through the mail. Reference copies are also available in many administrative offices and libraries, and Oklahoma high schools, junior and community colleges.

To purchase a copy of the OSU *Catalog* through the mail, send a check or money order for \$5.75 for Library Rate or \$7.50 for First Class, payable to Oklahoma State University, to Central Mailing Service, Attn: Catalog Requests, Publishing and Printing East, Oklahoma State University, Stillwater, OK 74078.

In addition to these publications, many of OSU's colleges, schools and departments have printed material concerning their programs. Contact the individual departments for specific information.

Oklahoma State University, in compliance with Titles VI and VII of the Civil Rights Act of 1964, Executive Order 11246 as amended, Title IX of the Education Amendments of 1972 (Higher Education Act), the Americans with Disabilities Act of 1990, and other federal laws and regulations, does not discriminate on the basis of race, color, national origin, sex, age, religion, handicap, or status as a veteran, in any of its policies, practices or procedures. This provision includes, but is not limited to, admission, employment, financial aid and educational services.

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University Calendar

First Semester 1999-2000, Fall 1999

August 9-13, Monday-Friday
Enrollment

August 13, Friday
Last day to cancel enrollment

August 16, Monday
Class work begins

August 20, Friday
Last day to enroll

August 20, Friday
Last day to add (nonrestrictive)

August 27, Friday
Last day to add (restrictive)

August 27, Friday
Last day to file a diploma application

August 27, Friday
Last day to drop a course with no
grade and no fees charged for course

August 27, Friday
Last day for 100% refund on
withdrawal

September 6, Monday
University holiday

October 4, 5, Monday, Tuesday
Students' Fall break

October 6, Wednesday
"Monday" classes will meet

November 1, Monday
Enrollment for Spring begins

November 5, Friday
Last day to drop a course with an
automatic "W"

November 5, Friday
Last day to withdraw from all courses
with automatic "W"

November 24, Wednesday
Last day to withdraw from all courses
with assigned "W" or "F"

November 25, Thursday
University holiday begins

November 29, Monday
Class work resumes

November 29 - December 3, Monday-
Friday
Pre-finals week

December 6-10, Monday-Friday
Final examinations

December 10, Friday
Class work ends

December 14, Tuesday
Grades due from faculty

December 23-31, Thursday through
Friday
University holidays

Winter Intersession

November 29 - December 3, Monday-
Friday
Enrollment

December 13, Monday
Intersession begins

December 24, Friday
Intersession ends

Second Semester 1999-2000, Spring 2000

January 3-7, Monday-Friday
Enrollment

January 7, Friday
Last day to cancel enrollment

January 10, Monday
Class work begins

January 14, Friday
Last day to enroll

January 14, Friday
Last day to add (nonrestrictive)

January 17, Monday
Student holiday

January 21, Friday
Last day to add (restrictive)

January 21, Friday
Last day to file a diploma application

January 21, Friday
Last day to drop a course with no
grade and no fees charged for course

January 21, Friday
Last day for 100% refund on
withdrawal

March 11, Saturday
Students' Spring break begins

March 20, Monday
Class work resumes

March 20, Monday
Enrollment for Summer and Fall begins

April 7, Friday
Last day to drop a course with an
automatic "W"

April 7, Friday
Last day to withdraw from all courses
with automatic "W"

April 21, Friday
Last day to withdraw from all courses
with assigned "W" or "F"

April 24-28, Monday-Friday
Pre-finals week

May 1-5, Monday-Friday
Final examinations

May 5, Friday
Class work ends

May 6, Saturday
Commencement

May 9, Tuesday
Grades due from faculty

Summer 2000, Regular 8-Week Summer Session

May 29, Monday
University holiday

June 1, 2, Thursday, Friday
Enrollment

June 2, Friday
Last day to cancel enrollment

June 5, Monday
Class work begins

June 7, Wednesday
Last day to enroll

June 7, Wednesday
Last day to add (nonrestrictive)

June 9, Friday
Last day to add (restrictive)

June 9, Friday
Last day to file a diploma application

June 9, Friday
Last day to drop a course with no
grade and no fees charged for course

June 9, Friday
Last day for 100% refund on
withdrawal

July 4, Tuesday
University holiday

July 14, Friday
Last day to drop a course with an
automatic "W"

July 14, Friday
Last day to withdraw from all courses
with automatic "W"

July 21, Friday
Last day to withdraw from all courses
with assigned "W" or "F"

July 28, Friday
Class work ends

August 1, Tuesday
Grades due from faculty

Short summer sessions are usually held
for three weeks, May 15-June 2,
for four weeks, June 5-July 30
for four weeks, July 3-28.

Proportionate dates for fee refunds,
dropping, and withdrawing apply to
block and short courses.

First Semester 2000-2001, Fall 2000

August 14-18, Monday-Friday
Enrollment

August 18, Friday
Last day to cancel enrollment

August 21, Monday
Class work begins

August 25, Friday
Last day to enroll

August 25, Friday
Last day to add (nonrestrictive)

September 1, Friday
Last day to add (restrictive)

September 1, Friday
Last day to file a diploma application

September 1, Friday
Last day to drop a course with no
grade and no fees charged for course

September 1, Friday
Last day for 100% refund on
withdrawal

September 4, Monday
University holiday

October 9, 10, Monday, Tuesday
Students' Fall break (tentative)

October 11, Wednesday
"Monday" classes will meet

October 13, Friday
Progress reports for freshmen due
from faculty

November 6, Monday
Enrollment for Spring begins

November 10, Friday
Last day to drop a course with an
automatic "W"

November 10, Friday
Last day to withdraw from all courses
with automatic "W"

November 23, Thursday
University holiday begins

November 27, Monday
Class work resumes

December 1, Friday
Last day to withdraw from all courses
with assigned "W" or "F"

December 4-8, Monday-Friday
Pre-finals week

December 11-15, Monday-Friday
Final examinations

December 15, Friday
Class work ends

December 19, Tuesday
Grades due from faculty

December 22-January 1, Friday through
Monday
University holidays

Winter Intersession

December 4-8, Monday-Friday
Enrollment

December 18, Monday
Intersession begins

December 29, Friday
Intersession ends

Second Semester 2000- 2001, Spring 2001

January 9-15, Tuesday-Monday
Enrollment

January 15, Monday
Last day to cancel enrollment

January 16, Tuesday
Class work begins

January 22, Monday
Last day to enroll

January 22, Monday
Last day to add (nonrestrictive)

January 15, Monday
Student holiday

January 26, Friday
Last day to file a diploma application

January 29, Monday
Last day to add (restrictive)

January 29, Monday
Last day to drop a course with no
grade and no fees charged for course

January 29, Monday
Last day for 100% refund on
withdrawal

March 9, Friday
Progress reports for freshmen due
from faculty

March 17, Saturday
Students' Spring break begins (tenta-
tive)

March 26, Monday
Class work resumes

March 26, Monday
Enrollment for Summer and Fall begins

April 13, Friday
Last day to drop a course with an
automatic "W"

April 13, Friday
Last day to withdraw from all courses
with automatic "W"

April 27, Friday
Last day to withdraw from all courses
with assigned "W" or "F"

April 30-May 4, Monday-Friday
Pre-finals week

May 7-11, Monday-Friday
Final examinations

May 11, Friday
Class work ends

May 12, Saturday
Commencement

May 15, Tuesday
Grades due from faculty

Summer 2001 Regular 8-Week Summer Session

May 28, Monday
University holiday

June 7, 8, Thursday, Friday
Enrollment

June 8, Friday
Last day to cancel enrollment

June 11, Monday
Class work begins

June 13, Wednesday
Last day to enroll

June 13, Wednesday
Last day to add (nonrestrictive)

June 15, Friday
Last day to add (restrictive)

June 15, Friday
Last day to file a diploma application

June 15, Friday
Last day to drop a course with no
grade and no fees charged for course

June 15, Friday
Last day for 100% refund on
withdrawal

July 4, Wednesday
University holiday

July 20, Friday
Last day to drop a course with an
automatic "W"

July 20, Friday
Last day to withdraw from all courses
with automatic "W"

July 27, Friday
Last day to withdraw from all courses
with assigned "W" or "F"

August 3, Friday
Class work ends

August 7, Tuesday
Grades due from faculty

Short summer sessions are usually held
for three weeks, May 21-June 8
for four weeks, June 11-July 6
for four weeks, July 9-August 3
Proportionate dates for fee refunds,
dropping, and withdrawing apply to
block and short courses.

The University

Oklahoma State University was founded on December 25, 1890, as Oklahoma Agricultural and Mechanical College, just twenty months after the Land Run of 1889. When the first students assembled for class on December 14, 1891, there were no buildings, no books, and no curriculum.

In 1894, two and one-half years after classes began in local churches, 144 students moved into the first academic building, later known as Old Central, on the southeast corner of campus. In 1896, Oklahoma A&M held its first commencement with six male graduates.

On July 1, 1957, Oklahoma A&M College became Oklahoma State University. Technical branches were established in Okmulgee in 1946 and in Oklahoma City in 1961. (In 1990 their names were changed to OSU-Okmulgee and OSU-Oklahoma City.) In July of 1988, the Oklahoma College of Osteopathic Medicine and Surgery became the College of Osteopathic Medicine of OSU.

OSU is located in Stillwater, a north-central Oklahoma community with a population of more than 36,000. Stillwater is approximately 60 miles from the Tulsa and Oklahoma City metropolitan areas and is readily accessible from other major population centers by interstate highway and air.

The University is coeducational and has an enrollment of approximately 26,000 students on its four campuses. It offers bachelor's, master's and doctor's degrees in a large number of fields, as well as the professional Doctor of Osteopathic Medicine and Doctor of Veterinary Medicine degrees. Specialist in Education degrees are also offered in selected fields.

Although OSU is a large, comprehensive university, its size does not minimize the personal attention given to each student. The individual is more than just a number at this university. OSU encourages all students, when they first enroll, to identify the college in which they wish to major. Once the student has identified his or her major department, he or she becomes a very important individual to the faculty and advisers of that department. Because the average number of students majoring in any one department is less than 150, the student can count on personal attention in a friendly environment.

The largeness of the University has many distinct advantages. It has 1.9 mil-

lion volumes in the library, modern research laboratories and equipment, excellent physical education, recreation and student union facilities, nationally-recognized residence halls programs, outstanding cultural events, and 36 nationally-affiliated fraternities and sororities, that provide a stimulating educational and social environment.

The Mission

Oklahoma State University is a modern comprehensive land grant university that serves the state, national and international communities by providing its students with exceptional academic experiences, by conducting scholarly research and other creative activities that advance fundamental knowledge, and by disseminating knowledge to the people of Oklahoma and throughout the world.

Athletics Program Mission

Oklahoma State University is committed to providing regionally and nationally competitive athletics programs as an integral part of the overall educational mission of the University. Programs sponsored shall be in compliance with the highest recognized standards of the institution and the athletic governing bodies. Intercollegiate athletics will operate in harmony with the University's stated mission and be committed to the intellectual, cultural, physical and social development of the student-athletes as individuals. Opportunities for student-athletes shall be provided without discrimination.

Student Profile

OSU has a diverse student body. Students come not only from Oklahoma, but from across the nation and world. Of OSU's 27,100 students, approximately 20,450 are on the Stillwater campus, (including 1000 students at OSU-Tulsa), 2,300 at Okmulgee and 3,850 at Oklahoma City, and 500 students at the College of Osteopathic Medicine in Tulsa. Eighty-one and one-half percent of the undergraduate enrollment is from Oklahoma; 12 percent from other states; and six and one-half percent from more than 115 foreign countries. Of the under-

graduate population, 53 percent are men and 47 percent are women. Minorities make up 14 percent of the undergraduate student body. The graduation rate of full-time, degree-seeking undergraduate students is 50 percent.

The graduate student enrollment totals 4,660. Of these students, approximately 700 enroll through OSU-Tulsa. Sixty-four percent are from Oklahoma; 15 percent from other states; and 21 percent from foreign countries. Of the graduate population, 56 percent are men and 44 percent are women. Minorities make up 14 percent of the graduate student body.

An annual report regarding gender equity in OSU's athletic programs is available upon request from the Athletic Department.

Facilities

The OSU campus is one of exceptional beauty, with modified Georgian style architecture in many of the buildings. The main campus encompasses 840 acres and more than 200 permanent buildings. These facilities include the Edmon Low Library, ranked first in the state of Oklahoma and one of the largest libraries in the entire Southwest. Other facilities include a large Student Union complete with hotel facilities, the Colvin Recreational Center, the Noble Research Center, the Bartlett Center for the Studio Arts and the Seretean Center for the Performing Arts.

In 1995, Willard Hall was completely renovated and rededicated as the new home for the College of Education. Willard Hall was a 1939 vintage women's dormitory that now reflects the past and creates a vision for the future.

In 1996, the University dedicated the Oklahoma Food and Agricultural Products Research and Technology Center. This vital facility undergirds the essential mission of the College of Agricultural Sciences and Natural Resources by allowing faculty and students the opportunity to investigate the ways and means of adding value to Oklahoma's raw foodstuffs.

In Fall 1997, the University opened its \$31 million Advanced Technology Research Center within the College of Engineering, Architecture and Technology. This multidisciplinary building will further enhance the University's role of being a

front runner in basic engineering and related research in a variety of fields that are relevant to Oklahoma, the United States and the world.

In Fall 1998, the University welcomed the complete renovation of the Classroom Building. This building is the principal undergraduate classroom facility for the University. The Classroom Building remodeling effort gives students an updated facility with state-of-the-art teaching systems.

Construction is currently underway to add space to the Student Union to incorporate a new area for the Center for Services to Students. This effort will house the offices of Admissions, Bursar, Financial Aid, High School and College Relations, Registrar and University Academic Services all in one building and will result in better assistance to students.

In Spring 1999, groundbreaking will occur for the remodeling of the existing Gallagher-Iba Arena. The expanded arena will seat up to 13,000 people for athletic, academic and entertainment activities.

OSU is emerging as a leader in network computing resources. The University has applied the student technology fee in concert with other University resources to create a second-to-none networking system on campus that includes new computer laboratories, high speed inter-laboratory connectivity, and a virtually seamless interface to the exploding Internet community. It is OSU's belief that the "virtual laboratory" made possible by the nearly boundless domain of the Internet will be the research vehicle for the future researcher.

The Lake Carl Blackwell area, located eight miles west of Stillwater, is also owned by OSU. The area includes approximately 21,655 acres, including the 3,000-acre Lake Carl Blackwell that provides the water supply for OSU. It is also used for research activities, in addition to being a popular regional recreational area.

Additional properties include 1,900 acres in farm land and facilities in Payne County, as well as 2,900 acres and various structures devoted to research stations around the state.

General Education

Oklahoma State University is committed to producing graduates who have a depth of knowledge in their major fields of study and a breadth of knowledge outside their majors. The best graduate is one with a mastery of a specific subject matter and a solid and diversified general education. With this commitment to breadth and general education, the fol-

lowing philosophy of general education was adopted in 1978:

The role of General Education at Oklahoma State University is to assist the student in the pursuit of general knowledge and in the development of skills and attitudes conducive to a lifetime of enlightenment. It must stimulate intellectual curiosity, original thought and expression, the capacity for critical analysis and problem solving and the ability to make conscious value judgments consistent with personal needs and the public interest. It must be a blend of the timely and the timeless and assist the graduate to live and function in a rapidly changing, complex and cosmopolitan world.

Accreditation

Oklahoma State University is accredited by the North Central Association (NCA) of Colleges and Schools, and programs within the colleges are also accredited. (The NCA may be reached at 30 N. LaSalle Street, Suite 2400, Chicago, IL 60601, phone (800) 621-7440.)

In the *College of Agricultural Sciences and Natural Resources*, the forestry program is accredited by the Society of American Foresters. The landscape architecture program (Bachelor of Landscape Architecture) is accredited by the American Society of Landscape Architects. The landscape contracting program is certified by the Association of Landscape Contractors of America. In addition, the College's teacher education program in agricultural education is accredited by the Oklahoma State Department of Education, and the Oklahoma State Department of Vocational-Technical Education.

In the *College of Arts and Sciences*, the medical technology program is accredited by the National Accrediting Association of Clinical Laboratory Science; the chemistry program is accredited by the American Chemical Society; the School of Journalism and Broadcasting as well as the programs in advertising, broadcast journalism, news editorial, and public relations are accredited by the Accrediting Council on Education in Journalism and Mass Communications; the music department is accredited by the National Association of Schools of Music, and the theater department by the National Association of Schools of Theater. The program in clinical psychology is accredited by the American Psychological Association; the program in communication sciences and disorders is accredited by the American Speech-Language-Hearing Association.

All programs in the *College of Business Administration* are fully accredited

by the American Assembly of Collegiate Schools of Business, (AACSB) the International Association for Management Education. The School of Accounting enjoys separate accreditation by this body.

In the *College of Education*, the aviation programs are accredited by the Federal Aviation Administration. OSU was the first university in Oklahoma with a program that received this designation. The counseling psychology program is accredited by the American Psychological Association. The leisure studies program is accredited by the National Recreation and Park Association and the American Association for Leisure and Recreation, with accredited options in leisure service management and therapeutic recreation. All professional education programs are accredited by the Oklahoma State Board of Education and the North Central Association of Colleges and Schools. Technical and industrial education is accredited by the Oklahoma State Department of Vocational-Technical Education.

In the *College of Engineering, Architecture and Technology*, bachelor's degree programs are accredited by nationally recognized accreditation organizations. Programs in aerospace engineering (an option in mechanical engineering), architectural engineering, biosystems engineering, chemical engineering, civil engineering, electrical engineering, industrial engineering and management, and mechanical engineering are accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology, Inc (ABET). Programs in construction management technology, electronics technology, fire protection and safety technology, and mechanical engineering technology are accredited by the Technology Accreditation Commission (TAC) of the Accreditation Board for Engineering and Technology, Inc (ABET). The program in architecture is accredited by the National Architectural Accrediting Board (NAAB).

Programs culminating in a B.S. in the *College of Human Environmental Sciences* are accredited by specialized agencies. The Foundation for Interior Design Education Research (FIDER) has accredited the undergraduate interior design program. The pre-production and the production management apparel curricula has received approval from the American Apparel Manufacturer's Association (AAMA). The Child Development Laboratory is licensed by the state of Oklahoma Department of Human Services (DHS) and has received a Two Star Differential Quality Certification from DHS. The Child Development Lab is also accredited by the accrediting branch of the

National Association for the Education of Young Children (NAEYC). Program approval has been granted to the early childhood education program by the Oklahoma State Board of Education. The American Association of Marriage and Family Therapists (AAMFT) has accredited the master's program in marriage and family therapy. The Commission on Accreditation/Approval for Dietetics Education (CAADE) of the American Dietetic Association has approved the Didactic Programming Dietetics (DPD) and accredited the post-baccalaureate Dietetic Internship Program (DI). The School of Hotel and Restaurant Administration is accredited by the Accreditation Commission for Programs in Hospitality Administration (ACPHA). The B.S. in the College of Human Environmental Sciences is accredited by the Council for Accreditation of the American Association of Family and Consumer Sciences.

The *College of Veterinary Medicine* is fully accredited by the American Veterinary Medical Association. The Oklahoma Animal Disease Diagnostic Laboratory is accredited by the American Association of Veterinary Laboratory Diagnosticians, and the Boren Veterinary Medical Teaching Hospital is accredited by the American Animal Hospital Association.

Programs at OSU's branch campuses have also received accreditation from national agencies. The OSU College of Osteopathic Medicine is accredited by the Bureau of Professional Education of the American Osteopathic Association.

OSU-Oklahoma City is accredited by the Commission on Institutions of Higher Education of the North Central Association of Colleges and Schools. In addition, other programs are accredited or certified by the following institutions: Oklahoma Drug and Alcohol Professional Counselors Association, National Asso-

ciation for the Education of Young Children, Rehabilitative Services for Deaf and Hearing Impaired, State Health Department for Emergency Medical Technicians, Council on Law Enforcement Education and Training, National League for Nursing Accreditation Commission, Oklahoma Board of Nursing, American Veterinary Medical Association.

OSU-Okmulgee is accredited by the Commission on Institutions of Higher Education of the North Central Association of Colleges and Schools. In addition, programs in automotive service technology and automotive body technology are nationally certified by the National Automotive Technicians Education Foundation, Inc. (NATEF). The dietetic technology program is accredited by the American Dietetic Association.

Refer to the appropriate college sections in the *Catalog* for further information on accreditation of specific programs.

Affirmative Action Program

Carolyn Hernandez, Director

It is the policy of OSU to be a complete equal opportunity University in all phases of operations, toward the end of attaining the University's basic mission and goals. OSU is committed to providing equal employment and educational opportunity on the basis of merit and without regard to race, ethnicity, color, age, religion, sex, national origin, disability, status as a veteran of the Vietnam Era, or veteran with a disability. All students are provided equal educational opportunity in all phases of the academic program and in all phases of the student life programs.

In support of these principles, OSU also has a policy prohibiting sexual harassment of students, staff and faculty. The University subscribes to the principle of the dignity of all persons and their labors. In support of this principle, sexual harassment is condemned in the recruitment, appointment and advancement of employees and in the evaluation of students' academic performance. OSU is committed to promoting equal opportunity in employment and education for all persons within its constituency in an environment free from sexual harassment.

Respect of each member of the campus community is vital to the individual and the community as a whole. OSU's Affirmative Action Program reflects the University's commitment to equal opportunity and complies with the legal requirements of federal and state civil rights laws.

To adequately meet the needs of protected groups, such as the qualified disabled, self-identification of employees is encouraged so those eligible can be afforded every opportunity to take advantage of the services offered. All information is protected by privacy laws and used only for affirmative action purposes.

Americans with Disabilities Act (ADA) Compliance Program

Ken Chance, Director

Considerable progress has been made to enhance ADA access to OSU programs, services, facilities and grounds. Students with disabilities are encouraged to help with such efforts through the ADA Advisory Council for Individuals with Disabilities. In addition, students may exercise certain ADA appeal "rights" if dissatisfied with student services or accommodations. OSU is committed to improving the full and non-discriminatory participation in all aspects of campus life for individuals with disabilities. For more information, contact the Office of ADA Compliance, 315 Student Union.

Entering the University—Admissions

Gordon L. Reese, Associate Director

Linda Testerman, Administrative Associate

Paulette Cundiff, Coordinator, Admissions Operations

Linda Peale-Owens, Coordinator, Admissions Programs

Karen Huff, Coordinator, International Admissions

Karen R. Mott, Coordinator, Transfer Credit Evaluations

Carol Dobson, Support Specialist

Application Procedure

When to Apply

It is advisable to apply for admission several months in advance of the first semester in which enrollment is desired. Applications for admission are processed on a "rolling basis." Admission decisions



are usually made and applicants notified within a week or two of receipt of all necessary admission documents.

How to Apply

OSU requires a non-refundable application fee of \$25 for all applicants. The fee must accompany a student's Application for Admission.

Freshmen. All applicants seeking admission must complete and submit an Application for Admission. A student should request that his or her high school counselor send to the Office of Admissions a current official high school transcript that contains class rank and grade-point average (6th, 7th, or 8th semester). In addition, at the time of application, a request should be made to have the results of the ACT or SAT sent to the Office of Admissions, unless such a request was made at the time of testing.

Transfers. Students who have enrolled in one or more colleges prior to applying to OSU must complete and submit an Application for Admission, and request that the registrar at each college send an official transcript of all work attempted to the Office of Admissions. Students who have earned 23 or fewer hours of college-level credit should also follow the procedure outlined above for first-time freshmen.

Readmission. A student who has attended OSU but was not enrolled during the immediate past semester (except the summer session) must file an Application for Readmission. A student who has enrolled in another college or university since last attending OSU, must submit a transcript from each school. Admission status will be determined after an evaluation of all previous work has been made.

Residential Life

All freshmen are required to live on campus their first year. For exceptions, see the "Residential Life" section of the *Catalog*. The University offers a variety of living and food service arrangements to satisfy most students. A Residence Hall Application is included in the Application Packet and should be submitted early in the senior year of high school to ensure a first-choice assignment. Opportunities abound for transfer students who desire to experience life on campus.

Freshman Admission

One of the goals of Oklahoma's public education system is to provide quality academic preparation for as many college-bound students as possible. In Oklahoma, each year more than 15,000

high school students make the decision to enter college.

Students with the ability to think clearly, to reason, to employ scientific methods, to use language effectively, and to apply knowledge, are those who will become the masters of their destiny in tomorrow's world. These students should pursue an academically-oriented high school curriculum. Such a course of study will help develop the basic academic skills and knowledge needed for success in college. These skills include reading, speaking and listening, mathematics, writing, reasoning and studying. The basic high school subject areas in which these skills can be nurtured are the arts, English, foreign languages, mathematics, natural sciences, and social studies.

Admission Requirements (Residents and Nonresidents)

For purposes of admission, a freshman student is one who has earned no more than six hours of college level credit after graduation from high school. (This excludes credits earned concurrently with high school enrollment, and credit earned by examination).

To be admitted in good standing, a student must graduate from an accredited high school or have earned a General Education Diploma (GED), and meet both the performance and curricular requirements listed below. (Accredited high schools are those fully accredited by one of the six regional associations of schools and colleges or by the individual state department of education.)

Performance Requirements. To be admitted in good standing for the 1999-2000 academic year, students must satisfy at least one of the following performance requirements:

1. achieve a four-year high school grade-point average of 3.00 or higher on a 4.00 grading scale, and rank scholastically among the top one-third of their graduating class;
- or
2. attain an ACT composite score of 22 or higher or a total SAT composite score of 1010 or higher.

Curricular Requirements. All students beginning college work after July 1, 1997 must have completed the following curricular requirements for admission:

Subjects	Years
English (grammar, composition and literature)	4
Mathematics (algebra I and above)	3

History (American history required)	2
Laboratory science	2
Citizenship (economics, geography, government, or non-Western culture)	1
Other (from any of the above, or foreign language, or computer science)	3

It is also recommended that students complete at least two units (years) from the areas of fine arts, music, art, drama or speech.

In addition to the requirements listed above, students who have earned any hours of college-level credit must also meet university retention standards to be admitted in good standing.

English Proficiency Requirement. All new applicants for undergraduate study for whom English is a second language are required to present a minimum paper-based score of 500 or a minimum computer-based score of 173 on the Test of English as a Foreign Language (TOEFL).

Special Freshman Admission Programs

Alternative Admission. Students whose high school achievement is below the standards specified in the performance requirements and/or who are deficient in *no more than one* curricular requirement, may be eligible for admission under the Alternative Admission Program. Space is limited and only those applicants showing the best promise of success using pre-determined criteria will be admitted. Priority will be given to those who apply by January 15, 2000.

Adult Admission. Adults 21 years of age or older or individuals on active military duty may be admitted, after careful consideration is given in determining the probability of academic success of the student. It is the opinion of Oklahoma State University that factors such as maturity of the individual, job skills and life experiences, motivation, ability to benefit, and access to educational programs should be considered in addition to past academic achievement in determining probability of academic success.

Opportunity Admission Program. Students who have not graduated from high school but whose composite score on the ACT, or combined verbal and mathematics scores on the SAT places them at the 99th percentile, may apply for full admission. Admissibility will depend on test scores, evaluation of maturity level, and whether the experience will be in the best interest of the student, both intellectually and socially.

Home Study or Unaccredited High Schools. An individual who is a graduate of a private, parochial, or other nonpublic high school which is not accredited by a recognized accrediting agency is eligible for admission to the University if:

1. The student has graduated from high school or a home study program, and
2. The student has attained an ACT composite score of 22 or higher, *or* a total SAT composite score of 1010 or higher, and
3. The student has satisfied the high school curricular requirements as certified by the school official or, if home study, the parent.

Correspondence Study Enrollment.

Admission to the University is not required for enrollment in correspondence work. However, academic credit for correspondence work will not be applicable toward a degree until the student has been formally admitted to the University and has secured the approval of the appropriate academic officer for such credit.

Non-degree Option. Students who wish to enroll in courses without intending to pursue a degree may be permitted to enroll in up to nine credit hours without satisfying admission requirements. If a student wishes to enroll in additional course work (over the nine hours allowed) he or she will be required to satisfy admission requirements.

Concurrent Enrollment as a High School Student.

1. A senior student enrolled in an accredited Oklahoma high school may, if he or she meets the requirements below, be admitted provisionally as a special student.

a. achieve an ACT composite score of 23 or higher or a total SAT score of 1050 or higher.

b. be eligible to complete requirements for graduation from high school (including curricular requirements for college admission) no later than the spring of the senior year, as attested by the high school principal.

2. An eleventh grade student enrolled in an accredited Oklahoma high school may be admitted provisionally as a special student, if he or she meets requirement a. above, and the additional requirements listed below.

a. achieve a composite score at or above the 90th percentile on the ACT, using Oklahoma norms, *or* a combined verbal and mathematical score on the SAT at or above the 90th percentile, using national norms.

b. If the student's ACT or SAT composite score is not at the 90th percentile, as detailed above, but the student's subscore(s) is at the 90th percentile, the student may enroll in course work in the discipline with the required score, providing the student does not have a curricular deficiency in the subject area.

3. A student receiving high-school-level instruction at home or from an unaccredited high school may be admitted provisionally as a special student if he or she meets the requirements below:

a. 17 years of age or older and achieve an ACT composite score of 23 or higher or a total SAT composite score of 1050 or higher; *or*

b. be 16 years of age and have achieved a composite score at or above the 90th percentile on the ACT, using Oklahoma norms, or whose combined verbal and mathematical score on the SAT at or above the 90th percentile, using national norms.

c. If the student's ACT or SAT composite score is not at the 90th percentile, as detailed above, but the student's subscore(s) is at the 90th percentile, he or she may enroll in course work in the discipline with the required score, providing the student does not have a curricular deficiency in the subject area.

A high school student admitted as a concurrent student may enroll in a combined number of high school and college courses per semester not to exceed a full-time college work load of 19 semester credit hours. For purposes of calculating work load, one high school credit course is equivalent to three semester credit hours of college work. For calculation of workload for students in "blocked" courses, contact the Office of Admissions.

A student who is otherwise eligible under this policy may enroll in a maximum of nine semester credit hours during a summer session, without the necessity of being concurrently enrolled in high school classes during the summer term. The completion of the high school curricular requirements shall not be required of concurrently enrolled high school students for purposes of admission. (Students may only enroll in curricular areas where the student has met the curricular requirements for college admission.) Concurrently admitted high school students will not be allowed to enroll in any zero-level courses designed to remove high school deficiencies.

Assessment/Course Placement. To help ensure that a student possesses the skills

necessary to be successful in college, he or she must obtain a 19 ACT subject score(s) in science reasoning, mathematics, and/or English to enroll in course work in the respective subject area(s). The student must score at 19 or higher in reading to enroll in any other collegiate course(s) outside the subjects of science, mathematics and English.

Once a student is concurrently enrolled at OSU, he or she may continue enrollment, provided that during the concurrent enrollment period the student achieves a college grade-point average of 2.00 or higher, and upon graduation from high school meets both the performance and curricular requirements for admission.

Transfer Admission

OSU requires a non-refundable application fee of \$25 for all applicants. The fee must accompany a student's Application for Admission.

For the purpose of determining admission, a transfer student is one who has earned a minimum of seven or more semester hours of college-level credit after graduation from high school. (Students with fewer than seven semester hours of college-level credit are classified as freshmen, and should refer to the "Freshman Admission" section.)

Oklahoma Residents

Students may transfer to Oklahoma State University from within the state system according to the following criteria:

1. Students who have earned between seven and 23 hours of college-level credit must satisfy both freshman admission requirements (see "Freshman Admission" section) and the retention standards listed below.

2. Students who have earned 24 or more hours of college-level credit must meet high school curricular requirements and the retention standards listed below.

Retention Standards. The standards pertaining to the retention of students pursuing study in undergraduate programs at OSU are:

0 through 30 semester hours	1.70
31 or more semester hours	2.00

Nonresidents of Oklahoma

Students may transfer to Oklahoma State University from outside the state according to the following criteria:

1. Transfer students seeking admission to OSU from colleges or universities accredited by the North Central Associa-



tion or other regional associations will be given full recognition of their credits earned providing:

- (a) They are in good academic standing at the institution from which they are transferring, and
 - (b) They have a cumulative grade-point average of 2.00 or higher (on a 4.00 scale) for all college-level work attempted.
 - (c) They meet the curricular requirements listed in the "Freshman Admission" section, or have remediated any curricular deficiency.
2. Transfer students who have earned between seven and 23 hours of college-level credit must satisfy both freshman admission requirements (see "Freshman Admission" section) and the requirements listed in 1. above.
 3. Transfer students seeking admission to OSU from colleges or universities not accredited by a regional association may be given full recognition for their credits earned when the credit is appropriate to the students' degree programs and after OSU has validated the courses. To be admissible, applicants must meet the conditions above.

Pre-engineering (Nonresident of Oklahoma). Engineering is a competitive program; therefore, enrollment preference is given to Oklahoma residents. In addition to the above requirements, a nonresident of Oklahoma applying for admission to pre-engineering must meet requirements determined by the College of Engineering. These requirements may exceed those required for residents of Oklahoma. (See "Admission Requirements" in the "College of Engineering, Architecture and Technology" section.)

Transfer Probation. Any transfer student falling slightly below the admission requirements listed above may be considered for admission on probation.

English Proficiency Requirement. All new applicants for undergraduate study for whom English is a second language are required to present a minimum paper-based score of 500 or a minimum computer-based score of 173 on the Test of English as a Foreign Language (TOEFL).

Readmission. A student who has attended OSU but was not enrolled during the immediate past semester (except the summer session) must file an Application for Readmission. A student who has enrolled in another college or university since last attending OSU, must submit a transcript from each school. Admission status will be determined after an evaluation of the previous work has been made.

International Admission

International students are required to meet academic performance standards which are equivalent to those established for all nonresident applicants.

Application Procedure. For purposes of admission, an international student is defined as "a student who is, or will be, in the United States on a non-immigrant student visa." This specifically refers to the Student (F) and Exchange Visitor (J) visas. All international students are considered nonresident students. The University will process the International Student Application and Financial Guarantee form for undergraduate admission (freshman and transfer) only after all the following items have been submitted:

1. Application for Admission and a fee of U.S. \$25.00 made payable to OSU.
2. One official or certified true copy of each academic record with a certified English translation. Students enrolled at U.S. institutions may have certified true copies of their foreign records sent by their current institution. Academic records may comprise one or more of the following:
 - a. Secondary school records (yearly mark sheets or transcripts).
 - b. Records from each college or university attended (yearly mark sheets or transcripts).
 - c. National examination results.
3. An official Test of English as a Foreign Language (TOEFL) score of 500 on the paper-based examination or a minimum score of 173 on the computer-based examination taken within the last two years.
4. Documented evidence of financial support.

Freshman Admission (International Students). For the purpose of determin-

ing admission, a freshman student is one who has earned fewer than seven semester hours of college-level credit. Students completing their secondary level education outside of the U.S. are required to meet equivalent U.S. high school performance standards. Students who have not earned any college-level credit should refer to the "Freshman Admission" section for nonresidents of Oklahoma. Students who have earned one to six semester hours of college-level credit should refer to both the "Freshman Admission" and the "Transfer Admission" sections for nonresidents of Oklahoma.

Transfer Admission (International Students). For the purpose of determining admission, a transfer student is one who has earned seven or more semester hours of college-level credit. Students who have earned fewer than 24 semester hours of college-level credit should refer to both the "Freshman Admission" and "Transfer Admission" sections for nonresidents of Oklahoma. Students who have earned 24 or more semester hours of college-level credit should refer to the "Transfer Admission" section for nonresidents of Oklahoma.

In evaluating college-level credit for course work completed outside of the U.S., OSU requires that the institution where the credit was earned and the program of study be recognized as tertiary level through the standards set by the country where the institution is located. OSU evaluates semester credit hours and grades earned based on U.S. equivalency standards.

Readmission (International Students). An international student who has attended OSU but did not attend OSU the immediate past semester must file an Application for Readmission and an updated Financial Guarantee. A student who has attended another college or university since last attending OSU must submit a transcript of all work attempted after leaving OSU. If the student's grade-point average meets minimum University and department standards, and his or her disciplinary record is satisfactory, he or she will be readmitted to OSU.

Engineering Program Admission (International Students). Engineering is a competitive program; therefore, enrollment preference is given to Oklahoma residents. In addition to the above requirements, an international student applying for admission to pre-engineering must meet requirements determined by the College of Engineering. These requirements may exceed those required for residents of Oklahoma. (See "Admission Requirements" in the "College of Engineering, Architecture and Technology" section.)

Immigration Issues. The Immigration and Naturalization Service (INS) requires that international students file a statement with the University showing adequate financial support for their education. OSU has its own financial guarantee form that international students need to complete as a requirement to receive the I-20 or IAP-66. Oklahoma State University has almost no financial assistance for international students.

Students should not plan to finance their education with employment. Students who are maintaining their immigration status, and making appropriate progress toward their degrees are eligible to apply for on-campus University employment for 20 hours per week. However, students should take into consideration that campus employment opportunities are limited. Students holding F-1 or J-1 visas are almost never permitted by INS to work outside of the University campus, and can be deported from the United States if they are found to be in violation of this regulation.

Students must notify INS when transferring from one U.S. institution to another. Students with F-1 status transferring from another U.S. institution must have his or her I-20 processed for transfer by the Office of International Students and Scholars at OSU within 15 days of the first enrollment. The student with J-1 status should contact the foreign student adviser at his or her current institution and the Office of International Student Services at OSU.

It is the student's responsibility to obtain the correct visa and to maintain his or her status while in the United States. Conditions that apply to F-1 or J-1 status are summarized on the I-20 and IAP-66, and are explained in detail during the mandatory international student orientation program. If a student is out of status, or has questions regarding INS regulations and OSU procedures, he or she should contact the Office of International Students and Scholars at OSU.

It is the responsibility of each international student to understand and abide by the INS regulations affecting his or her stay in the U.S.

Beginning the Enrollment Process

Enrollment Information. After admission is granted, all students will receive detailed enrollment information. The fall semester enrollment process for freshmen is completed during scheduled orientation sessions conducted on campus during the summer. Parents are welcome and are encouraged to partici-

pate in the enrollment process with the student.

Advance Fee Payment. All new students are required to submit a \$40 advance fee payment prior to the beginning of the enrollment process. This fee remains in the student's OSU account while he or she is attending the University; it can be refunded upon withdrawal from the University or applied to any outstanding charge during the student's last semester.

Immunizations. A record of immunizations must be submitted by each new student by the eighth week of the semester. Students will receive the Medical History and Immunization Schedule at enrollment, or students may contact the OSU Wellness Center.

Physical Examination. All new students are required to complete a physical examination. OSU Board of Regents policy allows two options to satisfy this requirement: the student may complete an OSU Wellness Center Health Risk Assessment (HRA) furnished by OSU; or the student may go to a physician of choice at his or her expense, have a physical exam, and submit the physical exam report (including immunization data) to the OSU Wellness Center.

Regardless of which option is chosen, all new students are required to submit an immunization history. This requirement includes proof or documentation of vaccination for measles—two doses of measles vaccine, mumps, polio, rubella, and tetanus—diphtheria.

Refer to the information supplied in the HRA packet for details associated with the immunization requirement.

New students will automatically be billed \$20.00 for the HRA during the first semester of enrollment. Students exercising the second option will have the fee waived upon receipt of their physical exam forms at the OSU Wellness Center by the eighth week of the semester.

Residence Classification for Purposes of Admission and Fees

(See also "Admission-Withdrawal" section of the "Academic Regulations.")

The admission requirements to Oklahoma State University may vary for residents and for nonresidents of the state; therefore, prospective students should determine their residence status before examining the admission requirements. Although the following policy statement is not necessarily inclusive of all regulations

governing the classifications of resident and nonresident students for the purpose of fee payment, it should, nevertheless, be of assistance to most students in determining their residence status. Administration of the state's residence policy as it applies to Oklahoma State University students is designated to the Office of Admissions. Questions concerning interpretation of the policy should be directed to the admissions director for a ruling.

Regulations governing the residence status of students are the responsibility of the Oklahoma State Regents for Higher Education and apply to all colleges and universities of the Oklahoma State System of Higher Education.

Basic Principles Governing Residence.

1. Attendance at an educational institution is interpreted as temporary residence; therefore, a student neither gains nor loses residence status solely by such attendance.
2. A nonresident student attending an Oklahoma college or university on more than a half-time basis is presumed to be in the state primarily for educational purposes.
3. An individual is not deemed to have acquired status as a resident of Oklahoma until he or she has been in the state for at least a year primarily as a permanent resident and not merely as a student. Likewise, an individual classified as a resident of Oklahoma shall not be reclassified as a nonresident until 12 months after having left Oklahoma to live in another state.
4. All married persons shall be treated as equal under this policy. Therefore, each spouse in a family shall establish his or her own residence status on a separate basis. Exceptions include (a) when a nonresident marries an already-established resident of Oklahoma, the nonresident may be considered a resident after documentation of the marriage and proof of domicile are satisfied, and (b) as provided under the "Full-time Professional Practitioner or Worker" provision.
5. The burden of proof of residence status or domicile shall be upon the applicant. Students filing an appeal for reclassification of his or her residence status shall do so on forms provided or approved by the Oklahoma State Regents for Higher Education.
6. Initial classification as a nonresident student shall not prejudice the right of a person to be reclassified thereafter for subsequent semesters or terms of enrollment as an Oklahoma resident provided proof of residence can be established.

Definition of Residence Terms.

Residents of Oklahoma: Residents of Oklahoma are those who have lived continuously in the state for at least 12 consecutive months and whose domiciles are in Oklahoma. Students' domiciles are their permanent homes—the places where they intend to remain and are expected to return. Students can have more than one residence, but only one domicile.

Independent Persons: Independent persons are those enjoying majority privileges (are legally emancipated from their parent(s) or guardian) and who are responsible for their own care, custody and support.

Dependent Persons: Dependent persons are those under the care, custody and support of their parent(s) or other legally sanctioned parental surrogates.

Full-time Students: Full-time students are those enrolled in a minimum of 12 credit hours per semester in an academic year, or a minimum of six credit hours during a summer session.

Residence Status Criteria.

Independent Student Criteria: Students who have achieved majority privileges (are 18 years of age or older), can provide adequate proof of independence from parental or legal guardian domicile, and have come to Oklahoma with the intention of establishing domicile, may be granted residence classification at the next enrollment period after the expiration of 12 consecutive months following the establishment of domicile in Oklahoma. Spouses must establish proof of residence on a separate basis.

In addition to the aforementioned criteria, independent students seeking reclassification as residents of Oklahoma must meet the following criteria for the current and immediately preceding year:

1. The student must not have been claimed as an exemption for state and federal tax purposes by his or her nonresident parent(s).
2. The student must prove self-support as evidenced by having provided the majority of funds for his or her own upkeep.
3. The student must have maintained a continuous residence in Oklahoma for at least 12 months.

Dependent Student Criteria: For the purpose of establishing residence status, the legal residence of dependent students is that of their parent(s) or legally-appointed guardian. Dependent students may become independent through marriage, formal court action, abandonment by parents, or positive actions demonstrating separation from the parent's

domicile. Students who can provide adequate proof of complete emancipation, and have come to Oklahoma with the intention of establishing domicile may be granted residence classification at the next enrollment period after the expiration of 12 consecutive months following the establishment of domicile in Oklahoma.

International Student Criteria: An individual who is not a citizen of the United States may become eligible for classification as an Oklahoma resident provided that he or she holds permanent resident status as defined by the Immigration and Naturalization Service, evidenced by the documents required under applicable federal law, who has resided in Oklahoma for at least 12 consecutive months and who meets the criteria for establishment of domicile.

Military Personnel: Students enrolled at Oklahoma State University while on full-time active duty in the Armed Forces are considered to be temporary residents in the state; therefore, they neither gain nor lose resident status. Members of the Armed Forces stationed in Oklahoma, their spouses, and dependent children may be admitted without payment of nonresident tuition so long as they continue to be stationed in the state in full-time military service and under military orders.

Full-time Professional Practitioner or Worker: An individual who provides evidence of having come to Oklahoma to practice a profession on a full-time basis, conduct a business full-time, or work on a full-time basis shall be declared an Oklahoma resident along with his or her spouse and dependent children so long as he or she continues in such full-time employment capacity.



Enrollment and Records

Robin H. Lacy, Registrar

Doug Reed, Associate Registrar

Joan M. Payne, Assistant Registrar

Linda Testerman, Administrative Associate

Paula M. Barnes, Coordinator, Athletes' and Veterans' Eligibility

Bonnie Stone, Coordinator, Enrollment Services and Student Data

Lori Morris, Coordinator, Fee Adjustments

Linda J. Bentley, Coordinator, Publications

Shirilyn Dehls, Coordinator, Student Records

Linda Sanders, Specialist, Degree Audits

Carol Dobson, Support Specialist

Student Enrollment

Enrollment is the process whereby students are counseled by academic advisers regarding course selection and placement, and the subsequent scheduling of those courses. A student must be admitted to the University prior to the enrollment process. (See "Entering the University.") All new freshman and transfer students are required to submit an advance fee payment prior to participation in the enrollment process.

First-time Students (Freshmen and Transfer)

The fall enrollment and orientation period for new freshmen takes place during the summer months, while enrollment for new transfer students begins in the spring. New students receive information about these programs after being admitted to the University. Enrollment and orientation activities include career counseling, academic advising and course selection, and an introduction to campus facilities and services. During the program, students meet with academic advisers who are available to assist in the planning of academic programs and the exploration of interest areas. Parents are encouraged to participate in these programs.

ALPHA Program

ALPHA is the fall orientation program designed for all students new to Oklahoma State University. It is coordinated through the Office of Student Affairs. The program is a combined effort of the University and the local community to provide a sense of belonging and well-being for new students. ALPHA provides an opportunity for new students to begin the process of adjusting to the University environment prior to the arrival of upperclass students. The ALPHA experience encourages students to become aware of the services, resources, and people available to them and to begin to develop peer relationships. ALPHA begins on the Friday before classes start in August. Specific information is mailed during the summer months to all new students who have been admitted.

Continuing Students

Students currently enrolled at OSU may enroll for the subsequent semester during specified periods of the current semester. Priority for these enrollment periods addresses the needs of students in relation to graduation proximity, with priority based on number of hours earned. Prior to the specific enrollment periods, students and academic advisers consult regarding course selections. Advisers may sign a Trial Schedule form for students wishing to enroll in the Sectioning Room of the Student Union, or authorize an on-line enrollment clearance for students wishing to self-enroll either by touch-tone telephone or by the IDS system terminals. An overdue account with the University will prevent completion of the enrollment process.

Priority Enrollment. Currently enrolled/continuing students register for summer and fall classes during the latter part of the preceding spring semester, and for spring classes during the latter part of the preceding fall semester. In order to facilitate access to courses required for timely degree completion, a student's priority for enrollment generally follows academic class level with seniors having the highest priority. Some exceptions to this basic priority may be necessary to accommodate bona fide student needs, such as a special priority for physically disabled students. The Office of Academic Affairs determines enrollment priorities, and enrollment schedules and priorities are published in the Schedule of Classes each semester.

Late Enrollment

A student is permitted to enroll during the first week of a semester or through the third day of a summer session or on

the first day of a summer short course. A student enrolling late will pay a late enrollment fee. The late enrollment fee will not be charged on or prior to the first day of a summer short course.

Identification Cards

As part of the enrollment process, each new student is issued a photo identification card. This card, along with the current fee receipt, establishes the student's identity as an OSU student and authorizes access to certain University facilities. Lost or stolen identification cards will be replaced at a nominal fee with proper photo identification from the student.

Change of Schedule

Adding Courses. Approval of the student's adviser is required for adding a course. The end of the first week of a regular semester or the third class day of a summer session is the last day a course may be added (nonrestrictive). A short course may be added no later than the first day of the short course. With instructor approval, a course may be added during the second week of classes of a regular semester or the fourth or fifth day of a summer session (restrictive).

Dropping Courses. Dropping refers to the dropping of one or more courses while remaining enrolled in at least one course for a given semester. Courses may not be dropped without the approval of the student's academic adviser.

At any time prior to the end of the second week of a regular semester or the first week of a summer session, or during the proportionate period for block or short courses, a student may drop a course, and no record of the course will appear on the student's academic record.

Beginning with the Fall 1998 semester, after the deadline for dropping with no record, but prior to the end of the 12th week of a regular semester or the sixth week of a summer session, or proportionate periods for block or short courses, a student may drop a course and the grade of "W" (dropped) will be recorded on the student's academic record.

After the 12th week of a regular semester, or the sixth week of a summer session, or proportionate periods for block or short courses, a student may not drop a course and will be assigned only the grade of "A," "B," "C," "D" or "F," or, when appropriate "I," "NP," "P," "S," "U," or "X" by the instructor at the end of the semester. (Exceptions to this policy may be allowed by petition due to extraordinary circumstances. The petition process is initiated in the student's dean's office.

A petition requires the signatures of the student's instructor, adviser and dean with the grade of "W" or "F" assigned by the instructor.)

A student may not drop any course in which a formal charge of academic dishonesty is pending against the student. If the student is absolved of the formal charge, he or she may drop the course with either a "W" or "F," (according to the drop grade policy), appearing on the academic record. If the student is found guilty, the instructor may take appropriate disciplinary action, including assigning the grade "F" for the assignment or the course.

Withdrawing from the University

Withdrawing refers to withdrawing from all courses for which a student is enrolled for a given semester. The withdrawal process is initiated in the student's dean's office. The student should appear in person, request an official withdrawal, and hand carry the form to the appropriate offices to complete the process. If the student is unable to appear in person, the request for withdrawal may be initiated through the mail or by phone to the student's dean's office. Beginning with the Fall 1998 semester, a student who withdraws prior to the end of the 12th week of a regular semester or the sixth week of a summer session, or proportionate periods for block or short courses, will receive a grade of "W" (withdrawn) on the student's academic record. A student who withdraws after the 12th week of a regular semester or the sixth week of a summer session but prior to "Pre-finals Week," will receive a grade of "W" (withdrawn) or "F" (failing) as assigned by the instructor of each course. The grade of "W" or "F" will be recorded on the student's academic record and the grade of "F" will be calculated in the grade-point average.

After the beginning of "Pre-finals Week" a student may not withdraw from the University and will be assigned only the grade of "A," "B," "C," "D," or "F" or (when appropriate) "I," "NP," "P," "S," "U," or "X" by the instructor of each course at the end of the semester or summer session.

Vehicle Registration and Parking Regulations

Any vehicle driven on the campus of the University by an OSU student should be currently registered with the Department of Public Safety. When a vehicle is registered, the student will be given an OSU vehicle registration decal at no cost. The decal is solely for the purpose of

registration and does not afford the student on-campus parking privileges.

Each student is allowed one paid parking permit. The parking permit fee is charged to a student's OSU account. In order to obtain a parking permit, the following items should be presented to the OSU Police Department: a completed Vehicle Registration form, student I.D., and, if living in a residence hall, a Residence Hall contract.

Parking permits for motorcycles, motor-propelled bicycles and scooters may be purchased, and such permit holders will be provided special parking areas.

Bicycle registration may be obtained without charge, an advantage in the event the bicycle is stolen or lost. When bicycles are recovered by the OSU Police, they are checked against bicycle serial numbers maintained in the registration files for return to the rightful owners.

A copy of the OSU Public Safety Guide is available from the Parking Office, 104 USDA Building, located at Farm Road and Orchard Street.

Veteran Services

Oklahoma State University maintains a full-time office of veteran services for the convenience of veterans and their dependents. OSU is an approved institution for students to receive education benefits by the Department of Veteran Affairs (DVA). Information and assistance is available for completion of appropriate forms necessary to apply for education benefits. The DVA has specific requirements regarding course work and attendance; contact the veterans representative for further information. The office is located in the Office of the Registrar, 103 Whitehurst.

Faculty and Staff Enrollment in University Courses

The advance fee payment is waived for permanent full-time employees. These employees may audit courses after securing an audit form and paying one-half the general fee. Any individual 65 years or older may audit a class at no charge.

Faculty. Permanent (tenure track), full-time (100%) members of the faculty may enroll for credit in one course per semester or a maximum of five hours during normally scheduled working hours and pay one-half the general and activity fees in effect at that time. Exceptions may be permitted only with approvals of the department head, dean and appropriate vice-president. If enrollment does not exceed one course, only the department head's approval is needed to receive a

fee waiver. If the employee is enrolled in more than one course, the employee's dean and vice-president must also give approval for a fee waiver. Some courses taught through extension and correspondence study are excluded. For more information, refer to the *Policy and Procedures Letters*.

Administrative/Professional and Classified Staff. Permanent, full-time (100%) active status staff members who meet the academic requirements of the University may enroll for credit and pay one-half the general and activity fees in effect at that time. Enrollment in University courses which meet during the staff member's normal working hours will be limited to one course or a maximum of five hours. There is no limit on the number of courses a staff member may enroll in after normal working hours. If enrollment does not exceed one course, only the department head's approval is needed to receive a fee waiver. If the staff member is enrolled in more than one course, his or her dean and vice-president must also give approval for a fee waiver. Some courses taught through extension and correspondence study are excluded. For more information, refer to the *Policy and Procedures Letters*.

Early Enrollment. Full-time employees of the University who have approval for enrollment may turn in their Trial Schedule forms to the Office of the Registrar any time after the class schedule book is available. An effort will be made to schedule classes of full-time employees to minimize conflict with their University employment.

Official Records

Freshman Progress Reports

The faculty will report grades for all freshmen on the dates as printed in the official University calendar. The dates will normally be prior to mid-semester. Progress reports are made available to freshman students shortly afterward. Copies are made available to the students' advisers and the students' deans.

Grade Reports

Reports of the grades of all students are compiled and released shortly after the end of each semester by the Office of the Registrar. These reports are made available to the students, the students' advisers and the students' deans.

Official Transcripts

All official transcripts of students' academic records at OSU are prepared and released by the Office of the Registrar. The official transcript includes the academic record, both undergraduate and graduate. It contains the signature of a University official and the official, imprinted seal of the University. Primary usage of the official transcript is for application for transfer to other academic institutions and for employment purposes.

Transcripts of academic records at the University may be ordered in person or by mail from the Office of the Registrar, Transcripts Section, 103 Whitehurst, Oklahoma State University, Stillwater, Oklahoma 74078-1013. Official transcripts will not be available until approximately one week after final examinations. Requests should include the following:

1. Student's full name (include maiden or other name if applicable).
2. Student I.D. number.
3. Birthdate.
4. The last semester the student attended.
5. Whether the current semester grades and degree are to be included when a transcript is ordered near the end of a semester.
6. Full names of the recipients of the transcripts, whether they are agencies, colleges, or individuals. Complete mailing addresses should also be included.
7. Student's signature. (This is the student's authorization to release the records to the designee.)

A student having delinquent financial obligations to the University will not be granted a transcript.

Copies of transcripts from other institutions cannot be furnished.



Students' Rights to Privacy

The Family Educational Rights and Privacy Act of 1974 (Buckley Amendment) was designed to protect the privacy of educational records, to establish the right of students to inspect and review their educational records in all offices, and to provide guidelines for the correction of inaccurate or misleading data through informal and formal hearings.

An OSU student has the right to:

1. Inspect and review information contained in his or her educational records.
2. Challenge the contents of the educational record.
3. Have a hearing if the outcome of a challenge is unsatisfactory.
4. Submit an explanatory statement for inclusion in the educational record, if the outcome of the hearing is unsatisfactory.
5. Secure a copy of the institutional policy, which includes the location of all educational records.
6. Prevent disclosure, with certain exceptions, of personally identifiable information from the educational record.

Withholding Disclosure of Information. Currently enrolled students may withhold disclosure of directory information. A student may file with the Office of the Registrar a written request not to release directory information. The University assumes that failure on the part of any student to specifically request the withholding of directory information indicates individual approval for disclosure.

Access to Records. No other information regarding students' educational records may be disclosed to anyone without written consent of students, except to "school officials" who have a "legitimate educational interest" in the student.

Students, or parents of dependent students, may inspect and review their educational records. Some form of photo identification must be displayed before access to educational records will be allowed. Parents of a dependent student may challenge denial of access by producing the most current copy of Internal Revenue Form 1040.

Definitions. "Educational Record" refers to those records which are directly related to a student and are maintained by an educational institution.

"Directory Information" includes: student's name; local and permanent addresses; telephone number; date and place of birth; major field of study; weight and height of students participating in officially recognized sports; dates of attendance at Oklahoma State University;

degrees, honors, and awards granted or received; academic classification such as freshman, sophomore, junior, senior, etc.; sex; educational institutions previously attended; degree(s) held, date(s) granted, and institution(s) granting such degree(s); dissertation or thesis title; adviser or thesis adviser; participation in officially recognized organizations, activities, and sports.

"School official" is defined as an individual currently serving as a member of the Oklahoma State University Board of Regents or classified as faculty, administrative, or professional, and the staff such school officials supervise. "Legitimate educational interest" is defined as an interest which results from the duties officially assigned to a school official and which are related to such a school official's responsibility for facilitating the student's development.

Costs

Fees and Tuition

It is extremely important that students carefully consider the total financing of their education, from the entering term to the completion of the degree. If financial help will be needed beyond those funds which the student or the family is able to provide, the student should make the necessary applications for financial assistance well in advance of enrollment. Students should pay particular attention to early deadlines for application for grants, scholarships, work-study, and Perkins Loans. While the needs and resources of each student differ, the University can provide a general list of fees and expenses normally encountered.

Students are given information at the time they complete their enrollment on the procedures and deadlines for payment of tuition and fees. (See "Financial Obligations" elsewhere in the *Catalog*.)

The required fees and nonresident tuition for Oklahoma State University are listed below. General fees and nonresident tuition are based on level of course. All course offerings are listed by four-digit numbers with the first digit indicating level of course. Lower-division courses are all courses with the first digit 0 through 2. Upper-division courses are all courses with the first digit 3 or 4. Graduate-division courses are all courses with the first digit 5 or above.

The figures which follow are for the 1999-2000 academic year. These fees

are subject to change without notice, as provided by University, Board of Regents, and OSRHE policies.

Oklahoma Residents

Lower-division courses

\$61.00	Resident tuition
\$5.11	Student activity fee
\$1.00	Student assessment fee
\$4.30	Facility fee
\$1.50	Library automation and mainframe fee
\$5.00	Technology fee*
\$77.91	Total per credit hour
\$2.00	<i>The Daily O'Collegian</i> fee per semester
\$46.00	Student health services fee per semester**
\$5.00	Records maintenance fee per semester

Upper-division courses

\$65.00	Resident tuition
\$5.11	Student activity fee
\$1.00	Student assessment fee
\$4.30	Facility fee
\$1.50	Library automation and mainframe fee
\$5.00	Technology fee*
\$81.91	Total per credit hour
\$2.00	<i>The Daily O'Collegian</i> fee per semester
\$46.00	Student health services fee per semester**
\$5.00	Records maintenance fee per semester

Graduate-division courses

\$86.00	Resident tuition
\$5.11	Student activity fee
\$4.30	Facility fee
\$1.50	Library automation and mainframe fee
\$5.00	Technology fee*
\$101.91	Total per credit hour
\$2.00	<i>The Daily O'Collegian</i> fee per semester
\$46.00	Student health services fee per semester**
\$5.00	Records maintenance fee per semester

Nonresidents of Oklahoma

Lower-division courses

\$61.00	Resident tuition
\$5.11	Student activity fee
\$1.00	Student assessment fee
\$4.30	Facility fee
\$1.50	Library automation and mainframe fee
\$5.00	Technology fee*
<u>\$136.00</u>	Nonresident tuition
\$213.91	Total per credit hour
\$2.00	<i>The Daily O'Collegian</i> fee per semester
\$46.00	Student health services fee per semester**
\$5.00	Records maintenance fee per semester

Upper-division courses

\$65.00	Resident tuition
\$5.11	Student activity fee
\$1.00	Student assessment fee
\$4.30	Facility fee
\$1.50	Library automation and mainframe fee
\$5.00	Technology fee*
<u>\$153.00</u>	Nonresident tuition
\$234.91	Total per credit hour
\$2.00	<i>The Daily O'Collegian</i> fee per semester
\$46.00	Student health services fee per semester**
\$5.00	Records maintenance fee per semester

Graduate-division Courses

\$86.00	Resident tuition
\$5.11	Student activity fee
\$4.30	Facility fee
\$1.50	Library automation and mainframe fee
\$5.00	Technology fee*
<u>\$188.50</u>	Nonresident tuition
\$290.41	Total per credit hour
\$2.00	<i>The Daily O'Collegian</i> fee per semester
\$46.00	Student health services fee per semester**
\$5.00	Records maintenance fee per semester

*College of Engineering, Architecture, Technology students pay \$19.00 per credit hour.

College of Osteopathic Medicine

Oklahoma Residents

\$9552.00	Resident tuition per year
\$84.00	Student activity fee per year
\$100.00	Student computer laboratory fee per year
\$330.00	Student curriculum materials and laboratory fee (first year) (\$220.00 second year)
\$92.00	Student health service fee per year
\$100.00	Student liability insurance fee per year (maximum)
\$130.00	Hepatitis vaccine (first year)

Nonresidents of Oklahoma

\$24,244.00	Nonresident tuition per year
\$84.00	Student activity fee per year
\$100.00	Student computer laboratory fee per year
\$330.00	Student curriculum materials and laboratory fee (first year) (\$220.00 second year)
\$92.00	Student health service fee per year
\$100.00	Student liability insurance fee per year (maximum)
\$130.00	Hepatitis vaccine (first year)

College of Veterinary Medicine

Oklahoma Residents

\$2,957.00	Resident tuition per semester
\$5.11	Student activity fee per credit hour
\$4.30	Facility fee per credit hour
\$1.50	Library automation and mainframe fee per cr. hr.
\$15.00	Technology fee per credit hour
\$2.00	<i>The Daily O'Collegian</i> fee per semester
\$46.00	Student health services fee per semester**
\$5.00	Records maintenance fee per semester
\$141.47	Resident fee per credit hour

Nonresidents of Oklahoma

\$2,957.00	Resident tuition per semester
\$5.11	Student activity fee per credit hour
\$4.30	Facility fee per credit hour
\$1.50	Library automation and mainframe fee per cr. hr.
\$15.00	Technology fee per credit hour
\$5,964.00	Nonresident tuition per semester
\$2.00	<i>The Daily O'Collegian</i> fee per semester
\$46.00	Student health services fee per semester**
\$5.00	Records maintenance fee per semester
\$141.47	Resident fee per credit hour
\$272.95	Nonresident fee per credit hour

**Students enrolled in six or fewer hours pay \$7.00, without use of medical services.

College of Veterinary Medicine students who repeat course work will be charged an amount per credit hour for Oklahoma residents and nonresidents. Nonresidents will also be charged nonresident tuition per credit hour.



Fees for Special Services

All students pay special fees each semester to contribute to the betterment and general welfare of the campus community. The activity fee provides partial support to such programs, services and organizations as the Student Government Association, collegial student councils and related student organizations, Allied Arts, fine arts, athletics, intramural activities and sports clubs, minority student organizations, and the Student Activities Office. User's fees, other fund-raising

activities, and, in some cases, membership dues provide the remaining support to make these positive, constructive, and meaningful programs and services available to all students.

The *assessment* fee provides for skills assessment and evaluation of students' capabilities at various stages of their academic careers, and to get feedback from students regarding their course work.

Students regularly enrolled in the University are assessed *facility, health and activity* fees that entitle them to use the Student Union, the Colvin Physical Education Center, and the Health Clinic, and that provide support for student governance, organizations and programs. Certain groups of students in special courses may be on campus for very short time intervals or may be required by the University to reside off-campus for the entire semester. Such students will not be charged health and activity fees when enrolled (1) only in a specialized course(s) offered for a special-interest group and not in any other course(s) in the University or (2) in a course(s) which requires that the student reside off the campus for the entire semester or summer session (medical technology, geology and forestry summer camps). Such courses typically are offered at unusual times and presented in a concentrated curriculum format. Other extenuating circumstances may be cause to consider denying use of and charge for these facilities or participation in activities sponsored by these fees.

The *library automation and mainframe* fee defrays the cost of equipment, software, and other aspects related to operating the on-line computerized library service.

The *technology* fee provides for the maintenance of existing facilities, and the expansion and development of central and collegiate facilities, software, and

multimedia capabilities. This fee is apportioned between a central (University) fee and a college fee; all courses are charged the central fee (per semester credit hour) and the college fee (per semester credit hour) based on the rate approved for the college that teaches the specific course.

Students enrolled in seven or more hours per semester will be assessed a *health services* fee that includes a fee for comprehensive health and pharmacy services. Health and pharmacy services are available to students enrolled in six or fewer hours if the student chooses to pay the full fee.

The *records maintenance* fee provides for the basic graduation cost, the maintenance of the academic record system, and issuance of official transcripts.

Special Class Charges

In certain courses, special services, supplies or equipment may be used. Costs for these are not normally covered by fees, tuition or departmental operating budgets, and, therefore, the cost is incurred by the student. Special charges are listed in each semester's class schedule book.

Special Fees

Advanced standing examination fee	
Locally developed (no charge)	
Nationally developed national agency rate	
Application fee for all undergraduate, osteopathic medicine, and graduate students	\$25.00
Audit without credit same as Oklahoma resident tuition	
Automobile parking permit (per year):	
Campus residents	\$44.00
Off-campus residents	\$54.00
Graduation fees:	
Fourth-year osteopathic medicine	\$15.00
Thesis binding fee each	\$6.00
Dissertation microfilming fee each	\$35.00
Health risk assessment fee for first-time students	\$20.00
International student status maintenance fee:	
per semester	\$15.00
per summer session	\$10.00
Late enrollment fee:	
after classes begin	\$25.00
Remedial	
Supplementary fee	\$24.00
(per credit hour, in addition to the general fee)	

Other Expenses

Books and supplies used by the student are available in the University Bookstore at reasonable prices. Additional incidental and personal expenses such as clothing and entertainment will depend upon the individual student.

Sponsored International Students. It is the long-established practice of Oklahoma State University to charge a special administrative/management/programming fee for sponsored international students who need extra assistance and/or whose sponsors have indicated a requirement for supplementary assistance. This assistance is beyond the scope of the regular University program established for domestic students. The customary fee is \$275.00 per semester. It is the established practice and policy of the University to charge appropriate amounts for such items as special training, research costs, enrichment, necessary travel and transportation, and other costs as may be required to provide a complete and appropriate program of education for sponsored international students. The Office of International Students and Scholars is designated to coordinate, expedite, and administer all aspects of procedures pertaining to such programs of education and training. Sponsors should direct all matters to the University's Office of International Students and Scholars, 076 Student Union. Electronic mail may be sent to thuff@okway.okstate.edu. The fax number is (405) 744-8120.

Fee Policy for Faculty and Staff

The advance fee payment, the facility fee and the student health center fee are waived for permanent, full-time faculty and staff. These employees are eligible to enroll for credit or audit courses and be charged fees at the rate of one-half the amount charged other students under the University fee waiver policy (one-half the general fee, for auditing only, and one-half the activity fee). To be eligible under this fee policy, an employee-student must submit a completed Request for Faculty-Staff Fee Waiver form to the Office of the Registrar prior to the beginning of classes. If the form is not on file prior to the beginning of classes, the student will not be granted the waiver in fees.

Any individual 65 years or older may audit a class at no charge.

Fee Policy for Graduate Assistants

The University will waive the nonresident tuition for graduate assistants em-



ployed at least one-fourth time in instruction, research or extension. Such waiver will include the summer term immediately following employment as a graduate assistant for the spring semester, even though the student is not employed for that summer term.

Refunds

Refunds and deposits that may be due a student will be first applied to encumbrances owed to the University.

Drop Fee Policy

A student dropping a course prior to the end of the second week of a regular semester or the first week of a summer session will receive a 100 percent refund of fees. No refund of fees will be given for courses dropped after the second week of a regular semester or the first week of a summer session.

Withdrawal Fee Policy

A student withdrawing from the University during the first two weeks of a regular semester or during the first week of a summer session will receive a refund of fees. The percentage of fees to be refunded:

Prior to the third week of a semester or the second week of a summer session—
100 percent

After the second week of a semester or the first week of a summer session—
0 percent

A student withdrawing from a short session will receive a refund during the first one-eighth of the session. Title IV recipients follow federal refund guidelines.

Repayment Policy

Financial aid is considered to be used first for direct educational costs (tuition and fees) and, if the student is in University housing, for room and board. Therefore, if a student financial aid recipient withdraws and is eligible for a refund of tuition and fees and/or room and board, all or part of this refund will be used to reimburse the Title IV financial aid program(s) up to the amount of assistance that the student received from the program(s).

If a student receives cash from financial aid in excess of non-institutional costs, part of this aid may be required to be repaid; the amount of the repayment depends upon how many weeks the student was enrolled and the amount of aid received.

When there are multiple disbursements of aid, the assumption is made that the first disbursement(s) is used to pay institutional charges. Therefore, if cash is disbursed, the cash is derived from the last disbursement(s) prior to the disbursement of cash.

A detailed policy can be obtained from the Office of Scholarships and Financial Aid.

Fee Refund Policy for Students Entering Military Service

If a student enters military service during the term in which he or she is enrolled and has not completed sufficient work for receiving grades, but is in good standing academically, the University will waive enrollment fees for the student during the term in which he or she re-enrolls after military service has been completed. The amount of the fee waiver is equal to the amount of fees paid for the semester during which withdrawal occurred. If the University finds that it is not feasible to waive the enrollment fees, it will make a refund to the student of the full amount of fees paid.

If a student enters military service during the term and is not in good academic standing at the time, the regular fee refund policy of the University applies.

Residence Hall Rates

All rates are approved by the OSU Board of Regents and are subject to change. The rates listed below were effective for the academic year 1998-99.

Residence Halls

Men's Halls	Women's Halls
Bennett Apts.	Bennett Apts.
Bennett	Bennett
Kerr	Drummond
Iba	Iba
Parker	Parker
Stout	Stout
Wentz	Wentz
Willham South	Willham North

Meal Plan Charges

	Semester Charge
375 passes/semester	\$1,312.00
325 passes/semester	\$1,236.00
250 passes/semester	\$1,084.00
175 passes/semester	\$944.00
100 passes/semester	\$580.00

Room Rent Charges. All halls provide a telephone instrument and local phone service in each room, and cable TV in

floor lounges. Single rooms are available in all halls, except the Bennett Apartments, for approximately 1.6 times the double room rate.

Kerr, Drummond, Parker Residence Halls (Air-conditioned, room cable TV, computer jack.)

	Semester Charge
Double Room	\$1,056.00

Willham North and South Residence Halls (Air-conditioned and room cable TV.)

	Semester Charge
Double Room	\$1,032.00

Bennett Residence Hall (Room cable TV.)

	Semester Charge
Single Room	\$980.00

Iba Residence Hall (Air-conditioned, computer jack) (Iba is open only to students who are sophomores and above.)

	Semester Charge
Double Room	\$1,024.00

Stout Residence Hall (Stout is open only to students who are sophomores and above, and is open continuously from the beginning of the fall semester to the end of the spring semester.)

	Semester Charge
Single Room	\$980.00

Wentz Hall (Air-conditioned, room cable TV, computer jack.) Assignment to Wentz Hall follows these priorities: (1) students who need year-round housing (housing during breaks); (2) students enrolled in the Graduate College; (3) undergraduates, sophomore level or above. These rates cover charges for the academic year in Wentz from one week prior to the beginning of classes in August through one week after commencement in May, including all break periods. Wentz is also open for the period May through August at an additional charge.

	Semester Charge
Double Room	\$1,157.00

Bennett Apartments

(Air-conditioned, room cable TV, computer jack, and is open continuously from the beginning of the fall semester to the end of the spring semester).

The Bennett Apartments are available for men and women. The apartments range from two bedroom, two bath and a living room for three or four residents, to two bedrooms, or a living room and one bedroom with bath for two residents. To request an apartment the student should write Bennett Apartments as one of the hall choices.

Per Person	Semester Charge
2 Per Bedroom	\$1,188.00
1 Per Bedroom	\$1,528.00

University Apartments

Rates include a telephone instrument and local phone service in each apartment. Basic cable TV service is included in the rent.

The University operates apartments to house married and single parents, and a limited number of single graduate and upperclass students. Priority is given to families and graduate students. Individuals should apply eight to 10 months in advance to assure choice of apartments.

Furnished apartments include coffee table, end or corner table, one table lamp, a love seat, two occasional chairs, a nightstand, double or single beds as needed, and a study desk. Table lamps and nightstands may not be available in the lowest rent rate area.

The following 1998-99 rates include all utilities (gas, water, electricity and local digital telephone service.)

	Monthly Charge
Rate 1 Apartments (AC optional) (Williams, 12-15, Prossor, Morrison areas)	\$396.75
Air conditioning, optional	\$65.00
Apartment furnishings, optional for all apartments	\$28.00
Rate 2 Apartments (AC optional) (West, Stevens, Demaree areas)	\$412.88
Rate 3 Apartments (AC included) (Williams, 101-105, Brumley areas)	\$490.28

Estimated Total Expenses for Students

An estimated budget (based on 1998-99 figures) for an undergraduate student at OSU is as follows:

Resident

Tuition and Fees (Based on 14 credit hours)	\$1,100.00
University Housing and Board (Based on average, double occupancy, residence hall charges)	\$2,825.00
Textbooks and Supplies	\$415.00
Ave. Misc. Personal Expenses	\$1,350.00
Total Per Semester	\$5690.00

Nonresident

Tuition and Fees (Based on 14 credit hours)	\$2,975.00
University Housing and Board (Based on average, double occupancy, residence hall charges)	\$2,825.00
Textbooks and Supplies	\$415.00
Ave. Misc. Personal Expenses	\$1,350.00
Total Per Semester	\$7,665.00

Financial Obligation

Robert E. Dixon, Jr., Bursar

Laurie Beets, C.P.A., Assistant Bursar

John Smith, Manager, Bursar Systems

Rosemary Stallbaumer, Assistant Director, Student Loans/Debt Management

Enrollment at Oklahoma State University incurs certain obligations and commitments on the part of an individual student, one of which is the student's responsibility to pay in a timely manner all financial amounts owed to the University. In order to remain in good financial standing with the University, and thereby continue to participate in its educational programs, services and benefits, a student must meet all financial obligations incurred at the University on or before the due dates. Students with financial difficulty should immediately contact the Office of the Bursar for assistance and guidance.

All students are required to pay an advance fee payment of \$40.00 toward their estimated fees at the time of enrollment. This advance payment will be credited to the student's account and applied to outstanding charges during the last semester of attendance. A student may request a refund of the advance payment at any time in which it is not required to hold an enrollment and there are no outstanding charges against the account.

Fees and tuition will appear on the regular monthly statement that is mailed to the student's local address or specified billing address. Students are responsible for ensuring that the address maintained and shared by the offices of the Registrar and the Bursar is current and accurate. For convenience, students may update their local or permanent addresses in either office. However, students wanting to change or add a billing address must do so at the Office of the Bursar. Failure to receive a bill does not relieve the student from the financial obligation, any finance charges, and other penalties that may occur if the account is not paid by the monthly due date.

All fees (required and optional) and tuition associated with the student's enrollment are due in the Office of the Bursar no later than 4:30 p.m. on the 15th day of each month following billing. Fall semester fees are due by September 15, spring semester fees are due by February 15, and summer session fee due dates vary depending on the session. All delinquent accounts will accrue an interest penalty at the rate of 1.5 percent monthly (19.56 APR).

Accounts must be cleared before the student can obtain the release of any records, obtain a transcript, receive a diploma, or enroll at Oklahoma State University for subsequent semesters. Students having difficulty in meeting their financial obligations should contact the Office of the Bursar for assistance.

It is the policy of the University to apply all financial aid to the student's account, withhold an amount equal to all charges showing on the student's account for the semester (fees, tuition, housing, etc.) and then refund the balance. OSU complies with the U.S. Department of Education, rules and regulations in accordance with *The Federal Student Financial Aid Handbook* instructions.

Scholarships and Financial Aid

Charles W. Bruce, Director

Patrick Kennedy, Assistant Director, Administrative Services

Gary Garoffolo, Assistant Director, Programs

Beverly Morris, Coordinator, Federal Work Study Programs

Margaret Betts, Coordinator, Information Services

Cathy Bird, Coordinator, Records Management

Bonnie Joerschke, Senior Counselor

Kim Bradley, Counselor

Robert Choate, Counselor

Sandra Dearing, Counselor

Karen Finley, Counselor

Judith Finnegan, Counselor

Tuition Waivers

Tuition waivers are awarded to undergraduate and graduate students on the basis of both demonstrated financial need and academic achievement. Awards range from approximately \$750 to \$1,500 per year for Oklahoma residents. Freshman waivers (single and multi-year) are awarded to entering students who have attained a high scholastic standing in high school. Transfer waivers are offered each year to outstanding students transferring from two- and four-year colleges to OSU. Applicants should apply by February 1 for priority consideration.

Tuition waivers for upperclass students are awarded each year to continuing OSU students who have completed at

least 24 credit hours and who have outstanding academic records.

Graduate students should contact their academic departments and the Graduate College regarding application procedures and scholarship deadlines.

Nonresident students entering OSU should also inquire about policies for waivers of out-of-state tuition. Such awards are possible based on the student's academic accomplishments, the student being the child or grandchild of an OSU alum, or the student being a member of a Native American tribe based in Oklahoma.

Leadership Awards

Through the President's Distinguished Scholarship, the OSU Foundation provides awards (\$8,000) for the high school graduates with superior academic and leadership skills.

The President's Leadership Council consists of approximately 100 freshman leaders who study a special curriculum in leadership seminars and receive scholarships (\$1,500).

Other OSU Scholarships

Both undergraduate, graduate and professional students are encouraged to explore other scholarship opportunities that may be offered by the various colleges and academic departments at OSU. The Office of Scholarships and Financial Aid and the student academic services office of each college are excellent resources for specific scholarship information.

The student may wish to use the computerized scholarship search program, FINDS, to assist in locating other OSU scholarship sources. FINDS is located in the office of Scholarships and Financial Aid.

Federal Aid Programs

Students who need financial assistance to attend college are encouraged to consider the many types of financial aid available through the OSU Office of Scholarships and Financial Aid. These programs include scholarships, grants, loans, and part-time jobs.

Financial aid at OSU is awarded on the basis of demonstrated financial need. Each student who wishes to be considered for need-based assistance should complete the Free Application for Federal Student Aid (FAFSA) and submit it to the processing center as soon after January 1 as possible to receive aid for the succeeding academic year. FAFSA

packets are available at the Office of Scholarships and Financial Aid as well as at most colleges and high schools. Early application is encouraged due to the high demand for available money. Students can apply for assistance by submitting the paper FAFSA or they can file electronically by accessing the U.S. Department of Education's "FAFSA on the Web" application site (www.fafsa.ed.gov).

An analysis of the FAFSA is used to determine demonstrated need for federal, state, and institutional programs such as Federal Pell Grants, Federal Supplemental Educational Opportunity Grants (FSEOG), Oklahoma Tuition Aid Grants (OTAG), Federal Perkins Loans, William D. Ford Federal Direct Loans, Federal Work-Study (FWS), and tuition waivers.

There are also programs available for students who do not demonstrate financial need. A number of tuition waivers are awarded solely on the basis of academic achievement, for which standardized test scores and high school and college grade-point averages are used as awarding criteria.

The Federal Direct Parent Loan for Undergraduate Students (PLUS) Program and the William D. Ford Federal Direct Unsubsidized Loan allow graduate students and independent undergraduates, as well as parents of dependent undergraduates, to borrow funds to meet educational expenses.

To be considered for financial aid, a student must:

1. Demonstrate financial need, except for some loan and scholarship programs.
2. Be a U.S. citizen or eligible non-citizen.
3. Be enrolled as a degree or certificate-seeking candidate, including a program of study abroad.



4. Meet minimum satisfactory academic progress standards.
5. Have a high school diploma or GED.
6. Not be in default on any federal loan, not have borrowed in excess of the allowable limits and not owe a refund to any federal grant program (including the Oklahoma Tuition Aid Grant program).
7. Be prompt in responding to any requests for additional information made by the Office of Scholarships and Financial Aid.

Students and parents are invited to contact the Office of Student Financial Aid for information regarding financial assistance programs or to make an appointment with a financial aid counselor to discuss specific eligibility requirements. The office has information about programs and services available on the World Wide Web (<http://www.okstate.edu/finaid/>).

Grants

Undergraduate students who have not completed their first undergraduate degree are eligible to apply for the Federal Pell Grant and Federal Supplemental Education Opportunity Grant. Undergraduate and graduate students who are Oklahoma residents are eligible to apply for the state grant program, the Oklahoma Tuition Aid Grant.

Federal Pell Grant eligibility is determined by the U.S. Department of Education by using a congressionally-approved formula.

Federal Supplemental Education Opportunity Grants are awarded to students who demonstrate financial need as reflected in the FAFSA. Funding in this program is limited and is usually awarded to applicants who demonstrate the most financial need.

Oklahoma Tuition Aid Grants are awarded to eligible Oklahoma residents who may apply by correctly completing the FAFSA. Grant amounts are determined by the applicant's enrollment status, demonstrated need, and by the availability of funds. Students are notified of their eligibility and award amounts by the Oklahoma State Regents for Higher Education, not by OSU.

Federal Work-Study

This program is designed to help students meet their educational expenses through part-time employment. The Office of Scholarships and Financial Aid determines award amounts on the basis of financial need. While all Federal

Work-Study student employees are paid at least the current federal minimum wage, the actual rate of pay depends on their qualifications and the types of jobs they hold. Eligible students may be employed by any participating office or department at OSU or at an off-campus, non-profit agency. The community service agencies must meet federal and OSU regulations, including being non-profit or governmental agencies whose services are available to everyone, regardless of ability to pay. While working in positions directly related to their curricula, students form strong links with the community. By attempting to place students in areas in which they are interested, the Federal Work-Study Program helps to stimulate the development of worthwhile work experience for the student while attending college.

Student Loans

OSU has several loan funds for students who need financial assistance. These funds are available to students who meet the eligibility requirements of the various programs and are making satisfactory progress in their college work.

Institutional loans include short- and long-term loans. The short-term loan program provides up to a maximum of \$300 per semester (less a \$10 service charge) for the purpose of meeting educationally-related expenses which are not charged to a student's University account. Students are billed for the loan through the Office of the Bursar on the billing statement of the month in which they apply. Applications must be made in person at the Office of Scholarships and Financial Aid.

Long-term loan programs consist of the Federal Perkins Loan, William D. Ford Federal Direct Subsidized and Unsub-sidized Loans and the Federal Direct Parent Loan for Undergraduate Students (PLUS).

The rate of interest on a Federal Perkins Loan during the period of repayment is five percent simple interest per annum on the unpaid balance. Funding in this program is limited and is awarded to applicants who demonstrate significant financial need.

The rate of interest on the William D. Ford Loan varies for first-time borrowers, but cannot exceed 8.25 percent. The rate of interest on a Federal Direct Parent Loan is variable but cannot exceed 10 percent.

Scholar Development and Recognition

Bob Graalman, Director

Gail Gillilan, Senior Unit Assistant

Some outstanding OSU students are competitive for a wide range of prestigious national and international scholarships at the end of their undergraduate careers, such as the Rhodes, Marshall, Truman, Goldwater, Udall, and others. In addition, there is a host of lesser-known but still valuable opportunities that require students to prepare competitive applications.

This newly-established office at OSU monitors student progress, provides important information, supplies support, and plans courses and activities that can lead to success in these areas. Interested students can contact the office to inquire about opportunities and strategies; often faculty will nominate candidates who have been performing at a high level academically and displaying other qualities through leadership and community service. Early identification of freshmen and sophomores is especially important in order for the student to gain the most from these programs.

Additionally, as an incentive for the kinds of students who are considered OSU's best and brightest, the Lew Wentz Foundation has provided substantial private funding to OSU for several scholarship programs that are managed in this office. The programs are:

1. Wentz Projects - an opportunity for outstanding undergraduates to plan and perform high-level research under the direction of a faculty mentor (\$4,000 each);
2. Wentz Scholarships - traditional awards based on academic excellence and well-rounded campus activities (\$2,500 each);
3. Wentz Humanities Scholarships - various awards for students in English, history, foreign languages, philosophy, and related scholarly disciplines;
4. Wentz Education Scholarships - various awards for those intending to become teachers in primary and secondary school situations.

Please contact this office for information on programming.

Student Services

Residential Life

Bob Huss, Director of Residential Life

Eddie Denman, Assistant Director of Residential Life—Administrative and Business Services

Carol Hackerott, Assistant Director of Residential Life

Dave Stoddart, Assistant Director of Residential Life

The Department of Residential Life exists to aid its residents' academic pursuits. Students who live on campus graduate faster and maintain higher grades than their off-campus counterparts. The Department of Residential Life provides residence hall space for approximately 5,000, apartments for more than 700, and a dining service program, available to all students and staff, that is nutritional, convenient and enjoyable. All freshmen live in residence halls. Exceptions can be made for one of the following reasons: being married; being 21 years of age or older; living with parents in Stillwater or the surrounding area; being a veteran; living in a fraternity or sorority house (sorority pledges generally live in residence halls due to limited sorority house space); or having completed 27 credit hours. Exceptions must be requested in writing, and approved by the Department of Residential Life.

All accommodations are rented on a contract date priority basis. Prospective students' applications and contracts are encouraged to be sent in 9 months before the desired occupancy in order to receive the preferred on-campus housing location.

Residence Halls

OSU Residence Halls offer a variety of living accommodations: apartments in Bennett, traditional non-air-conditioned space in Bennett and Stout, and contemporary air-conditioned space in Kerr-Drummond, Wentz, Parker, and Willham North and South. Wentz Hall provides year-round housing for graduate and undergraduate students who are 21 years of age or older. (Other students who need continuous housing should request Wentz.) Stout Hall and Bennett Apartments do not close for academic year breaks, but are closed for the summer. Stout and Iba halls are available for students of sophomore standing and above. Parker is open only to students active in the Honors Program.

The Department of Residential Life emphasizes the development of interpersonal skills by having the staff teach leadership skills, group development skills, personal interaction skills, and study skills in noncredit seminars and credit classes. These programs are the formal aspect of helping students become involved in the residence halls. Residence halls and dining centers offer numerous opportunities for student leadership. More than 500 students are involved in planning and leading educational, recreational and social activities within the residence halls.

Residence hall living is relatively inexpensive. Over \$1,400 per year is saved by the average student living in residence halls versus living off campus. Residence hall rates include all utilities including telephone (cable TV and computer jacks in some halls). The 325 passes per semester meal plan costs approximately \$3.50 per meal. The in-hall laundry facilities are convenient and economical as is the on-campus parking. Residence hall rates rarely increase during the academic year.

Students are offered several lifestyle options from which to choose. The Independent Living Centers of Stout, Iba and Wentz provide more student responsibility including a 24-hour visitation option.

In every residence hall there is a well-trained professional staff to coordinate the day-to-day operations of the building, as well as student staff whose primary function is to see that students benefit educationally from their residence hall living experience. Each floor or wing has a live-in student staff member (resident assistant) responsible for assisting and guiding the residents. Resident assistants are undergraduate students specially trained in all aspects of residence hall living with the experience and knowledge to answer questions and act as an adviser for student government and programs.

Students may choose from five different meal plans, (freshmen are required to take at least 175 passes per semester) depending on their individual needs. Some non-freshman students choose not to be on the meal plan. A variety of offerings are available in the four dining centers (Bennett, Kerr-Drummond, Scott-Parker-Wentz, and Willham.) Any student may eat any meal in any of the four dining centers. Each dining center offers a unique menu. Specialty menus include delicatessen, health club, country cooking, Italian, fast food, Mexican, wok cooking, and others. These specialty plans vary as the students' needs change. A pizza restaurant and a convenience store are housed in Kerr-Drummond, and a bakery in Scott-Parker -Wentz. Dining is available more than 16 hours a day.

For more information, contact the Department of Residential Life, Oklahoma State University, Iba Hall, Stillwater, Oklahoma 74078.

Mobility Impaired Student Housing

All residence halls and many university apartments offer some housing for students who have impaired mobility. Upon notification, the Department of Residential Life routinely modifies rooms and apartments to meet an individual's special needs. This modification may take several months, so advance notification is critical.

University Apartments

More than 700 all-brick apartments are available within walking distance of all classrooms and the library. These apartments serve students in the following priority: families, single graduate students, and single, upperclass, undergraduate students. Priority for single students is given to those who have lived in the residence halls. All apartments are two-bedroom units with optional furnishings.

The apartments have attractive outdoor surroundings with sidewalks, off-street parking, play areas, and laundry facilities provided in the University laundry and Brumley Apartments.

School bus transportation is provided to the Stillwater Middle School and High School, and one of the elementary schools. All other schools are within one and one-half miles of the housing area.

The Family Resource Center, located in the University Apartments area, offers a variety of programs to meet the needs of University Apartment residents. These programs vary depending upon the needs of the clientele as determined by surveys and individual meetings with residents. Typical programs have included: English as a Language classes (ESL), after-school programs, car seat loans, toy library, child care information, and pot luck dinners. The Family Resource Center (FRC) also has a small cafe - the World Cup Cafe.

University Apartments provide an on-site staff member, an apartment assistant who is readily available to the residents. Each apartment assistant has responsibility for about 90 apartments. The assistant's duties include helping residents resolve inter-apartment conflicts, meet neighbors and find appropriate community services. They also provide information about the facilities and the University, and provide referrals to appropriate University offices for residents' needs.

The apartment assistant can be a very helpful person for all residents.

For more information contact the University Apartments Office, 120 Brumley, Oklahoma State University, Stillwater, Oklahoma 74078.

Students with Children

Information on child care in the Stillwater community is available at the following locations on campus:

Family Resource Center — 719 N. Walnut

Nontraditional Student Services — 060 Student Union, Marie Basler, *Coordinator*

Adult Student Organization — 045 Student Union

University Counseling Service

Suzanne M. Burks, *Director*

Baiba Ercum, *M.D.*

Jack Davis, *Clinical Counselor*

Rex Finnegan, *Senior Clinical Counselor*

Connie Fox, *Senior Clinical Counselor*

Rex Finnegan, *Senior Clinical Counselor*

Joni Hays, *Senior Clinical Counselor*

Theresa Horton, *Senior Clinical Counselor*

Kris Stenberg, *Senior Clinical Counselor*

Teresa Tully, *Clinical Counselor*

Cindy Washington, *Clinical Counselor*

The University Counseling Service provides confidential professional personal and career counseling for OSU students. Both individual and group counseling is available.

Assistance is offered for emotional problems, as they affect personal and academic goals, intellectual functioning or relationships with others. Among the variety of concerns dealt with in counseling are stress, anxiety, depression, eating disorders, substance use/abuse, interpersonal relationships, career counseling, career and personality assessment. Psychiatric consultation is available as needed.

University Counseling Service also assists students with problems, concerns, and experiences relating to educational difficulties; i.e. study habits,

unusual test-taking stress, lack of motivation, or attitudes related to school.

University Counseling Service operates the Career Resource Center. The center provides walk-in assistance for OSU students. It contains books, handouts and computerized resources on careers, study strategies, scholarship and graduate school searches, resumes, cover letters and job search development strategies.

A broad range of developmental and proactive programming is offered through University Counseling Service in outreach and service to living groups, organizations and academic classes.

Minimal fees are assessed for individual and group counseling, for certain tests, for specific programs or workshops and for some career assessments. Depending upon the need, tests and other University services may be used in conjunction with counseling.

All information regarding appointments and content of counseling is strictly confidential.

The University Counseling Service is an accredited member of the International Association of Counseling Services, Inc.

Student Disability Services

Debra Swoboda, Coordinator

Student Disability Services is committed to providing support services to students with physical and learning disabilities. The underlying philosophy of the program is to provide support services that will facilitate the academic progress of each individual student. A plan for services is developed on an individualized basis and may include academic advisement, specialized testing, recorded textbooks, academic accommodations, technological assistance, and other services as requested. Students may initiate a request for services by contacting Student Disability Services.

Student Health Center

**Steve Rogers, C.H.E., M.B.A.,
Director**

**Ronald R. Sanders, M.D., Chief of
Staff**

A student enrolling at Oklahoma State University for the first time is required to present a Health Risk Assessment or a record of a physical examination by his or her private physician, or present a recent equivalent record of physical examination, such as a record from a

place of employment or school, or the Armed Forces. An immunization record is of utmost importance. This health report is for determination and evaluation of the condition of the student so that corrective measures may be taken.

Oklahoma State University is as interested in the student's physical and emotional well-being as it is in his or her intellectual and cultural development. Good health will not guarantee academic success, but it will help; while poor health, either physical or emotional, can impair both the academic and the extracurricular career.

The OSU Student Health Center maintains a staff of full-time physicians, mental health professionals, nurses, laboratory, pharmacists and x-ray technicians, and other necessary supportive and ancillary personnel who make a specialty of providing the best possible care at the least possible expense for the student. Along with this full-time help, there are part-time specialists in psychiatry and radiology.

The Student Health Center is an ambulatory primary care facility, designed to provide cost-effective, physician-directed health care to students. A fee is charged to cover direct costs on laboratory, x-ray, pharmacy and elective services. In the event a medical condition exists that is beyond the scope of the services offered, referrals can be made to a family physician, or a local physician in Stillwater. Emergency services are offered by Stillwater Medical Center 24 hours a day.

For more information contact the Student Health Center, 1202 West Farm Road, Oklahoma State University, Stillwater, Oklahoma, 74078.

Multicultural Development and Assessment Center

Howard Shipp, Director

Pete G. Coser, Coordinator

Liza Longoria, Coordinator

Teresa Newson, Coordinator

The Multicultural Development and Assessment Center (MDAC) is a comprehensive support service for African-American, Hispanic, Native American and Vietnamese-American students. The program provides educational and personal growth opportunities to enhance the university experience for minority students matriculating at Oklahoma State University. Support services are provided through one-to-one counseling, group counseling, outreach programs, academic skill development programs, and

tutoring. The following areas of student development are emphasized: academic development, personal adjustment/development, motivation, and career goals.

The MDAC staff work closely with other offices of the University. These efforts include direct and indirect assistance in the following areas: recruitment and retention; financial assistance; and career development and employment opportunities.

To enhance the social and cultural opportunities for minority students, MDAC staff members serve as a resource to various minority student groups and organizations in an advisory or consultative capacity. These organizations include: Hispanic Student Association, Afro-American Student Association, Minority Women's Association, Native American Student Association, Vietnamese-American Student Association, American Indian Science and Engineering Society, Burnin' Black Choir, NAACP, Society of Black Engineers, Technicians and Architects, and the Black Greek organizations.

Special Programs, Services and Facilities

Special Programs

The University Honors Program

Robert L. Spurrier, Jr., Director

**K. Celeste Campbell, Coordinator,
Honors Communication and
Advisement**

**Marilyn C. Bisch, Honors Academic
Counselor**

Oklahoma State University is an active member of the National Collegiate Honors Council and the Great Plains Honors Council. The University Honors Program is composed of a university-wide General Honors component and specialized upper-division components at the departmental or college levels. The Honors Program provides academically talented students with the opportunity to study, conduct research, and exchange ideas in an exciting and supportive academic environment. Honors sections are offered in many general education

courses, and special honors seminars and interdisciplinary honors courses are also available. Honors classes are taught by outstanding faculty members, and the classes are small in size to facilitate active student involvement.

Completion of the requirements for the General Honors award leads to special designation on the student's OSU transcript, as does completion of the requirements for the Departmental or College Honors award in the student's academic major. Students who earn a minimum of 39 honors credit hours and complete the Departmental or College Honors award, as well as the General Honors award, with 3.50 OSU and cumulative grade-point averages at graduation, receive the Honors Program degree, including a special entry on their transcripts and special honors diplomas.

Additional advantages for active participants in the Honors Program (minimum of six honors credit hours per semester and 12 honors credit hours for each two consecutive semesters for freshmen and sophomores and three honors credit hours per semester for juniors and seniors) include use of the Honors Program Study Lounge in the Edmon Low Library (with a computer lab), extended check-out privileges for library materials, priority enrollment for the following semester, and an honors housing option in the residence halls.

Admission of new freshmen to the University Honors Program is based on an ACT composite score of 27 or higher (or comparable SAT score) with a high school grade-point average of 3.75 or higher. Application forms are included in the OSU Application for Admission. Students other than new freshmen may be admitted to the program on the basis of their cumulative grade-point averages

(1-59 hours earned: 3.25, 60-93 hours earned: 3.37, 94 or more hours earned: 3.50).

For additional information about the University Honors Program, interested students should consult the director of the University Honors Program, 509 Edmon Low Library.

Pre-law, Premedicine and Other Preprofessional Programs

Students planning to enter a professional school should visit with their advisers and consult professional school admission and course work requirements listed in the specific school catalog. Many professional schools select students with a variety of bachelor's degrees, although others may require a minimum basic core curriculum of varying length and grade-point average. Preprofessional program information is available in such areas as dental hygiene, dentistry, engineering, law, library science, medical technology, medicine, nursing, nutritional sciences, occupational therapy, optometry, osteopathic medicine, pharmacy, physical therapy, physician's associate, radiologic technology, social work, and veterinary medicine. For more information, students should consult their advisers or the director of student academic services of the appropriate college.

Bachelor of University Studies

Individualization and flexibility are the features of the program leading to the degree of Bachelor of University Studies. This program is designed for the goal-directed, motivated and mature student who finds that the present degree programs (majors) at the University will not enable the student to attain his or her educational objectives; it is not intended for students whose educational objectives are undetermined. The Bachelor of University Studies degree permits a student to utilize the total resources of the University available in accomplishing unique educational objectives. The program may or may not prepare a student for a particular occupation or entry into a professional school.

A student who believes that his or her educational objectives can best be fulfilled through a Bachelor of University Studies degree program can obtain information on the program from the office of student academic services in the college in which the student is to be enrolled.

All students who intend to present a program for the Bachelor of University

Studies degree must enroll in one of the colleges of the University. The Bachelor of University Studies degree program must meet requirements stated in the "University Academic Regulations" in the *Catalog*.

Credit By Exam

Oklahoma State University Testing and Evaluation Service is a national test site for the College Board's College Level Examination Program (CLEP). National CLEP testing centers offer two kinds of examinations: general examinations and subject examinations. OSU only grants college credit for subject examinations. Credit earned through these examinations are normally recognized by other colleges and universities throughout the nation.

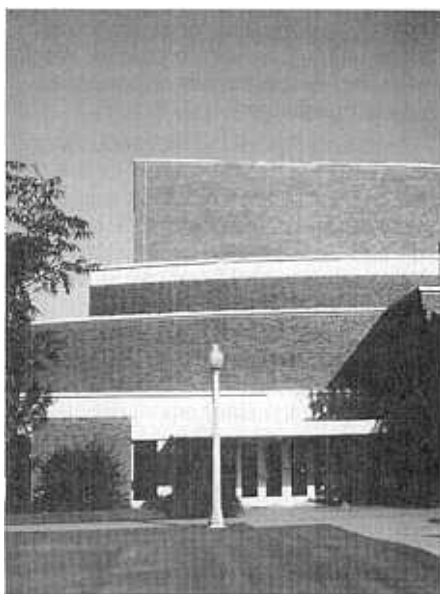
Oklahoma State University is a national test site for Regents College Examination. The University Testing and Evaluation Service administers these examinations in arts and sciences and education.

OSU grants credit for acceptable scores in the Advanced Placement Program (AP) as administered by the College Entrance Examination Board in Princeton, New Jersey. The AP tests are taken by high school students while in high school. High school counselors can be of assistance in making testing arrangements.

Oklahoma State University recognizes credit earned through the International Baccalaureate (IB) Program in a limited number of subject areas. Credit will be awarded to students who have taken Higher Level courses through the International Baccalaureate Program and scored at least a 4 (on a seven point scale) on the Higher Level course examination. This credit will be awarded on a course-by-course basis.

Military personnel and veterans who wish to establish credit for military training should submit to the Office of Admissions a copy of their DD214, (Armed Forces of the United States Report of Transfer or Discharge) or their DD295 (Application for the Evaluation of Educational Experiences During Military Service), and any certificates of completion for military schools attended. OSU also accepts credits earned through the DANTES Subject Standardized tests for active military personnel.

Academic departments on campus at OSU may offer advanced standing examinations in subject areas not offered by the CLEP or AP. Any currently enrolled student whose travel, employment, extensive readings or educational experience appear to have given the student proficiency in a subject that is offered at OSU, equivalent to the proficiency



ordinarily expected of those students who take the subject in a regular class, may apply for an examination on the subject.

A student may apply to take a validation examination for a course taken at an institution that OSU does not recognize as accredited. The dean of the college in which the course is offered appoints a committee of three to construct, administer and evaluate the examination.

Information pertaining to these examinations may be obtained from the Office of Admissions. See also the "Academic Regulations" section of the *Catalog*.

Gerontology Institute

The Gerontology Institute is housed in the College of Human Environmental Sciences. The Gerontology Institute's mission is to serve the growing demand for instruction, outreach and research excellence in the field of aging. It functions as a multidisciplinary program allowing students an opportunity to study in the field of aging. The Institute provides a university-wide focus in coordinating departmental curriculum in gerontology.

The Gerontology Institute was created in response to a widespread interest in course offerings in gerontology. Students can receive an M.S. in gerontology through natural and applied sciences or they can pursue a graduate certificate in gerontology. There is also a bachelor's program in gerontology through the departments of Sociology and Family Relations and Child Development. Doctoral students can include gerontology as an area of specialization in their programs.

The Institute sponsors an annual Ethics and Aging Conference in the Tulsa area for professionals and students in the field of aging.

The headquarters for the Southwest Society on Aging, the largest regional gerontological association in the U.S., is located at the Institute. This partnership allows students an opportunity to network with professionals in the field of aging.

The Gerontology Institute serves as a link between the University and the community in the field of aging, and sponsors student internships in community agencies. The future holds limitless opportunities for continuing innovative partnerships and shared programming between the Gerontology Institute and the community.

Independent and Correspondence Study

Charles E. Feasley, Director

Independent and Correspondence Study (I&CS) provides independent study

opportunities to learners whose work, family responsibilities, physical isolation, or closed course sections may preclude participation in regularly scheduled class meetings. I&CS offers over 150 courses for college credit and continuing education units.

Students may enroll in correspondence study courses at any time without being admitted to OSU and take up to a year to complete course work. Some courses are also offered as video-assisted telecourses or standardized independent study. For these courses, students must be admitted to OSU, enroll through regular campus registration, and complete these courses during one campus semester. Some of these courses also have three campus meetings.

For more information or enrollment, contact OSU Independent and Correspondence Study, 470 Student Union or electronic mail to ICSINF@okway.okstate.edu.

National Student Exchange

The National Student Exchange (NSE) provides OSU students the opportunity to spend a semester or a year at one of over 120 U.S. colleges and universities, including Alaska, Guam, Hawaii, Puerto Rico, and the Virgin Islands. Two Canadian universities in British Columbia and Quebec have also been added to the NSE program sites.

Students also have access to designated study abroad programs offered by participating universities without paying the higher cost of nonresident tuition. The NSE also enables students from other member college and universities to attend OSU at nonresident tuition rates. For additional information and application material contact the study abroad coordinator, Office of International Programs, 307 Center for International Trade Development or by electronic mail at auel@okway.okstate.edu.

Oklahoma Scholar-Leadership Enrichment Program

The Oklahoma Scholar-Leadership Enrichment Program (OSLEP) is a state-wide academic program designed to develop scholarship and leadership abilities of outstanding students. Students study in intensive, five-day seminars with a distinguished scholar and are selected from Oklahoma's 21 four-year colleges and universities. OSU's upper-division and graduate students with a 3.00 GPA are eligible to apply. Freshmen and

sophomores who have demonstrated exceptional academic achievement are also considered. OSLEP seminars carry two hours of credit, and the only cost to students is the tuition for two credit hours and a transcript fee. The seminars are graded on a satisfactory/unsatisfactory basis and are transferred to OSU as Pass/Fail. Application should be made as early in the academic year as possible. Further information and application materials may be obtained from OSU's OSLEP coordinator, Department of Botany, 104 Life Science East.

Semester at Sea

Semester at Sea is an opportunity for OSU undergraduates in good academic standing to earn a semester of credit in a wide range of academic areas while traveling around the world on the *S.S. Universe*. Approximately 50 percent of the semester is spent at sea and 50 percent in various ports allowing students to travel and relate experiences directly to the academic program aboard ship. Specific information may be obtained by contacting the director, 060 Student Union.

Study Abroad

Students at OSU are encouraged to add an international dimension to their education through study abroad. Students may earn OSU credit through reciprocal exchange programs in many European countries including Turkey, and also in Japan. In addition, students may earn OSU credit by participating in summer and short term programs offered by OSU departments and extension units in countries such as the Bahamas, England, France, Italy, Japan, Mexico, Peru and Russia. Students may earn transfer credit through participation in pre-approved study abroad programs offered by other U.S. universities or through direct enrollment in a university abroad. Work, internship and volunteer opportunities are also available.

Outstanding OSU undergraduate and graduate students may apply for the Bailey Trust Memorial Scholarship for study abroad in the liberal arts. Information and applications are available at the College of Arts and Sciences Student Academic Services Office, 202 Life Sciences East. Students interested specifically in modern language study abroad may also apply for the Dutreau Scholarship through the Department of Foreign Languages and Literatures, 303 Gunderson Hall. National and regional scholarships for study abroad are also available, and federal financial aid can often be used to offset the cost of an academic program abroad.

Information on study, work or volunteer projects abroad is available from the Study Abroad office and Study Abroad Library, 072 Student Union, or by electronic mail to auel@okway.okstate.edu. Students are invited to visit the Study Abroad Library without appointment. Application deadlines for most fall and summer study abroad programs and scholarships are at the end of January or the beginning of February. Deadlines for spring study abroad is usually in October or November.

Special Services

Academic Advising

Academic advising is considered a major function within the University and is student-centered in that it serves the student first and foremost and not a particular discipline, department or college. Academic advising is designed to assist students in developing their intellectual potential through effective use of all resources available at the University—academic, cultural and social. Thus, the role of the student's academic adviser is (1) to assist in educational planning, including clarification of career and educational goals, curriculum planning, and short-term course selection, (2) to become aware of and make appropriate referrals to campus support services, (3) to provide information to prospective majors, and (4) to prepare degree plans for graduating seniors and submit these to the respective college graduation certification office.

The advising function is performed within each of the undergraduate colleges and in the Office of University Academic Services. Each college structures its advising system based upon the college's philosophy and perceived student needs. In most colleges, freshmen and undeclared students are advised through the college's office of student academic services, whereas students who have declared majors are advised by an adviser in their major department.

Each academic dean has established an office of student academic services to represent him or her in matters concerning undergraduate students. Students are encouraged to contact their office of student academic services when questions arise regarding advising, academic programs and requirements, and academic support services.

The locations of the offices of student academic services are:

Agricultural Sciences and Natural Resources—136 Agricultural Hall

Arts and Sciences—202 Life Science East
Business—201L Business Building
Education—106 Willard
Engineering, Architecture and Technology—101 Engineering North
Human Environmental Sciences—114 Human Environmental Sciences
University Academic Services—201M Whitehurst Hall

Students should keep in mind that while the University provides advising as a service and resource, the ultimate responsibility for identifying and completing degree requirements rests with the student.

University Academic Services

The Office of University Academic Services (UAS) is responsible for providing academic advising and other related services to students who are admitted provisionally to OSU through the Alternative Admission and Adult Admission programs, as well as probationary students referred by the academic colleges. The Alternative Admission Program allows approximately eight percent of OSU's entering freshman class to be admitted without meeting all of the normal criteria for admission; the Adult Admission Program allows students who are 21 and older and those on active military duty an opportunity to seek admission to the University, provided they have not completed more than six hours of college work.

Students who enroll through UAS are assigned to advisers who monitor remediation of curricular deficiencies and progress toward meeting the University's General Education require-

ments. Advisers also help clarify University policies and assist students in exploring career goals and various degree programs in the six undergraduate academic colleges. One primary goal of UAS is to provide personal attention and assistance to students as they develop successful study habits and explore the various academic options available to them at OSU.

Student Academic Mentor Program.

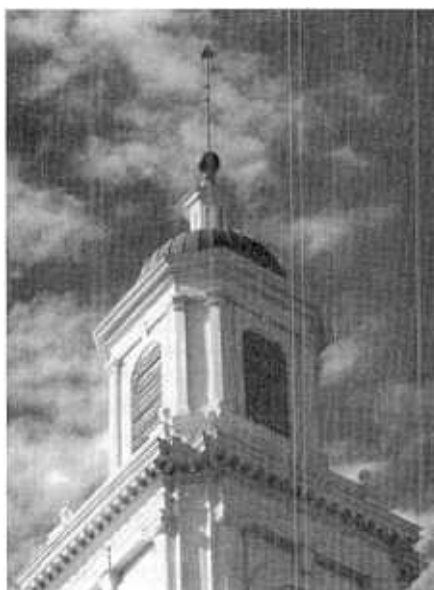
The Student Academic Mentor (SAM) Program is a campus-wide service that pairs each new freshman, transfer and adult student with an upper class student in an effort to ease the transition to OSU. These "SAMs" are carefully selected among continuing students at OSU to work with new students individually and in small groups during ALPHA, the week prior to the beginning of the fall semester. Their goals are to help students feel welcome and to assimilate them into campus life.

University Academic Assessment

Program. UAS also provides academic advising and counseling to probationary students enrolled in the University Academic Assessment Program (UAAP). This program is designed for students who have experienced academic difficulty, many of whom are on probation or have been readmitted after suspension. Also included are transfer students who are admitted on academic probation and those students who are denied enrollment through their academic colleges. UAAP gives students an opportunity to evaluate their career and educational goals in an attempt to develop a realistic and successful educational plan. In addition to meeting minimum grade-point averages required by the Oklahoma State Regents for Higher Education, students must enroll in and complete the Academic Assessment and Evaluation course. This course is designed to help students identify their reasons for experiencing academic difficulty and determine ways to overcome their academic weaknesses. It also assists students in exploring various career and educational alternatives.

Referrals. In addition to the teaching, academic advising and counseling functions of UAS, the office serves as a central information center whereby referral to a variety of campus academic and non-academic support services is given.

Tutorial Service. Qualified tutors for common general education courses are available free of charge for all students enrolled through University Academic Services. Tutor applicants are thoroughly screened to guarantee quality tutoring and are matched with students who need their services. Tutors are paid from UAS funding; however, students who fail to



keep their appointments are billed directly for the cost. Information on other tutoring programs, as well as other campus-wide academic support and resource centers, is made available to all OSU students through the Office of University Academic Services.

University Assessment Program

The University Assessment Program at OSU provides public assurance of program quality and accountability, and data for periodic reports documenting progress toward meeting instructional, institutional and programmatic objectives. The University Assessment Council consisting of faculty, staff and student members developed the following philosophy:

1. Determine student readiness based on multiple indicators including past academic performance, educational readiness, educational goals, study skills, self concepts and motivation.
2. Ascertain student academic progress and learning competencies.
3. Ascertain student achievement of program goals and objectives.
4. Determine student and alumni satisfaction with academic and support services, curriculum, faculty and personnel.
5. Provide information to enhance academic and student service program design, development and management.
6. Evaluate results of the assessment information collection, feedback and integration process.

On July 1, 1994 the Office of University Assessment was created as an administrative unit. This office pursues the University Assessment Council philosophy by administering the two programs of assessment and tracking.

The program of assessment has four initiatives:

1. Entry level, composed of Entry Level Placement Analysis, computerized placement tests, ACT, SAT, high school GPA, and others.
2. Mid level, composed of departmental and university-wide measures of student achievement.
3. Outcomes, composed of departmental measures of student achievement.
4. Satisfaction, composed of the student satisfaction and alumni surveys.

The program of tracking has four functions:

1. Following selected student cohorts.
2. Providing an early warning system of student difficulties.

3. Integrating assessment data into longitudinal profiles of individual students.
4. Providing feedback to the institution.

The OSU Office of University Assessment submits a yearly report to the Oklahoma State Regents for Higher Education that summarizes the activities conducted at OSU in the above areas. Each activity is also reported separately with information regarding objectives or outcomes, methods used, student population involved, and results.

Career Services

Career Services assists OSU students and alumni with job search activities related to internships, part-time employment while attending college, and full-time professional employment following graduation.

On-campus interviewing is an easy and convenient way to obtain interviews without leaving campus. On-campus interviews can be an important source of opportunities but should be only one of the strategies for a total job search. Subscribing to OSU CareerWeb can help sophomores looking for an internship, and it can help the alumnus trying to connect to a new employment situation. Last year over 250 companies conducted 4500 interviews on campus.

Resume Referral. A student's resume is sent out to employers when they request resumes in a particular major. Last year over 400 companies requested resume referrals.

Web Resume. Web resume allows the student to develop a resume on the Internet from your home or from any OSU computer lab. This resume can be converted to a Word resume for personal use. Once the resume is completed and submitted to the OSU CareerWeb Database, employers have access to view it on the World Wide Web.

Posting of Job Vacancies. Job postings can be accessed on the World Wide Web (<http://home.okstate.edu/careernet>). Entries are posted on a daily basis. Some of the job listings include part-time on-campus, part-time off-campus, education jobs, business, industry, and government listings, internships, and OSU jobs (full-time).

Internship Program. The internship program provides students opportunities to explore careers in a variety of academic areas allowing them to experience their career options before graduation.

Career Fairs. Career fairs are held on campus each year to provide opportunities for interaction between students and employers. Employers' have information booths and distribute literature about their companies and various job opportu-

nities. Current career fairs include College of Engineering, Architecture and Technology Career Fair; OSU Career Fair; OSU Business Career Fair; Information and Telecommunications Technologies Career Fair; Graduate and Professional School Fair; MLK Multicultural Career Expo; Part-time Job Fair; OSU Hospitality Days; Agricultural Sciences and Natural Resources Career Fair; Teacher Job Fair, Internship Fair; Project 1000 Career Fair; Summer Camp Fair; and Government, Health and Social Services Career Fair.

Interview Preparation. Interview preparation services include resume critiques, mock interviews, employer information, and job search acceptance.

Credential Service. Credential service assists students seeking employment in teaching, school personnel or higher education fields. A credential file holding up to seven letters of recommendation may be established. When requested by a student or employer, a copy of the file is made and sent to the employer for consideration.

Career Services is located at 360 and 370 Student Union and is open from 8:00 a.m.--5:00 p.m., Monday through Friday.

Computing and Information Services

Computing and Information Services (CIS) is the central provider of computing, data networking, and telephone services for Oklahoma State University. CIS also provides a variety of other important services to the campus including computer training, publications, programming support for institutional information systems, desktop computing support on site, and a comprehensive Help Desk.

The CIS Help Desk, serving more than 4,000 customers each month, provides diagnostic support and remedial assistance by phone, by electronic mail at helpdesk@okstate.edu, or in person at 113 Math Sciences.

All OSU students are given computer access and electronic mail upon enrollment. Students can also access some CIS computers from their homes via dial-up modem facilities. OSU's extensive data communications network provides interfaces to OneNet, MIDnet, the Internet, and the World Wide Web.

CIS supports six computing facilities in various locations around campus with more than 400 microcomputers. A SUN Workstation cluster is located in 113 Engineering South.

The central mainframe computer at OSU is an IBM 9672-R32 Enterprise Server operating MVS/ESA and VM/ESA. Two time-sharing systems, TSO and

CMS, are available on the mainframe. CIS also has a DEC System 3000-600 VMS and a DEC 2100A-4/275 RISC DIGITAL UNIX machine.

Additional information about CIS and computing at Oklahoma State University can be found at the World Wide Web site on the Internet (www.okstate.edu/cis_info). It is updated frequently with timely announcements.

The Center for Family Services

The Center for Family Services is sponsored by the Department of Family Relations and Child Development in the College of Human Environmental Sciences West building. This multipurpose facility also houses the OSU Child Development Laboratory.

The Center's dual mission is to provide high-quality, low cost marital and family therapy services to the public and to provide a training environment for master's degree students specializing in marriage and family therapy. Because the Center for Family Services is a training facility, advanced graduate students in marriage and family therapy conduct the majority of the therapy. While conducting therapy, therapists-in-training are under the direct supervision of clinical faculty members who are all licensed marriage and family therapists. The Center's state-of-the-art facility allows for observation of sessions by clinical supervisors and videotaping of sessions.

The Center for Family Services is open to any individual, couple or family that desires help with relationship issues, including marital concerns, parent-child relationships, or other family issues. Fees are determined on a sliding fee scale based on income and family size, ranging from \$5 to \$50. No one will be denied services because of inability to pay.

Appointments are available on request. While appointments are available during both day time and evening hours, most appointments are scheduled on Wednesday and Thursday evenings. When an individual contacts the Center to seek marital and family therapy services, a staff member will ask a few questions about the family and the reasons for seeking the services, in order to assign the most appropriate therapist. Usually within 24 hours, an initial appointment will be scheduled. If time allows, an information packet will be sent before the first appointment.

The marriage and family therapy program is accredited by the American Association of Marriage and Family Therapists.



Child Development Laboratories

The Oklahoma State University Child Development Laboratories (CDL) have a rich tradition of excellence in early childhood education. Originally established in 1924, the labs presently reside in a two million dollar facility opened in 1983.

The Child Development Laboratories program offers a site for quality educational programming for young children; training of pre-service teachers in early childhood education; observation and interpretation of human growth and development; research designed and implemented by OSU faculty and students to further the knowledge base in such areas as early childhood curriculum, social interaction, language development and cognitive development; and community service in the form of child care, parenting programs and in-service teacher education.

The CDL is licensed by the Department of Human Services and is accredited by the National Association for the Education of Young Children. The program offers planned learning activities that are developmentally appropriate; frequent and positive interactions between children and students; nutritious meals and snacks; regular communication with parents; positive guidance techniques that are used to manage the classroom, and to promote high self-esteem and self-control; high adult to child ratio; well trained and experienced staff and on-going, systematic program evaluation.

Subject to availability, families have an opportunity to select from a full day, year-round program; a full day, semester-calendar program; or a half-day, semester-calendar program. The Child Development Labs are open from 7:45 a.m. to

5:15 p.m. Monday through Friday. Children enrolled in the program range in age from six months through kindergarten age.

Mathematics Learning Resource Center

The Mathematics Learning Resource Center (MLRC) is intended to be the hub of undergraduate mathematics instruction at OSU. The MLRC is located in the basement of South Murray Hall and is open to students on a walk-in basis. The MLRC consists of a 40-station networked microcomputer lab, a 10-station video lab, and a tutoring room. Instructional software and several programming languages are available, as is a library of video cassettes that contain lessons on almost all levels of mathematics courses through calculus and differential equations.

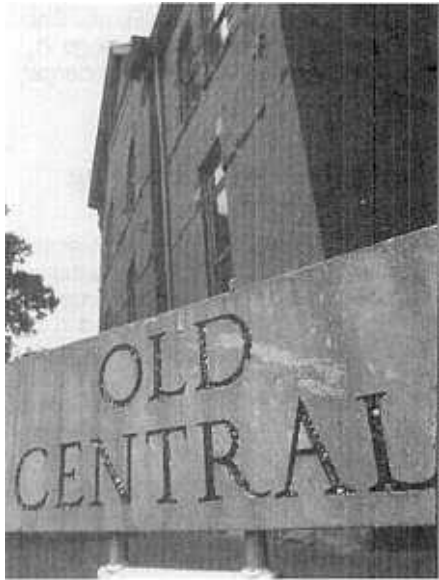
Undergraduate students majoring in mathematics are available in the Center to tutor students and to assist students in the use of the equipment.

Psychological Services Center

The Psychological Services Center was established in 1971 as a training, service and research facility at Oklahoma State University. It is operated by the Department of Psychology through the College of Arts and Sciences, and the College of Education. It is located in 118 North Murray on the OSU campus. The building is accessible to the handicapped.

Services are provided to children, adolescents and adults and are available to residents of Stillwater and the surrounding community as well as OSU students, faculty and staff. The Center offers a variety of psychological services such as but not limited to: individual, group, family, and marital therapy; parent counseling and training; play therapy for children; treatment of phobias and anxiety disorders; relaxation training; assertiveness training; stress management; depression; intellectual, personality, and neuropsychological assessment; and school consultation.

The Center's staff includes master's, doctoral, and postdoctoral students in the clinical, counseling and school psychology training programs, that are accredited by the American Psychological Association. The staff also includes supervising clinical, counseling, and school psychologists from the Department of Psychology and the School of Applied Health and Educational Psychology. Although the exact composition of the staff may change from year to year,



the staff is generally composed of individuals from diverse ethnic and cultural backgrounds.

There is a graduated fee structure ranging from \$5 to \$70 per session, depending on one's financial situation.

The Center is open from 8:00 a.m. until 9:00 p.m. Monday, Tuesday and Thursday. On Wednesday and Friday, it is open from 8:00 a.m. until 5:00 p.m. Appointments can be made by contacting the Center.

Special Facilities

Bartlett Center for the Studio Arts and the Gardiner Art Gallery

Old Gardiner Hall, as the Bartlett Center was formerly known, was built in 1910 as a women's residence hall and has served also as a classroom building for women's physical education, speech, agriculture extension and the College of Business. The building was named to recognize Maude Gardiner, founder of the University's home economics program. Gardiner Hall was renamed the Bartlett Center when Mr. and Mrs. F. M. "Pete" Bartlett gave Oklahoma State University a generous gift designated for the renovation of the hall.

The Bartlett Center has greatly enhanced the image of the visual arts at OSU. The Center provides activities which have brought regional and national recognition to OSU in the visual arts. The department contains eleven studios, and two computer laboratories all custom designed for specific activities. Special studios include oil painting,

watercolor, graphic design, and drawing. In addition to studio space, the Center provides a 100 seat auditorium with complete multimedia capabilities, Department of Art faculty offices and the Gardiner Art Gallery.

The Gallery provides year-round exhibitions of regional and national importance to which the public is invited. Exhibitions have included the work of Manuel Neri, Deborah Butterfield, Lucas Samaras, and traveling exhibitions such as "American Works on Paper: 100 years of American Art," and "Watercolor U.S.A." Since 1987, the Gallery has hosted a biennial juried show, "The Cimarron National Works on Paper." Faculty and student work is also exhibited on a regular basis.

Bartlett Independent Living Center

The F.M. "Pete" Bartlett family, with a vision of independent living for all, funded the renovation of a residential home on campus. This concept of a research and demonstration center illustrates universal design, that is, design for the life span of all people regardless of age, sex or ability.

A partnership between the College of Human Environmental Sciences (HES) and Integris Mental Health System was established by housing the Reflections Senior Day Treatment Program in the Bartlett Independent Living Center. Integris Mental Health provides clinical services for the elderly and works with OSU/HES to establish educational and research opportunities.

This program was named the 1997 Most Innovative Program by the Association for Ambulatory and Behavioral Healthcare. OSU students interested in the field of aging have an exciting opportunity to learn and interact with older adults. Reflections provides students with research and practicum opportunities, internships and assistantships.

The special features of the center include computerized environmental control systems; motorized windows, blinds, and draperies; and adjustable-height work centers. The center provides a base of knowledge for students, builders, architects, interior designers, and other professionals who work with clients experiencing life span changes.

Colvin Recreation Center

The Colvin Center, one of the finest facilities in the nation, encompasses a wide variety of organized and informal recreation activities for all University students. Campus recreation programs include intramurals, sports clubs,

cardiovascular fitness, non-credit activity classes and outdoor recreation programs. Activity areas available include racquetball, indoor and outdoor swimming, fencing, billiards, dance, golf, table tennis, wrestling, weight-lifting, basketball, volleyball, badminton, squash and indoor climbing wall. Over 50 intramural activities are conducted for women, men and co-rec (coed) teams.

Outdoor facilities available for student recreational use include tennis courts, basketball courts, archery range, golf driving range, jogging track and fields for soccer, rugby, football and softball. Facilities are also available at Lake Carl Blackwell and Camp Redlands for a challenge course, sailing, canoeing and crew. Additional information about recreation programs may be found in the "Student Life" section, and on the World Wide Web (<http://home.okstate.edu/homepages.nsf/toc/osurechome.htm>).

Oklahoma Museum of Higher Education-Old Central

Historic Old Central, dedicated June 15, 1894, was the first permanent building on campus. Classes began in the new "ultra-modern" structure September 12, 1894. Originally referred to as "The College," this building housed both academics and administration for six years. In 1900, the Department of Chemistry moved from the basement of the College to a new building; in 1906 administration moved into the new Morrill Hall.

The Friends of the Oklahoma Museum of Higher Education (OMHE) is a group composed of influential Oklahomans interested in raising funds to complete development of the museum. In 1994 the Oklahoma Higher Education Hall of Fame, created by the Friends, inducted the first members. The Hall of Fame currently displays 40 prominent educators, administrators and supporters from all areas of Oklahoma. Inductions occur annually each October from nominations made by alumni, colleagues, friends and family; nomination forms are available at the museum.

When fully developed, OMHE will represent all higher education institutions in Oklahoma. Current exhibits center on OAMC/OSU's well documented history. One room contains an exhibit on Bacone College, at Muskogee, the oldest continuously operating school in the state (1880). Rotating exhibits feature selected educational institutions in Oklahoma.

Major structural restoration has been completed to present Old Central as it was in 1894. Interior photos published in the 1894-95 *Catalog* are being used as guides for re-creating five period rooms.

Tour groups, orientation classes and group use of Old Central can be arranged at the museum office, or by calling (405) 744-2828. (Classes are not charged and education related groups are given preferential rates.) Museum hours are 9:00 a.m. to 5:00 p.m. Tuesday through Friday, and 10:00 a.m. to 4:00 p.m. Saturday; closed Sunday, Monday, and state holidays. (Home football game day hours are adjusted according to game time.) Donations of \$1.00 per adult and 50 cents per child are requested, but not mandatory; any amount helps keep the museum open. Larger donations are always appreciated; tax verification provided on request.

OSU Library

Composed of the Main Library and four branch libraries, the OSU Library is one of the largest research libraries in North America. It contains two million volumes, 17,550 serials, more than three million microforms and 250,000 maps and aerial photographs, and outstanding electronic access to research materials.

The Edmon Low Library, also known as the Mail Library, is located in the center of campus and is open 120 hours per week when classes are in session. Librarians provide reference assistance from three service points 96 hours per week, and with few exceptions, books and periodicals are shelved in open stacks. Besides individual study areas, the Library has two small conference rooms that students can schedule for group study, and for persons with disabilities, access to an adaptive technology room is available upon request.

Access to Information. The Library's online information system, PETE, provides access to the library's catalog, various databases and links to other university libraries. PETE is accessible through personal computers connected to the Computer and Information Services mainframe. PETE and public Internet workstations are available in the Main Library and at each branch.

With a strong presence on the World Wide Web, the Library offers a wide array of electronic resources. Included are access to more than 70 databases and 10,000 titles with full-text articles. Library services, such as electronic mail reference, book renewals, interlibrary loan requests, and book purchase suggestions, are available through the library's web site (www.library.okstate.edu).

The Library offers free one-hour training sessions in its computer-training rooms for those interested in learning PETE, the web and other electronic resources. Also available is a one-hour credit course in library resources (LBSC 1011) offered each semester.

Interlibrary Services borrows materials for faculty and students that are unavailable at the OSU Library. Requests for photocopied materials are usually filled within one week; however, books may take longer. For students enrolled in courses away from the Stillwater campus, forms are available on the website for requesting copies of articles or books be sent to them.

Government Documents. Many consider the OSU Library's Documents Department to be the best regional depository for U.S. Government publications in the Southwest. Non-depository materials as well as publications of the state of Oklahoma, foreign governments, and international organizations are obtained to support fields of interest to OSU. The Documents Department has a growing collection of indexes and data files issued by the United States and commercial companies. These files include the 1990 Census, the 1992 Economic Census, and indexes to congressional publications and international trade information. Whenever possible the department provides Internet access to U.S. government information via the OSU Library's web site.

Student Employment. The OSU Library is a major employer of OSU students on campus. Position announcements are posted regularly in the Edmon Low Library and on the Library's website. Each year various work scholarships and cash awards are made available to student employees, including the Class of 1942/Willham Library Scholarship, the Huik Wunn "Catherine" See Outstanding Shelves Award, the Mary Jane Smothers Library Memorial Assistantship, and the James B. and Verena J. Wise Outstanding Student Employee Award.

M. B. Seretean Center for the Performing Arts

The M.B. Seretean Center for the Performing Arts provides a modern and well-equipped home for the departments of Music and Theater. Constructed in 1970 at a cost of three million dollars and named in honor of its principal benefactor, M.B. "Bud" Seretean, a 1947 OSU graduate, the Center is the focal point of all major dramatic and musical events on the OSU campus. The center's 75,000 square feet include the 900-seat Concert Hall and the 600-seat Vivia Locke Theatre which attract a myriad of fine arts activities such as ballet, concerts, mime, opera, plays, faculty and student recitals, and a host of summer conventions.

In addition to the auditorium and theater, the Seretean Center houses teaching studios for music, a variety of classrooms, a specially-designed choral

room, a rehearsal hall for band and orchestra, costume and scene shops, and a well-equipped audio center, all designed to provide an excellent atmosphere in Oklahoma for the teaching of the fine arts.

Student Union

The primary purpose of the Oklahoma State University Student Union is to serve the members of the University community through an organization that provides a myriad of necessary and convenient goods and services; offers programs to enhance the educational, social, cultural, and recreational development of individuals; and fosters an atmosphere conducive to open interaction and exchange among all students, faculty, staff, alumni and guests.

Dating back to 1815, college unions have always been thought of as "places where all may meet on common ground." In their early years, the college unions were debating halls for university students. Through the years, student unions have added to these halls such facilities as recreation centers, dining halls and meeting rooms. Today student unions bring together students, faculty, staff, alumni and guests in a friendly, casual atmosphere. They are not merely buildings, but serve as the community center—"the heart of the campus."

The OSU Student Union is certainly no exception to this tradition as it has been serving the University community and state since opening in 1950. With a facility consisting of 661,000 square feet, it stands as the largest and most comprehensive union in the world. It provides the University with such services as an 81-room hotel, the Bookstore, a variety of lounges, a theater, extensive food services, a shopping mall, a recreation center, a post office, a travel agency and many University offices.

The Student Union is the center of campus life as it houses the offices for major student organizations. Many activities such as movies, dances and speakers are provided for students by the Union's student programming organization, the Student Union Activities Board.

As Oklahoma State University's conference center, the Student Union hosts many continuing education conferences throughout the year. The variety of meeting rooms located throughout the Union are also available for OSU student organizations and faculty meetings, normally at no charge.

Although the OSU Student Union's annual budget exceeds 13 million, less than 10 percent of the total cost of operating the Union is funded from student fees. As the Union receives no state

funds for its operations, the remainder of its budget is generated from the sale of goods and services, thereby making it virtually a self-supporting University facility.

Telecommunications Center

The Telecommunications Center is a visible commitment to the University's desire to keep pace with the communications revolution. Educational Television Services (ETS) occupies the facility and is equipped with two independent, fully operational studios with a capacity of eight cameras. A third studio is a self-contained, instructor-controlled, classroom-style studio for videotaping courses and live two-way presentations via compressed video fiber optic lines. There are two off-line and one on-line editing suites and two remote camera units.

ETS has the ability to transmit or receive on either the C-band or Ku-band satellite format, including using a Ku-band satellite truck from remote locations. ETS produces over 1400 live and taped programs per year consisting of video teleconferences, educational programs, documentaries, video training tapes, and public service announcements for the University, state agencies and for state and federal grants.

ETS employs a full-time staff of 35 in the areas of production, engineering and art. Each of these areas is also staffed with students working to earn practical experience under the guidance of professionals. For those students who meet the prerequisites, who are conscientious and who are willing to work, there are three methods of entry into employment at ETS. One method is through an internship which allows the student to earn college credit. Another method is through part-time employment at ETS, usually reserved for those students who have completed an internship, and the third is through the University's work-study program.

Wellness Center

The OSU Wellness Center offers a variety of health-related programs for all OSU students. These programs include free wellness screening (cholesterol, blood pressure, body composition, and computerized health risk appraisal), nutrition counseling, wellness education classes, certification of aerobics and weight training instructors, and campus-wide health promotion activities.

The Wellness Center offers opportunities to undergraduate and graduate students to participate in practicum and internship programs in the disciplines of

computer science, counseling and psychology, exercise science, health education, marketing, nutrition, pre-physical therapy, and wellness.

The Wellness Center houses a 140-seat theater, demonstration kitchen and dining room, aerobics area, weight room, computer lab, resource center, a full-service wellness laboratory, and physical therapy clinic. These rooms are available to OSU student groups for OSU-sponsored events, in cooperation with the Wellness Center.

Campus Life

Kent Sampson, Director, Campus Life

Barbara Dunn, Coordinator, Allied Arts

Marie Basler, Coordinator, Nontraditional Student Services

Muhrizah Brunken, Coordinator, SUAB and Student Union Programs

Jan Carlson, Coordinator, Special Projects

Stephen Haseley, Coordinator, Leadership Programs

Joyce Montgomery, Coordinator, Volunteer Center

Pamela Walters-Wilson, Coordinator, Greek Life

Regina Henry, Counselor, International Students and Scholars

Tim Huff, Coordinator, International Students and Scholars

The Department of Campus Life is in the forefront of co-curricular activities on campus. It is responsible for the facilitation and implementation of programming for students and student organizations at the University. Campus Life's commitment is to provide an environment that encourages interaction among students, faculty, staff and the community at large through organizations to provide the best quality of services with integrity and respect for a diverse population.

The Campus Life Center services, 060 Student Union, include Student Union display case scheduling, insurance for OSU sponsored trips, a calendar of events, scheduling of Bennett Chapel, notary public, registering posters, fliers and signs, scheduling use of campus grounds, student organization records, motor pool requests, campus work orders for student groups, scholarship and membership applications, and a resource center that offers a wide variety of brochures on various subjects.

Campus Life at OSU encompasses these administrative and programming areas:

Allied Arts

Allied Arts is the oldest university performing arts series in Oklahoma. The program has brought thousands of outstanding performances to Stillwater, as part of its mission to enrich university life and provide the university community with a broad range of professional musical, dance and theatrical events. Allied Arts performances are selected by a committee composed of students, faculty and staff, and each year five or six performances are scheduled for the series. Students, faculty and staff can purchase a subscription for all events, or individual tickets to specific shows. For ticket information and schedule, contact the Allied Arts office.

Greek Life

Oklahoma State University benefits from the presence of 18 national Interfraternity Conference Fraternities, 11 National Panhellenic Conference Sororities, and six National Panhellenic Council Fraternities and Sororities. The Greek experience stresses campus and community involvement, academic excellence, leadership, athletic competition, and professional development. Greek life has been a part of OSU since 1917. The system provides student leaders with the opportunity to participate in a wide variety of activities, including numerous philanthropies that Greek members support. The Department of Greek Life, located in 050 Student Union, provides guidance and resources to all Greek organizations. The full-time staff consists of Greek alumni who have extensive background and knowledge of the Greek system.

Honor and Service Organizations

OSU offers opportunities for personal and professional development through many nationally-affiliated honor and service organizations. These organizations provide opportunities for leadership and program development, new friendships and recognition of achievement. University-wide organizations include:

Blue Key (junior and senior honor society)

Golden Key (junior and senior honor society)

Iota Kappa (honor society for sophomores)

Mortar Board (junior and senior honor society)

Orange and Black Quill (honor society for juniors)
 Order of Omega (honor society for sorority and fraternity members)
 Phi Eta Sigma (freshman and sophomore honor society)
 Phi Kappa Phi (national honor society for seniors and graduate students)
 (See college sections for organizations within each college.)

International Students and Scholars

The International Students and Scholars (ISS) office provides assistance to more than 2,000 international students from countries as far away as Singapore and Zambia and as close as Canada and Mexico. The goals of the office are to assist international students to: learn about their new surroundings; use the resources of the University and community; and be advocates for students throughout the University and the community.

The staff in the International Students and Scholars office is responsible for advisement to students and faculty on matters which are unique to international students and scholars. Personal consultation, financial planning, liaison with embassies, consulates and sponsors, legal referrals, academic referrals, immigration matters, and orientation programs, are among the services offered. Non-immigrant students and scholars can apply for internal-employment clearances in the office.

Pre-arrival information is sent to new students. Orientation and assistance with housing, banking, enrollment, etc., are offered to newly-arrived students. A newsletter is published monthly, as well as weekly updates to the list ISS information is located on the Internet. ISS presents a variety of programs throughout the year in which student volunteers participate and assist.

The International Students and Scholars office encourages international and American students, faculty, staff and community members to use its services and participate in the programs.

Lectures

Oklahoma State University, through its academic organizations and student groups, has a significant number of speakers each year, enriching the intellectual life on campus. Individuals, from both off-campus and on-campus, share

their expertise with faculty, students, staff, and town's people on a wide variety of topics.

Many of the academic units as well as student groups invite speakers to their meetings in order to enhance the educational component of the University. These lectures are generally of interest to specific academic areas, rather than to the general campus. The Student Government Association, through its Speaker's Board, brings major figures in politics, entertainment, and business to the campus. The Student Union Activities Board also has a speaker's program related to topics of general student interest. Other student organizations conduct active lecture programs concerning their interest areas.

Allied Arts conducts lecture-demonstrations in conjunction with a number of its classical arts performances. In this manner, students can gain additional knowledge of classical arts and artists.

Nontraditional Student Services

The primary goal is to assist nontraditional students, anyone with at least a two-year break in education, by providing support, information and referrals. The coordinator serves as a resource person for the entire campus community and seeks to raise the awareness of faculty, administrators and students with regard to the needs of this special group. All nontraditional students are encouraged to stop by to discuss their concerns or questions. The coordinator also advises students who have rent-related difficulties, such as landlord disputes, or who are looking for housing off-campus.

Campus Recreation

Campus recreation programs are designed to provide equipment, space and professional assistance in helping University students, staff members, and their families pursue individual recreation interests. Located in the Colvin Recreation Center and Annex are facilities for 32 activities including racquetball, climbing wall, basketball and swimming. In addition, areas for soccer, football, rugby, softball, archery, tennis, jogging, sailing, canoeing and hiking are made available for student and staff use.

Personal Enhancement Program. The staff of the Colvin Recreation Center offers a variety of noncredit classes each semester to students, faculty and staff. All land aerobic classes are free of charge to students. Other instructional programs

for adults include CPR, first aid, lifeguarding, scuba, swimming, tennis, ballroom and swing, martial arts, water aerobics, tai chi, yoga. A summer day camp for children, ages 6-12, emphasizes physical activity. Swim lessons are also available to children during the summer session.

Intramural Sports. The vision of the intramural sports program is to improve the quality of life at OSU, and the mission is to develop students mentally and physically, provide quality programs and services, and to encourage all participants to value recreation. These programs are important for all students attending OSU because they provide an opportunity to meet new people, cultivate present relationships by participating with friends, and stimulate personal physical fitness through sports. Programs are available at differing skill levels, as well as opportunities to compete in specific divisions for men, women and co-recreational leagues. With over 50 activities to choose from, intramural sports offers something for every student.

Sports Clubs. The campus recreation program advises and helps organize the active sport clubs on campus, which are governed by the Sports Club Council. The Council is chartered by the University and its officers are elected students. This Council develops sports club policies, sets priorities, and functions as the official representative for all sports clubs. The campus recreation program provides the adviser for this Council. Membership in all sports clubs is open to all students. If a group of students is interested in starting a sports club, the coordinator will assist them.

Active sports clubs are Auto Club, Bowling, Crew, Cycling, Fencing, Karate, Lacrosse, Rugby, Sailing, Scuba, Soccer, Snow Skiing, Volleyball, Waterskiing, Weightlifting, Wheelchair Sports and Wilderness Pursuits.

Outdoor Adventure. The goal of Outdoor Adventure is to provide opportunities for fun, adventure, education and excitement. With a variety of national and international trips as well as workshops at all skill levels, opportunities are provided for enrichment for the whole community.

In addition to trips and workshops, an extensive low-and high-elements challenge course is offered at Camp Redlands, and a state-of-the-art indoor climbing facility is at the Colvin Recreation Center. To support the courses and the local community, the Outdoor Adventure Rental Shop in the Colvin Recreation Center provides access to everything from in-line skates to sleeping bags.

Whether it is sea kayaking in the Baja, a day at the challenge course, or the annual climbing competition, the common elements in all programs are quality leadership and lots of fun.

Religious Life

Campus religious centers, supported by state and national church bodies specifically to serve the University community, provide opportunity for worship in both traditional and contemporary services; religious education commensurate with higher learning for the development of the whole person; counseling that maintains a spiritual basis for the cohesion and meaning of life; and social activities which allow relationships and life views to deepen. The 18 religious centers have strategic locations close to campus and, in addition to their own ministry, coordinate many of their efforts with each other and the University administration through the Association of University Ministries.

Residence Hall Organizations

Residence halls are popular places to live on the OSU campus. The housing and food service programs have a proud tradition of excellence recognized nationwide. Much of the success of the residence halls is the strong and vital student government system consisting of floor governments, councils for each hall or complex and the Residence Halls Association, which represents all halls on campus.

The Residence Halls Association acts as the voice of residence hall students to the University administration concerning policies and regulations, and coordinates campus-wide activities for the enrichment of residence hall living. All residence halls on campus combine to form the Residence Halls Association (RHA). Each hall has its own elected officers and constitution, and is a part of the RHA system of representative government. There are numerous opportunities for involvement in the hall, such as floor officer, social committees, food committees, and sports and athletic activities.

Student Development Transcript

The Student Development Transcript (SDT) gives OSU students the opportunity

to record their co-curricular activities in a format similar to an academic transcript. Involvement in all campus organizations and volunteer service may be included. The transcript can be used with applications for scholarships, honorary organizations and with resumes for job applications. Contact the Campus Life office for more information on this valuable tool.

Student Union Programs

Student Union Programs (SUP) offer a variety of programs and activities for the campus and Stillwater communities, including Cowboy Christmas and Cowboy Country arts and crafts fairs, Holiday Interlude and the Madrigal Dinner Concert. SUP also presents regular evening programs in the Union, including bingo, casino night, coffeehouse and world culture programs. Late Night in the Union, a special finals week program providing a free pancake breakfast for students is held at the end of every semester. SUP also provides musical entertainment in the Food Court during lunch hour on a regular basis as well as summer programs for students, faculty, staff and their families. The Student Union Activities Board (SUAB) provides diverse activities and events for students and the OSU community. SUAB coordinates special cultural, educational, and thought-provoking events such as Freshman Follies, the Bonfire Bash, Springfest, and Network Event Theatre first run movies.

Theater

Live theater productions are an important part of the cultural life of the campus. OSU Theatre produces six to eight plays each academic year from a wide variety of dramatic and musical theater literature. Two separate productions series are offered. Each year, four fully-mounted large-scale productions are presented in the 600-seat Vivia Locke Theatre. Two to four student-directed, designed and performed studio productions are presented in the 100-seat Gundersen Studio Theatre. Each production's cast and crews are made up of theater majors and minors as well as nonmajors from across the campus. Auditions are open to all students on campus regardless of major.

Volunteer Center

The Volunteer Center serves students, staff and faculty at OSU. The goal is to introduce volunteerism as a way to bring together different groups of people on

campus and within the Stillwater community. Volunteering helps build transferable work skills, and such experiences are also important to be reflected in a resume. Volunteering can also help one gain experience in one's major area of study or another area of interest.

Alumni Programs and Services

The OSU Alumni Association (OSUAA) serves as a connection between alumni and the University. Its mission is to provide services to its members and alumni, and to support the needs of Oklahoma State University, its students, faculty, staff and friends.

Membership is open to all graduates, former students and friends of Oklahoma State University. Members may join through an annual membership fee or a one-time life membership fee.

The OSU Alumni Association offers a wide variety of benefits to its members through discounts on insurance, hotel rooms, rental cars and moving expenses; opportunities for business networking; student scholarships; chapter activities; special events on campus, including Homecoming; alumni awards; travel packages; and publications.

Chapters. OSUAA has about 50 alumni chapters across Oklahoma, and additional chapters in such cities as Houston, Dallas, Atlanta, Austin, Washington, D.C., Chicago and Denver. Chapter activities include alumni networking, student scholarships, athletic event watch parties, and other programs that support OSU.



Homecoming. OSU's Homecoming is one of the few homecoming celebrations in the country jointly coordinated by students and alumni. The OSUAA provides staff support to student committees selected each year. Homecoming includes a variety of events, including the Harvest Carnival for children; the popular WalkAround, where Homecoming decorations are viewed by thousands of spectators; a pep rally; a parade; and the crowning of Homecoming royalty at halftime of the football game.

Student Recruitment. The OSU Alumni Association helps alumni chapters sponsor programs for the top academic achievers in Oklahoma's high schools. Alumni also help recruit out-of-state students and provide scholarships to students in their areas.

Alumni Awards. The OSU Alumni Association administers and produces four award programs each year. The awards are the Alumni Hall of Fame, Distinguished Alumni and Distinguished International Alumni, Alumni Service and Top Ten Seniors. The awards recognize personal and professional achievements and service to OSU and the Alumni Association.

Travel. The OSU Alumni Association offers educational and fun travel packages to locations around the world.

Communication. The OSU Alumni Association communicates with its members in a variety of ways, including the Internet (www.okstate.edu/alumni). Alumni Association members receive the award-winning *OSU Magazine*. All alumni also receive the *OSU Spirit*.

AlumNet. The OSU Alumni Association provides alumni the opportunity to advocate for OSU at the legislative level.

OSU Foundation

The OSU Foundation was created in 1961 with the basic mission of finding private donors who were interested in providing additional scholarships for the best minds and finest leaders Oklahoma's high schools had to offer. The OSU Foundation is the only agency designated to solicit, receive and administer all private gifts on behalf of OSU. Although it is a separate corporation, the OSU Foundation maintains a close and cooperative working relationship with the University.

The mission of the OSU Foundation is to encourage the commitment of personal and financial resources from the private sector toward the priority objectives of Oklahoma State University, bal-

ancing the interests of the donor with the needs of the University, and to manage those resources efficiently and effectively. The Foundation exists to support Oklahoma State University in its mission to provide its students with exceptional academic experiences, to conduct scholarly research and other creative activities that advance fundamental knowledge, and to disseminate knowledge to the people of Oklahoma and the world.

OSU-Oklahoma City

Jerry Carroll, Provost and President of Oklahoma State University-Oklahoma City

Brenda J. Harrison, Vice-Provost for Academic Affairs

Jerry Brooks, Vice-Provost for Finance and Operations

Pamela J. Davenport, Vice-Provost for Student Services

Oklahoma State University-Oklahoma City (OSU-OKC) is a North Central Association accredited, state-assisted public two-year college serving one of the fastest growing metropolitan cities in the country. Located in the heart of Oklahoma City at the crossroads of Interstate 44 and Interstate 40, this campus enrolls approximately 4,500 full- and part-time students each semester. OSU-OKC has grown from a campus of one building with fewer than 100 students in 1961 to a campus that today consists of 80 acres, nine modern buildings, 227 faculty members, and a staff of 157 caring and committed people.

Offering 22 associate in applied science degree programs, associate of science program, a variety of certificate programs, and developmental education courses, the Oklahoma City campus takes pride in its student-centered approach to collegiate education. Curriculum is designed in response to local employment needs and input from professionals who serve on OSU-OKC advisory committees. All energies are directed toward one goal—blending both academic and student support services to create a collegiate educational experience—that addresses the needs of the individual student. Degrees awarded at OSU-OKC are listed below.

Associate In Applied Science. The Associate in Applied Science degree signifies the completion of at least 60 semester credit hours of collegiate

course work that will place the graduate on a career path. Oklahoma State University-Oklahoma City offers 22 Associate in Applied Science degree programs in five divisional areas.

Agriculture Technology
Horticulture Technology

Business Technology
Accounting
Computer Information Systems
Management
Quality Management
Technical Communications

Engineering Technology
Architectural Technology
Civil Engineering Technology
Construction Technology
Electronics Engineering Technology
General Engineering Technology
Heating, Ventilation and Air Conditioning Technology (HVAC)
Industrial Drafting and Design Technology
Quality Assurance
Surveying Technology

Health Services
Nurse Science

Human Services
Alcohol and Substance Abuse Counseling
Crime Victim/Survivor Services
Interpreter Training
Municipal Fire Protection
Occupational and Environmental Safety
Police Science

Cooperative Programs
Nurse Science, with Panhandle State University
Veterinary Technology, with Murray State College

Associate of Science. The Associate of Science degree is a program designed for transfer to an upper-division baccalaureate degree program. The Associate of Science degree is typically awarded to those who wish to major in subjects with heavy undergraduate requirements in mathematics and science, including, but not limited to, fields such as engineering and agriculture. It represents successful completion of a minimum of 60 credit hours, excluding any physical education courses. Oklahoma State University-Oklahoma City offers eight Associate of Science degree programs.

Agriculture Technology
Horticulture Technology

Arts and Sciences
Industrial Laboratory Technology
Public Service

Business Technology
Health Care Management

Human Services

Alcohol and Substance Abuse Counseling

American Sign Language
Fire Protection Technology
Police Science

General Education

Division of Arts and Sciences
English and Language Arts
Humanities
Life Science
Mathematics
Natural Sciences
Physical Sciences
Social Sciences

Philosophy. Oklahoma State University-Oklahoma City operates in the belief that each person should be treated with dignity and respect; afforded equal opportunity to acquire a complete educational experience; given an opportunity to discover and develop special aptitudes and insights; and provided an opportunity to be equipped for a fulfilling life and responsible citizenship in a world characterized by change.

The Mission. The mission of Oklahoma State University-Oklahoma City is to provide collegiate level career and transfer educational programs and supportive services, that will prepare individuals to live and work in an increasingly technological and global community.

Institutional Effectiveness. The Institutional Effectiveness effort provides for a long-term commitment to institutional change through assuring effective, ongoing institutional self-study processes. These efforts are an integral part of institutional decision-making system and the student learning and growth process. The purpose of the Institutional Effectiveness effort on campus is to ensure that systems are in place that: determine institutional effectiveness, are improvement oriented, maximize limited resources, provides meaningful and quality information to faculty, service providers and students to assist in decision making, provide an effective guide for future planning.

The process for determining institutional effectiveness is linked to the major functions of the mission—to provide collegiate-level career and transfer educational programs and supportive services, developmental education, continuing education, and access that will prepare individuals to live and work in an increasingly technological and global community. It is driven by a process of critical self-examination and is directly related to improving curriculum and the quality of teaching and learning within the institution. OSU-OKC's plan calls for a continuous quality improvement process across the campus that engages faculty in thinking about the purpose and mis-

sion of education; and ultimately develops a program that will assess and document student academic achievement.

Functions of OSU-OKC. OSU-OKC maintains an open-door policy that provides access to higher education for all eligible individuals, and treats all students fairly and equally and with no discrimination, regardless of social, economic or academic background. It provides learning opportunities for students to complete an Associate in Applied Science degree, an Associate of Science degree or Certificate Program primarily in technical education. It prepares students for upper-division academic study at a four-year college or university.

When appropriate, OSU-OKC participates in reciprocal and cooperative relationships with educational and various other types of institutions.

OSU-OKC provides students the opportunity to acquire the knowledge and skills that enable them to accomplish specified career or personal educational goals. It provides a developmental studies program to enable students to be successful at the college level. It provides a complete student services program, including academic advisement, career planning and placement, enrollment management, counseling services, judicial programs and services, admissions and records, minority student programs and services, veterans services, student activities, financial aid, assessment, student support services and child care.

OSU-OKC conducts workshops, seminars and conferences to accommodate the needs of local business, industry and community groups on a noncredit basis. It engages in a broad campus-wide program of assessment and improvement, including regular and systematic review of program and funding sources, in order to conduct long- and short-range planning, and to provide and encourage faculty and staff development activities to meet stated goals and to improve efficiency and effectiveness.

OSU-Okmulgee

Robert Klabenes, Provost and President of Oklahoma State University-Okmulgee

Linda Avant, Assistant Provost

Ken Morris, Vice-Provost

Larry Williams, Executive Vice-Provost

Oklahoma State University-Okmulgee offers collegiate advancing technology programs of study that culminate in an associate in applied science degree. This residential branch campus is noted for the quality of its facilities and equipment, as well as its benchmark quality of technological and academic education.

OSU-Okmulgee's core curriculum is as diverse and innovative as its student body. Individuals receive the comprehensive education required to prepare them as competitive members of a world-class workforce and to be contributing members of society.

OSU-Okmulgee offers more than 35 degrees and six diplomas in addition to the General Studies department for students who are undecided about their majors. Included in the diversified instructional departments are the following fields of study: air conditioning and refrigeration technology; automotive technology; business technology; computer systems technology; construction technology; diesel and heavy equipment technology; electrical and electronics technology; engineering graphics technology; hospitality services technology; distinctive manufacturing technology; small business occupations; and visual communications.

OSU-Okmulgee's college credit courses are unique in Oklahoma. The Okmulgee campus blends the best of emerging technologies, enhanced computer applications and general education to prepare students for rewarding careers in business and industry. The comprehensive higher education received by students at OSU-Okmulgee makes these students highly marketable. Graduates from the college usually go directly from graduation to a waiting job and a bright future in terms of potential advancement. Today, there are OSU-Okmulgee graduates with outstanding skills and professional ethics working in jobs in virtually every corner of the world. The educational experience at OSU-Okmulgee is "hands on" from the day the student enters college.

OSU-Okmulgee operates on a year-round, three semester basis. New semesters begin in early January, late April

and late August, each lasting for 15 weeks. The academic programs offered each semester are complemented by contemporary facilities and state-of-the-art instructional equipment.

The first college in the state to issue a warranty for its graduates, and the developer of the model adopted throughout Oklahoma, OSU-Okmulgee awards a Graduate Performance Guarantee. This guarantee assures the student and first employer that the graduate will enter the workplace with a set of pre-determined skills and competencies. The Graduate Performance Guarantee from OSU-Okmulgee is a "win-win" situation for the student, the campus, business and industry. The Graduate Performance Guarantee is tangible evidence of the confidence in the quality of the comprehensive high technology education offered to students at OSU-Okmulgee.

Oklahoma State University-Okmulgee is located at 1801 E. 4th Street, Okmulgee, Oklahoma 74447-3901. The toll-free phone number at OSU-Okmulgee is 1-800-722-4471. Information can also be found on the World Wide Web (www.osu-okmulgee.edu).

OSU-Tulsa

Anthony Brown, *Interim Associate Vice-President for Academic Affairs*

Oklahoma State University-Tulsa, formerly Rogers University-Tulsa, was established on January 1, 1999. The A&M Board of Regents exercises governmental control of OSU-Tulsa and contracts with participating universities for courses and degree programs. OSU-Tulsa provides the third and fourth year of undergraduate study for the Tulsa metropolitan area. Courses for the first and second years of undergraduate study are provided by Tulsa Community College. Graduate programs at OSU-Tulsa are offered either by participating universities under contract with OSU-Tulsa or through the OU/OSU Research and Graduate Education Center. (See the "Graduate College" section for information on the Graduate Center.)

Programs of study are offered by four participating universities—Oklahoma State University (OSU), the University of Oklahoma (OU), Langston University (LU), and Northeastern State University (NSU). A participating university brings degree programs to OSU-Tulsa that are approved for delivery on its main campus. OSU degree programs available at OSU-Tulsa are identical, in terms of admission and curricular requirements,

to the degree programs available on the Stillwater campus. OSU-Tulsa is not permitted to contract for programs that duplicate those provided by LU and NSU. The participating universities provide academic advisement at OSU-Tulsa for their respective degree programs.

Faculty from the participating universities provide course instruction. To ensure that programs at OSU-Tulsa are comparable to those on the Stillwater campus, OSU assigns OSU-Tulsa classes as part of the regular teaching load of OSU faculty when possible. Regular OSU faculty who commute from the Stillwater campus or OSU faculty assigned to the OSU-Tulsa campus teach OSU classes.

Courses taken through OSU-Tulsa are treated as residence credit at the university teaching the course. Courses taken at OSU-Tulsa that are offered by LU, NSU, or OU are accepted at OSU as transfer credits. Courses taken from another participating university are automatically posted to the student's admitting university transcript. For information on transfer credits, refer to the section "Transfer of Credits."

Students wishing to take courses at OSU-Tulsa must first be admitted to one of the participating universities. Admission requirements for students seeking admission to programs offered by OSU at OSU-Tulsa are the same as if they were pursuing the degree program on the Stillwater campus. Under a reciprocal admission policy, students admitted to OSU may take courses from the other participating universities without further admission processing. Admission counseling for each participating university is available at OSU-Tulsa.

Students apply for and receive financial aid from the participating university that admits them. OSU students attending the Tulsa campus receive financial aid services through the OSU Financial Aid and Office of Scholarships. Financial aid counseling is available and aid is disbursed at OSU-Tulsa. Scholarships also are available for OSU students attending the Tulsa campus.

Students wishing to take courses at OSU-Tulsa enroll and pay tuition and fees at the Tulsa campus. Tuition and fee rates for courses at OSU-Tulsa are set by the Oklahoma State Regents for Higher Education and published in the OSU-Tulsa class schedule each semester. Enrollment procedures, academic deadlines, and related academic policies and procedures are also published in the OSU-Tulsa class schedule. Class schedules are available on the Stillwater campus in the Graduate College Admission Office and the Transfer Admission Office.

Participating universities are responsible for maintaining academic records, posting grades, and issuing official transcripts for their respective students. Official transcripts, academic record information and other services are available to students at OSU-Tulsa.

Degrees are granted by each of the participating universities. Students completing requirements for a degree offered by OSU at OSU-Tulsa will receive a degree from Oklahoma State University. Graduates may participate in their admitting university's graduation ceremonies and in a commencement program sponsored by OSU-Tulsa and held in Tulsa each spring.

Additional information about OSU-Tulsa can be obtained by contacting the OSU-Tulsa Student Information Center at 1-800-277-8228 or 918-594-8355, or visiting the OSU-Tulsa World Wide Web site (www.tulsa.okstate.edu).

Regents' Resolution on Disruption of the Educational Process

A resolution of the Board of Regents for Oklahoma State University to further clarify existing student regulations. Section 1, "Legal Obligation of the Student," as it pertains to the disruption of the educational process, was adopted in the regular monthly meeting at Stillwater, Oklahoma, on July 11, 1970:

Be it resolved by the Board of Regents of Oklahoma State University:

I. That this statement known as "Emergency Disciplinary Procedure in Cases of Disruption to the University's Educational Process" containing the following provisions be enacted:

A. Definition of Disruptive Conduct

Oklahoma State University has long honored the right of the individual to free discussion and expression, of peaceful demonstration, and of petition and peaceful assembly. That these rights are a part of the fabric of this institution and of the nation as stated in the Bill of Rights is not questioned. They must remain secure. It is equally clear, however, that in a community of learning, willful disruption of the educational process, destruction of property, and interference with the rights of other members of the community cannot be tolerated.

B. Responsibility of the Student

Any student, who willfully by use of violence, force, coercion, threat, intimidation or fear, obstructs, disrupts or attempts to obstruct or disrupt, the normal operations or functions of the University, or who orally or in writing advises, procures, or incites others to do so, shall be subject to dismissal from the University.

The following, while not intended to be exclusive, illustrates the offenses encompassed herein: occupation of any University building or part thereof with intent to deprive others of its use; blocking the entrance or exit of any University building or corridor or room therein; setting fire to or by any other means substantially damaging any University building or property, or the property of others on University premises; any possession or display of or attempt or threat to use or use of firearms, explosives, other weapons or destructive means or devices, except as necessary for law enforcement, in any University building or on the University campus; prevention of the convening, continuation or orderly con-

duct of any University class or activity or of any lawful meeting or assembly in any University building or on the University campus; inciting or organizing attempts to prevent student attendance at classes; and, interfering with or blocking normal pedestrian or vehicular traffic on the University campus.

C. Responsibility of the President

When it appears that there is a violation of Section I-A or I-B, it shall be the duty of the president (and he or she is fully authorized to act) to take all steps which the president deems advisable to protect the assumed and designated interests of Oklahoma State University and to see that its rules, regulations and policies are enforced. The president shall ensure that any person or persons found guilty after proper hearing shall be disciplined in accordance with the existing Oklahoma State University student disciplinary regulations.

In carrying out these duties, the president may call upon any member of the University administration, or any member of the faculty, and the president may call upon any agency of the University created to deal with cases arising under Section A. Action by any state or federal court shall not preclude the University from exercising its disciplinary authority.

D. Responsibility of the Board of Regents

The Board of Regents recognizes that by the Constitution and Statutes it has the power to make such rules and regulations for the management of the University as it may deem necessary and expedient, not inconsistent with the Constitution and laws of the state. While the Regents fully appreciate their obligations in this respect, they further recognize that in dealing with those offenses against the University defined in Section A hereof, they must impose the duty and authority of enforcing the policies set forth herein in the principal executive officer of the University—the president. It will be the responsibility of the Board of Regents to furnish all possible assistance to the president when requested by the president.

II. Subject to the provisions of Sections I-A through I-D, it shall be the duty of the president to exercise full authority in the regulation of student conduct and in matters of student discipline. In the discharge of this duty, delegation of such authority may be made by the president to administrative or other officers of the institution, in such manner and to such extent as may be by the president be deemed necessary and expedient; provided, that in the discharge of this duty it shall be the duty of the president to secure to every student the right of due process.

III. The text of this resolution shall be printed in the "Student Regulations" section of the *Student Handbook* of the University and in the *University Catalog*.

Student Rights and Responsibilities

By enrolling at OSU, students accept the responsibility for complying with all applicable laws and University policies, while retaining the rights guaranteed under the Constitution of the United States. OSU expects students to show respect for the rights of others and for lawful authority, to represent themselves truthfully and accurately at all times, to respect private and public property, to fulfill contractual obligations including those that are financially made with the University, and to take responsibility for their own actions and the actions of their guests.

In order to help ensure that students understand their rights and responsibilities, the OSU "Student Rights and Responsibilities Governing Student Behavior" policy statement codifies and clarifies major areas of student rights and responsibilities. The University makes this document available on the OSU homepage on the internet. Additionally, printed copies may be obtained by students on request in the offices of the Executive Vice-President, the Vice-President for Student Affairs, the Associate Vice-President for Multicultural Affairs, Director of Affirmative Action, student academic services office of each college, Student Conduct Office, University Residential Life, Student Activities, the Student Union Information Desk and the Edmon Low Library Reserve Desk.

University Police Services

Public Safety

Philosophy and Service

The Oklahoma State University Police Department is dedicated to enhancing the opportunity for students, faculty and staff to participate in the educational experience by providing a safe, protected and orderly environment. As a service organization, the department offers a full range of police resources, including area patrols, criminal investigations, crime prevention, facilities security analysis, event planning, and parking management and enforcement. In addition, members of the department serve on University and community committees, provide training and specialized presentations to campus organizations and living groups, participate in the design and installation of safety and traffic control devices, and act as special advisers to all campus departments and administration. The professional police men and women, full-time staff members, and part-time employees are all hand-picked to meet the high standards and multidimensional mission of a public safety department.

The OSU Police Department was recently the recipient of Community Policing grants allowing for an increase of sworn officers to a total of 32. Six officers are assigned community policing responsibilities, and one is assigned to traffic and alcohol safety. The department employs a number of part-time employees (student employees) to perform low-threat duties such as parking enforcement, entrance and motorist assists, and selected assignments dealing with traffic and crowd control. Even though the department has been successful in gaining personnel funding from outside sources, there have been efforts to be more efficient in the management of resources.

Operational cuts and position losses have been compensated by more efficient management of resources. Policies have been implemented that address conservation of equipment and supplies. A grant was used to computerize the department's records for statistic compilation, data analysis, and retrieval of information, aiding in the successful garnering of over three hundred thousand dollars in grants and awards from outside sources.

Actual Reported Part I Crimes At OSU

Year	1995	1996	1997	+/-%*
Part 1 Crimes				
Criminal Homicide	1	0	0	0%
Rape (Sex Offense)	0	1	5	400%
Forcible	0		3	200%
Non-forcible	0	0	2	—
Robbery		0	1	—
Aggravated Assault	0	0	3	—
Breaking & Entering	67	84	79	-6%
Forcible Entry	21	24	34	42%
No Force	42	52	39	-25%
Attempt Force Entry	4	8	6	-25%
Larceny	197	236	151	-36%
Motor Vehicle Theft	7	10	2	-80%
Autos	5	8	2	-75%
Trucks	2		0	-100%
Other Vehicles	0		0	-100%
Arson	2	1	0	-100%
Total (Part 1)	275	332	241	-27%
Other Sexual Offenses	0	1	1	0%
Hate Crimes	0	1	0	-100%
Total Stolen Property	\$181,899	\$218,960	\$137,579	-37%
Alcohol Violations Arrests	160	90	35	-61%
Drug Violations Arrests	17	22	23	5%
Weapon Law Violation Arrests	2	2	2	0%
All Other Arrests	192	173	149	-14%
Total Arrests	371	287	209	-27%
Adults (All Offenses)	360	264	197	-25%
Juveniles (All Offenses)	11	23	12	-48%
Cases Cleared (Part 1)	32	47	53	13%
Clearance Rate	12%	14%	22%	

*Base Year 1996.

Larceny is reported here even though not required in the Crime Awareness Act of 1990.

Actual Reported Part I Crimes At Fraternities/Sororities

Year	1995	1996	1997	+/-%*
Part 1 Crimes				
Criminal Homicide	0	0	0	0%
Forcible Rape	0	0	0	0%
Attempt to Rape	0	0	0	0%
Robbery	0	0	0	0%
Aggravated Assault	0	0	1	—
Breaking & Entering	9	6	3	-50%
Forcible Entry	3	6	1	-83%
No Force	6	0	2	—
Attempt Force Entry	0	0	0	0%
Larceny	22	28	13	-54%
Motor Vehicle Theft	0	0	—	—
Autos	0	2	1	-50%
Trucks	0	0	0	—
Other Vehicles	0	0	0	—
Arson	0	0	0	—
Total (Part 1)	31	36	18	-50%
Other Sexual Offenses	0	—	1	0%
Hate Crimes	0	0	0	0%
Total Stolen Property	\$8,676	\$27,893	\$9,530	-66%
Alcohol Violations Arrests	12	1	2	100%
Drug Violations Arrests	0	0	0	0%
Weapon Law Violation Arrests	0	0	0	0%
All Other Arrests	7	5	11	120%
Total Arrests	19	6	13	117%
Adults	13	11	13	18%
Juveniles	0	1	0	-100%

*Base Year 1996.

OSU Police and cadet officers provide a positive image to visitors and members of the campus community, whether it is providing directions, parking information, or just a friendly welcome. Officers represent the University as a group of caring and professional people, intent upon enhancing a friendly community atmosphere. Necessary enforcement includes using alternatives to arrest when reasonable, and full cooperation with administrative services and functions that have an impact on student conduct. Enforcement efforts are geared toward providing a safe community.

OSU Police participation in athletic and special event staging and planning ensures that all aspects of safety and security of participants are considered. OSU Police officers provide professional crowd control and traffic regulation before, during, and after such events. As first responders to emergency situations, OSU Police are often cited by citizens for decisiveness and professionalism.

Students and staff find the OSU Police willing to share statistics, insights, and experiences as a basis for class reports or vocational interest. OSU Police managers seek proactive means to avoid problems and situations, whether it is suggesting added security measures, providing insight on planned activities, or using investigative analysis to assign a deterrent force.

For the OSU Police, "service" is not just a word or a part of a catchy slogan, but a way of life. People programs, such as motorist assistance, money escorts, and emergency notifications are a part of the department's efforts to be involved in the community. OSU's emergency phone system was expanded, and there are currently 46 such phones strategically located on campus. These phones, with immediate response from the police, have been in operation for 17 years and are still being copied by other universities. The department employs 16 cadet officers for largely parking enforcement, but campus organizations needing reliable and professional-appearing drivers often arrange to use members of the cadet corps.

Operating under a 1989 grant from the Oklahoma Highway Safety Office, the OSU Police launched the program Campus Community Alcohol Safety Effort (C-CASE), aimed at promoting seatbelt use and educating citizens, primarily students, about the effects and penalties of alcohol use and abuse. A second positive effect of the C-CASE effort was the strict enforcement of alcohol-related laws, that has shown dramatic results in getting the drunk driver off campus streets and consequentially preventing accidents. This program continues in part, with emphasis on traffic enforcement.

Thousands of visitors, campers, fishermen, and sightseers visit Lake Carl Blackwell and surrounding recreational areas. OSU Police officers provide friendly and efficient police protection, including lake patrol and rescue operations on the water.

Overall, the OSU Police Department believes in providing proactive law enforcement and service to the University community.

Crime Awareness

Security, Prevention, Statistics, Intervention

Crime

It is an unfortunate fact that criminal incidents of all types occur on college campuses. Many campuses around the country investigate and make public the nature of crimes, the number, and how they are investigated. Oklahoma State University subscribes to that approach and further believes that the public should know how active the OSU Police are in crime prevention and detection.

The OSU Police sponsor a number of special programs for faculty, staff and students designed to provide information about campus security practices and procedures. During freshman parents' orientation each summer and monthly new employee seminars, procedures, suggested practices, availability of pertinent information, and individual responsibilities are discussed. The OSU Police crime prevention staff provide additional safety and security programs as requested. (See also "Avoiding Victimization.")

Reporting Crimes

Crime victims, regardless how seemingly insignificant the crime, are encouraged to promptly report the incident to the OSU Police or the appropriate police agency. To report a crime, a victim or witness need only call the police phone number, 311 (non-emergency) and 911 for emergencies, and a police officer will meet the person to gather the information. An official report is made with copies available to the victim. Each day the incidents from the previous day, excluding names, are summarized and made available to the OSU president, key OSU staff, other law enforcement agencies, the media, and published on the Public Safety internet page. Each month the number of incidents in each category of crime are counted and reported to the

Oklahoma State Bureau of Investigation, who in turn provides the information to the Federal Bureau of Investigation. Each year, the FBI publishes a book of crime statistics called *Crime in the United States*, that includes accurate accounting of the criminal incidents that occurred on the OSU campus. OSU has reported crime statistics in this manner since the FBI began publishing campus crime statistics in 1971.

Students and others are encouraged to report crimes or incidents to persons on campus with significant counseling responsibilities. The OSU Public Safety Department has further developed procedures for collecting information on crimes and violations pertaining to liquor laws, drug-related violations, and weapons violations from such counseling personnel and persons referred for campus disciplinary actions on these offenses. Such violations are published along with other criminal statistics.

Should a student need assistance in reporting crimes or incidents on or off campus, university counselors or police will provide guidance, direction or assistance.

Crimes in Progress

To report a crime in progress, a person, victim or witness, can dial 911 or use one of the outside emergency telephones, or call one of the police phone numbers. Either reporting method will stimulate the response of police, fire, ambulance, or other first responders. In addition, the victim of serious crimes can request support personnel, such as ministers, rape crisis or domestic violence counseling, during or after reporting.

Additionally, crime victims may be eligible for funds through victim compensation laws administered by the Office of the District Attorney.

Actual Crime at OSU

When comparing crime at OSU to other institutions of similar size, OSU's crime statistics are one of the lowest. While a part of the former Big Eight athletic conference, OSU boasted having fewer crimes than any of the other Big Eight universities. As members of the Big Twelve conference, OSU ranked 11 in crime statistics in the 1997 year.

The crime and arrest statistics reported are those which occurred within the jurisdictional boundaries of campus. They do not include "off campus" organizations or "off campus" private housing; these are within the city's police jurisdiction. It is the responsibility of the Stillwater Police Department to monitor and record

criminal activities at "off campus" organizations or "off campus" private housing. Crime statistics concerning these locations or areas are available at the Stillwater Police Department.

Future

Although it is believed that the low incidence of crime will continue, this report is not intended to give a false sense of security. Crime will occur, but prevention efforts can be effective in reducing the opportunities for criminal activity. Citizens play a key role in crime prevention efforts by being cautious, careful, alert to personal safety and protective of personal and University possessions. The crime prevention tips noted below should be followed.

Security and Access Control

It is OSU's policy to lock the doors of buildings that are not in use. However, when working or studying in buildings after normal working hours, it is suggested that individual offices be locked, based upon an assumption that unrestricted access to the building is possible. Some buildings on campus are rarely locked, at the department's request, since students study and work on projects all hours of the day and night. Again, individual offices should be locked by the user on a presumption that the building is accessible. Residence halls have open access between the hours of 6 a.m. to midnight, Sunday through Thursday, and 6 a.m. to 2 a.m. on Friday and Saturday. During non-open access hours, all residence hall doors are locked except the front desk entrance. Instances of propped open doors have occurred, and residents are encouraged to take security precautions in the halls and rooms. Individual rooms should be locked at all times for safety.

Crime Prevention

OSU has experienced success at reducing and preventing crime. Some of the more notable efforts are:

- Emergency telephone system
- Emergency 911 dialing
- 24-hour preventive patrols
- Campus foot patrol by uniformed officers
- Police officer bicycle patrol
- Burglar alarms in key areas
- 24-hour staff in Residence Halls
- Custodial staff in academic buildings after hours
- Crime prevention seminar presentations to groups

Crime prevention pamphlets for students and employees

Monitoring of some parking lots by surveillance cameras

Crime stopper telephone line - 744-TIPS (744-8477)

In addition to preventing crime, considerable effort is devoted to crime intervention. All reported crimes are investigated immediately. Follow-up investigation occurs to identify the offenders. Where multiple incidents occur, surveillance techniques are implemented to help apprehend violators. When caught, offenders are processed through the county court system and OSU when appropriate.

Police Protection

The OSU campus is protected by a campus police agency consisting of 32 sworn officers, 10 support persons, and 14 part-time persons. The agency is operated and available 24 hours a day, 365 days a year. Authority of the sworn officers is derived from state statutes; these allow for full police powers on OSU property. In addition by agreement with the City of Stillwater, campus police and city police enjoy an excellent working relationship. All campus police officers undergo an extensive selection process and meet state-mandated training requirements.

Community Policing

The department subscribes to the concepts of community policing. The officers have been practicing problem-solving concepts for years. The department now employs six officers through federal funding for community policing. A satellite office has been established in Willham Hall to facilitate contact with residence hall students. A police officer bicycle patrol was established to provide an opportunity for the officers to have closer contact with students.

Avoiding Victimization

Tips for personal safety and property security:

Be cautious of strangers.

Avoid getting into vulnerable no-exit places.

Do not hesitate to call police when confronted by unknown persons.

Keep house or residence hall room locked.

At night, walk in groups of at least two.

Walk with confidence, and avoid walking near bushes and parked cars.

Become familiar with the location of emergency telephones.

When parking, remove valuables from plain view and lock the vehicle.

Engrave valuables with driver's license number and record serial numbers.

Make copies of credit cards and lists of other valuables carried on person.

Write name and ID number in several places in textbooks.

Lock bicycle in a bicycle rack.

Report all incidents and losses to police immediately.

When serious crimes occur on or off campus that are considered to be a threat to the campus community, that information will be provided to faculty, staff and students. The medium for this information dissemination will be the campus newspaper, faculty/staff newsletters, or in special instances, specific notices to on-campus residences. Such notices may be posted on residence hall entrance doors, in residents' mail boxes, or placed on electronic voice mail. In addition, the OSU Department of Public Safety maintains an internet page (www.osupd.okstate.edu). This page allows access to the daily crime log, crime prevention tips, and links to other sites providing similar information pertinent to the OSU campus.

Persons may dial the campus phone number 744-6063 and have voice mail access to crime tip information, crime update, crime prevention tips, and parking information.

Alcoholic Beverages and Other Drugs

As set forth in local, state and federal laws, and the rules and regulations of the University, Oklahoma State University prohibits the unlawful possession, use, or distribution of illicit drugs and alcohol by students and employees in buildings, facilities, grounds, or other property owned and/or controlled by the University or as part of University activities.

Under OSU regulations, no low-point beer or other alcoholic beverage is allowed in OSU housing, including fraternities and sororities, except for married student housing, regardless of age. Furthermore, under the same regulations, the possession/consumption of low-point beer or alcohol by those of legal age (over 21) is allowed only in certain designated, non-public places on the OSU campus, properties and facilities. For further explanation, see the pamphlet "OSU Dangers of Drugs and Alcohol Abuse."

Drug and alcohol laws are vigorously enforced on the OSU campus. Violators are subject to criminal prosecution in the District Court of Payne County. The

enforcement techniques range from plain view violation to long-term undercover investigations by local, state, or federal agents and agencies.

University Counseling Services and the Employee Assistance Program have counseling and rehabilitation programs for students and employees, respectively. Should these programs not meet an individual's needs, there are other programs in the community or nearby that may be better suited. A number of such programs are listed in the "OSU Dangers of Drugs and Alcohol Abuse" pamphlet.

Students should be aware that a student who has been convicted of any offense under any federal or state law involving the possession or sale of a controlled substance shall not be eligible to receive any grant, loan or work assistance under this title* during the period beginning on the date of such conviction and ending after the interval specified in the table below (the Conference Report on the Higher Education Amendments of 1998 [H.R. 6], September 25, 1998, Suspension of Financial Aid for Drug Convictions, Sec. 483. Student Eligibility).

If convicted of an offense involving the possession of a controlled substance, ineligibility period is:

First offense	1 year
Second offense	2 years
Third offense	Indefinite

If convicted of an offense involving the sale of a controlled substance, ineligibility period is:

First offense	2 years
Second offense	Indefinite

Sexual Assault

What To Do If Victimized

Oklahoma State University's prevention efforts in the area of sexual assault (including rape) involve the entire community. Many groups are involved in sexual assault prevention. These groups include the OSU Police Department, Residential Life, University Counseling, OSU faculty, Greek Life, University Conduct Office, OSU Student Health Center, OSU Mental Health, PaNOK (students who are peer educators), and OSU staff personnel. They provide training programs, presentations, and workshops to any interested individuals or groups.

Program topics generally include stranger rape, date and acquaintance rape, rapist characteristics, rape trauma syndrome, and victim recovery. An increasing number of presentations, explaining the male's role in sexual

assaults, are directed to all male audiences, such as fraternities and athletic teams.

Procedures to Follow

A victim of sexual assault should follow certain procedures and consider several options. These procedures and options are clearly outlined in the rape avoidance seminars mentioned previously and "Rape Prevention" pamphlets made available to the OSU community. These educational programs and pamphlets also outline techniques and strategies that help people recognize and avoid sexual assault threats.

Evidence. Preserving evidence is of paramount importance after a sexual assault. Victims should be careful not to bathe, douche, wash clothing, or tamper with other potential evidence after a sexual assault. The first inclination may be to do one or more of these; however, the temptation should be resisted. Evidence is critical in a criminal prosecution.

Contacting the Police Department.

When a sexual assault is reported to the OSU Police Department or to the Stillwater Police Department, an officer is dispatched. Determining the extent of physical and emotional trauma that the victim has suffered will be the officer's first concern. If the attack just occurred, the officer will want a brief review of the events, a description of the assailant, the direction of travel, and a description of the vehicle used by the assailant, if any. This information is necessary in order to apprehend the assailant as soon as possible. After the initial interview, the officer or whomever is designated by the victim, will assist in getting a complete change of clothes.

Agreeing to have a Sexual Assault Examination.

An officer or designee will take the victim to the Student Health Clinic or the Stillwater Medical Center to be examined by a physician. A complete physical examination will be given as well as treatment for any injuries. A friend or relative may be permitted to accompany the victim. In addition, the victim may be examined for the purpose of obtaining evidence that would be needed in court. Appropriate antibiotic therapy can be given to decrease the chances of developing venereal disease. After the examination at the hospital, the officer may bring the victim back to the police headquarters or another location to complete the interview. Again, a counselor is encouraged to be present.

The victim of a rape is not responsible for legal expenses related to the criminal prosecution. The case is prosecuted by the Office of the District Attorney. The victim only has to contribute time. The Stillwater Medical Center can provide initial medical services for rape victims. The Crime Victims Compensation Board can provide payment for medical services and counseling, even if charges are not filed. The victim need only file an application with the Office of the District Attorney.

Police Investigation. Later, at police headquarters, the victim will be asked to be more specific about the events of the attack. A person of the victim's choosing may accompany the victim during this period. This questioning is done to help the investigation and to help arrange the events firmly in mind. The victim's comments will probably be tape recorded for future reference. This will make testifying in court much easier and less frightening. It will be handled considerately and courteously. Only the investigating officer will ask questions. Based on conversations with the officer, the victim can then decide whether or not to file charges. Threats or harassment of a rape victim after charges have been filed are rare. When finished at police headquarters, the victim can go to a place of their choice. OSU and Stillwater Police officers have been trained to deal with sexual assault victims. However, if the victim should feel uncomfortable speaking to a male officer, every effort will be made to notify a female officer, female counselor, or female volunteer.

A rape or sexual assault may be reported to the hall director, a university counselor, or health worker at the Student Health Center. Charges do not have to be filed against the attacker if a rape is reported. However, it is wise to give information to the police anyway. The information and suspect description may help locate a suspect in other offenses and possibly prevent another person from becoming the victim of a rape. The police will not know that there is a rapist on campus unless they are told. The police will not pressure the victim to file charges.

Victims of sexual assault can elect to have personal information eliminated from police reports.

Support Services

University Conduct Office. If the victim does not want the case to be addressed through the criminal justice system, another alternative is available. Cases involving students who are accused of

non-academic misconduct might be assigned to the Office of Student Conduct. Persons found guilty of sexual assault, forcible or non-forcible, could be placed on probation or suspended from OSU. Both the accuser and the accused are entitled to the same opportunities to have others present during a campus disciplinary hearing, and both are entitled to be informed of the outcome of any disciplinary proceeding. Further information can be obtained by contacting the Office of Student Conduct at 744-5470. Also, a copy of the "Student's Rights and Responsibilities" can be obtained at various locations on campus.

Role of Housing. The hall directors and resident assistants who work in the residence halls continually attend sexual assault training programs, and they learn how to respond to a student who has been victimized by a sexual or physical attack. They have been informed about the resources available; in fact, some have been trained to conduct sexual assault presentations and workshops. A victim of a sexual assault may request assistance from the University administration in changing academic and/or living situations where a continued threat may be reasonably assumed.

Role of Counseling Services. The OSU Student Health Center and University Counseling Services provide individual and group counseling services for those victimized by sexual or physical assault. Services are available to all Oklahoma State University students, regardless of gender, and their significant others.

The psychological and emotional trauma after a sexual assault can be painful. Possible symptoms include: eating disorders, sleep disturbances, lack of trust, guilt feelings, depression, mood swings, and relationship and communication problems. Sexual assault incidents can only be greatly reduced when men and women understand the dynamics involved in sexual assaults and are willing to participate in educational programming and ongoing communication.

University Academic Regulations

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In addition to these minimal regulations, additional college, department or program requirements may apply. Students are advised to review all steps of their academic progress with their academic adviser.

1. Admission—Withdrawal

1.1 Admission of Freshmen. Policies and procedures governing the admission of new freshmen are detailed in another section of the *Catalog*. (See "Admission" section.)

1.2 Admission of Transfer Students. Policies and procedures governing the admission of transfer students are detailed in another section of the *Catalog*. (See "Admission" section.)

1.3 Admission to Certain Professional Programs. Admission to certain programs as approved by the University may be restricted. (See "Admission" section and college sections in the *Catalog*.)

1.4 International Student English Proficiency Requirement. As a condition of admission to undergraduate study at OSU, all persons for whom English is a second language shall be required to present a minimum paper-based score of 500 or a minimum computer-based score of 173 on the *Test of English as a Foreign Language* (TOEFL). (See "Admission" section of the *Catalog*.)

1.5 Satisfactory Academic Progress. Students not under academic suspension from the University are judged to be making satisfactory progress toward their educational objectives. They are eligible to enroll in any of the undergraduate colleges except as may be restricted. (See "Admission to Certain Professional Programs.")

1.6 Scholastic Requirements for Continuing Enrollment of a Student under Academic Probation in an Undergraduate College. For continued enrollment in an undergraduate program, a student must have earned a retention grade-point average as indicated below:

Total hours attempted	Minimum retention grade-point average required
0 through 30	1.70
31 or more	2.00

Freshman students, (30 or fewer credit hours, as defined by OSRHE policy), with a retention GPA of 1.70 to less than 2.00 will be placed on academic notice. These students should remain in contact with their student academic service offices regarding special academic support services and procedures.

Any student not maintaining a retention GPA as indicated above will be placed on probation for one semester. At the end of that semester, he or she must have a semester GPA of 2.00, not to include activity or remedial courses, or meet the minimum standard required above, in order to continue as a student.

All courses in which a student has a recorded grade will be counted in the calculation of the grade-point average for retention purposes excluding any courses repeated or rerieved, and excluding remedial courses and physical education activity courses. These calculations are made three times per year, to coincide with the conclusion of the fall and spring semesters, and the collective summer term. Grades submitted after these calculations are carried forward to the next calculation. (See also "Grade-point Average Calculating" and "Academic Forgiveness.")

A senior, with 90 or more hours in a specified degree program, who has failed to meet the retention grade-point average of 2.00 or the semester GPA of 2.00, may enroll, at the discretion of the institution, in an additional 15 semester hours in a further attempt to achieve the requirements for retention. Such students will be afforded this extension one time only.

Seniors must achieve a 2.00 GPA or above for each semester of course work comprising this one-time exception. To continue beyond the 15-hour exception, the senior must raise the retention GPA to 2.00. A part-time senior would be permitted to take up to 15 additional hours if the student achieves a minimum 2.00 GPA each semester.

A student enrolling on probation should seek help from an academic adviser and a counselor in the University Counseling Services when deciding on an academic load and extracurricular activities. A student whose poor grades may have been caused by health problems should seek the help of a physician.

1.7 Academic Suspension. A student on probation will be suspended when he or she earns a semester GPA of less than a 2.00 in regularly-graded course work not including activity or remedial courses, and the retention grade-point average for all hours attempted falls below the following:

Total hours attempted	Minimum retention grade-point average required
0 through 30	1.70
31 or more	2.00

Freshman students, (30 or fewer credit hours, as defined by OSRHE policy), with a retention GPA of 1.70 to less than 2.00 will be placed on academic notice. These students should remain in contact with their student academic service offices regarding special academic support services and procedures.

All courses in which a student has a recorded grade will be counted in the calculation of the grade-point average for retention purposes excluding any courses repeated or reprimed and excluding remedial courses and physical education activity courses. These calculations are made three times per year, to coincide with the conclusion of the fall and spring semesters, and the collective summer term. Grades submitted after these calculations are carried forward to the next calculation. (See also "Grade-point Average Calculating" and "Academic Forgiveness.")

A senior, with 90 or more hours in a specified degree program, who has failed to meet the retention grade-point average of 2.00 or the semester GPA of 2.00, may enroll, at the discretion of the

institution, in an additional 15 semester hours in a further attempt to achieve the requirements for retention. Such students will be afforded this extension one time only.

Seniors must achieve a 2.00 GPA or above for each semester of course work comprising this one-time exception. To continue beyond the 15-hour exception, the senior must raise the retention GPA to 2.00. A part-time senior would be permitted to take up to 15 additional hours if the student achieves a minimum 2.00 GPA each semester.

1.8 Reinstatement after Academic Suspension. A student who has been suspended from the University for academic reasons may not be readmitted until one regular semester (fall or spring) has elapsed (unless the faculty appeals committee grants immediate reinstatement). Students who wish to appeal suspension status should inquire about procedures and deadlines from the Office of the Executive Vice President.

Readmission after one regular semester has elapsed will be considered on the merits of the individual case. Suspended students can be readmitted only one time. If a student is suspended a second time, he or she must attend another institution and raise the retention GPA before readmission to OSU can be considered.

Beginning with the Spring and Summer semesters of 1998, a student suspended from OSU at the end of the spring semester may continue in the summer semester at OSU if this spring suspension was the student's first suspension. The student must complete a minimum of six hours and must achieve a 2.00 summer semester GPA, or raise the graduation/retention GPA to the OSRHE standard, in order to continue in the subsequent fall semester. The student should contact his or her dean's office for additional information and restrictions. (See also "Academic Suspension.")

1.9 Readmission. A student who has attended OSU but was not enrolled during the immediate past semester (except the summer session) must submit an Application for Readmission. A student who has enrolled in another college or university since last attending OSU, must submit a transcript from each school. Admission status will be determined after an evaluation of the previous work has been made.

1.10 Withdrawing from the University. Withdrawing refers to withdrawing from all courses for which a student is enrolled for a given semester. The withdrawal process is initiated in the student's dean's office.

Beginning with the Fall 1998 semester a student who withdraws prior to the end of the 12th week of a regular semester or

the sixth week of a summer session, or proportionate periods for block or short courses, will receive a grade of "W" (withdrawn) on the student's academic record. A student who withdraws after the 12th week of a regular semester or the sixth week of a summer session but prior to "Pre-finals Week," will receive a grade of "W" (withdrawn) or "F" (failing) as assigned by the instructor of each course. The grade of "W" or "F" will be recorded on the student's academic record and the grade of "F" will be calculated in the grade-point average.

After the beginning of "Pre-finals Week" a student may not withdraw from the University and will be assigned only the grade of "A," "B," "C," "D," or "F" or (when appropriate) "I," "NP," "P," "S," "U," or "X" by the instructor of each course at the end of the semester or summer session.

2. Student Status

2.1 Classification of Students. Undergraduate classification is determined by the criteria below:

Freshman	fewer than 28 semester credit hours passed
Sophomore	28 to 59 semester credit hours passed
Junior	60 to 93 semester credit hours passed
Senior	94 or more semester credit hours passed

2.2 Full-time Students. Regular semesters: undergraduate students who are enrolled in 12 or more semester credit hours are classified as "full-time" students. Graduate students enrolled in nine or more semester credit hours are classified as "full-time." Summer session: undergraduate students who are enrolled in six or more semester credit hours, or graduate students who are enrolled in four or more semester credit hours, are classified as "full-time." Credit hours enrolled in through correspondence study are not counted toward full-time status, unless the course is independent study taken through regular enrollment.

Students engaged in an internship or cooperative education program assignment that requires full-time work on the assignment are regarded as full-time students when they are enrolled in the number of credit hours deemed appropriate for the academic credit they receive for the assignment.

A student holding a 0.50 FTE graduate assistant appointment, and enrolled in a minimum of six hours during the fall or spring semester, and three hours during the summer semester will be certified as a full-time graduate student. Any FTE appointment less than 0.50 requires nine hours of enrollment for the fall or spring semester, and four hours of enrollment

for the summer semester in order for the student to be classified as a full-time student.

A student enrolled for the final semester of a bachelor's degree program may be classified as a full-time student if enrolled in fewer than 12 hours during that semester.

A student in the terminal phase of the plan of study leading to a master's or doctoral degree, may be classified as a full-time student if enrolled in fewer than nine hours during the semester in which the degree will be conferred. If the dissertation, thesis, report, or creative component is the only item left to complete the plan of study, the student is designated as being enrolled full-time upon the approval of the department head and dean of the Graduate College.

2.3 Part-time Students. Students who are enrolled but not meeting the definition of full-time students are classified as "part-time." Undergraduate students are classified as "half-time" if they are enrolled in six hours in a regular semester (or three hours in a summer session). Graduate students are classified as "half-time" if they are enrolled in four hours in a regular semester (or two hours in a summer session). OSU does not use "three-quarter time status" for academic purposes.

2.4 Special Students. A student who does not have immediate plans to enter a degree program but wants to take courses, may be classified as a "special student." A student on an F-1 visa may not enroll as a special student since he or she must be admitted to a degree program.

3. Requirements

3.1 Date of Matriculation. Matriculation occurs when a student first enrolls in an accredited institution of higher education. That date will be used in calculating the time limit for the use of a given plan of study.

3.2 Changes in Degree Requirements. When a student first enrolls at OSU, the degree requirements are made available. Although the curriculum may be revised before a student graduates, a student who makes normal progress toward graduation (completing a four-year degree in not more than six years) will be held responsible for the degree requirements in effect at the time of matriculation, and any changes that are made, so long as these changes do not result in semester credit hours being added or do not delay graduation. A student has the option of adopting the new requirements that have been established since matriculation.

3.3 Honors Programs. (See "Honors Programs" in the *Catalog*.)

3.4 General Education Requirements.

Although the University has a general education program, each college determines and publishes the general education requirements for its degree programs. College requirements may exceed the minima for general education established by the University, which are:

- 40 semester credit hours, including six semester credit hours of English composition; (by OSRHE policy, these 40 hours are exclusive of physical education activity courses);
- three semester credit hours of American history (HIST 1103), and three semester credit hours of American government (POLS 1113);
- at least six semester credit hours in each of the approved general education designated areas of Analytical and Quantitative Thought, Humanities, Natural Sciences, and Social and Behavioral Sciences (at least one course in each of these four areas must come from the approved general education lower-division course list, and at least three hours of (A) must be a general education MATH course);
- at least one course designated as International Dimension and one course in Scientific Investigation.

Substitution of general education courses is allowed when background for the major demands greater depth in an area in which a general education requirement is stated. Only in the Analytical and Quantitative Thought (A) and Natural Sciences (N) areas is substitution of the more advanced lower-division course permitted. Such a substitution requires the recommendation of the student's academic adviser and dean and the approval of the Office of the Executive Vice-President.

Courses used to fulfill general education requirements are identified by code letters which appear preceding the course titles listed in the back of the *Catalog* and in the class schedule book. The code letters designate the general education category for which the course may be used:

- A Analytical and Quantitative Thought
- H Humanities
- I International Dimension
- L Scientific Investigation
- N Natural Sciences
- S Social and Behavioral Sciences

General Education courses are also identified on the World Wide Web, maintained by the Office of Academic Affairs.

3.5 English Composition Requirement.

The University requires a minimum of six semester credit hours in English composition for a baccalaureate degree. The required sequence of courses is ENGL 1113 and ENGL 1213. For those who

qualify, ENGL 1013 or 1313 may be substituted for ENGL 1113. Students who earn an "A" or "B" in ENGL 1113 (or ENGL 1013 or 1313) or who earn three semester credit hours in English composition through credit by exam, and who have the consent of their college, may substitute ENGL 3323 for ENGL 1213. Students who qualify may substitute ENGL 1033 or 1413 for ENGL 1213. A third course may be required by the student's college to satisfy either an additional composition or oral communication requirement.

3.6 English Proficiency Examination.

Effective October, 1993, the English Proficiency Examination was waived for students who had matriculated since Fall 1988 through Spring 1994.

3.7 Substitution of Required Courses.

In meeting degree requirements a lower-division course may not be substituted for an upper-division course requirement. Substitution policy is governed by the individual colleges.

3.8 Waiving of Required Courses.

A maximum of six semester credit hours may be waived. Required courses in English, American history and American government cannot be waived, and the total number of semester credit hours required for the degree cannot be reduced. Waive cards must be signed by the student's adviser, the head of the student's major department and the dean of the college.

3.9 Changing Majors. Students are advised to select a specific major no later than the end of the sophomore year. Students on probation, or not making satisfactory progress toward a degree, may change majors only with the approval of the dean of the college in which they wish to pursue a different degree.

3.10 Deadline for Completion of Requirements.

Degrees are conferred only on specific commencement dates. If a student completes requirements for a degree after a commencement date, the degree will be granted at the next scheduled commencement after the student files a diploma application. (See "Diploma Application.") The student may request a certified statement of completion of graduation requirements at the Office of the Registrar. All candidates for degrees must have their names listed in the commencement program.

3.11 Second Baccalaureate Degree.

A student who receives a baccalaureate degree from OSU may use all applicable courses toward a second baccalaureate degree. A minimum of 30 semester credit hours of additional work, including all requirements of the second baccalaureate degree, is required. The Bachelor of University Studies degree has separate requirements.

4. Credits

4.1 Residence Credit. Residence credit is awarded for work taken on campus (not through correspondence or credit earned by examination) or at a location officially designated as a residence center by the governing board of the institution (e.g., in-state military bases and OSU courses at the University Center at Tulsa.)

4.2 Extension and Correspondence Credit. Academic credit is awarded for courses offered through the extension offices of the six colleges, by the Independent and Correspondence Study Center of OSU, or by transfer of work certified as extension or correspondence credit by another fully accredited institution.

Extension Credit. OSU will accept, toward a degree, a maximum of eight semester credit hours earned through extension at another institution if that institution is fully accredited.

Correspondence Credit. OSU will accept, toward a degree, a maximum of eight semester credit hours earned through correspondence at another institution if that institution is fully accredited. Credits earned through correspondence cannot exceed one-fourth of the credits required for a baccalaureate degree. (See also "Full-time Status.")

4.3 Transfer Credit from Other Accredited Four-year Institutions. Except as excluded in the section on "Transfer of Credits from Junior Colleges" and "Residence Requirements," credits transferred from accredited senior colleges will apply toward baccalaureate degrees in the same way that they would apply had they been earned in residence at OSU. Students may not use transfer credits to satisfy more than one-half the major course requirements for a department unless they have the approval of the head of that department and the academic dean.

4.4 Transfer Credit from Junior Colleges. Credits will be accepted by transfer from a junior college to meet lower-division (i.e., 1000- and 2000-level courses) requirements only. A minimum of 60 semester credit hours must be earned at a senior college. Within these guidelines, transfer credits are subject to the individual colleges' degree requirements.

4.5 Transfer Students with Less than a "C" Grade-point Average. Students who are accepted as transfer students with GPAs below OSU's retention standards will be placed on academic probation.

4.6 Credit by Exam. The academic regulations listed below apply to the following examinations: Advanced

Placement Program (AP), International Baccalaureate Program (IB), College Level Examination Program (CLEP), Regents College Examinations and OSU Advanced Standing Examinations.

- a. credit earned by examination will not be placed on a student's transcript unless he or she is currently enrolled and has successfully completed 12 or more semester credit hours of academic work at OSU;
- b. credit will be recorded with a neutral grade of "P" (Pass) if the student earns the equivalent of a "C" or better on the examination. No grade is recorded if the student fails the exam;
- c. the amount of credit by exam which may be applied to a degree program is subject only to meeting the residence requirements of OSU (see "Residence Requirements");
- d. a native speaker of a foreign language (one whose high-school level instruction was conducted principally in that language) cannot earn credit toward graduation in lower-division (1000-2000 level) courses in that language (see "Foreign Language Credit for Native Speakers");

OSU Advanced Standing Examinations may be offered by academic departments on campus in subject areas not offered through the examination programs listed above. Any currently enrolled student whose travel, employment, extensive readings or educational experience appear to have given the student proficiency in a subject that is offered at OSU, equivalent to the proficiency ordinarily expected of those students who take the subject in a regular class, may apply for an examination on the subject.

In addition to the regulations listed above, to qualify for an OSU Advanced Standing Examination the student must:

- e. need the course to meet some requirement for a certificate or degree being pursued at OSU;
- f. be enrolled at OSU;
- g. not have taken an exam over the course within the preceding six months;
- h. receive the approval of the head of the department in which the course is offered and the dean of the student's college;
- i. present a valid student I.D. at the examination.

Information and application forms pertaining to OSU Advanced Standing Examinations may be obtained from the Office of Admissions.

4.7 Validation Examination Credit. A student may apply to take a validation examination for a course taken at an

institution that OSU does not recognize as accredited. To qualify for a validation examination, a student must:

- a. be enrolled at OSU at the time the student takes the examination;
- b. present the necessary evidence to prove that the student has taken the course;
- c. obtain the recommendation of the Office of Admissions and the approval of the dean and head of the department in which the course is offered;
- d. take the examination within the first semester after entering OSU;
- e. take only one such examination in each subject.
- f. present a valid student I.D. upon examination.

The student obtains the examination form at the Office of Admissions. The dean of the college in which the course is offered appoints a committee of three to construct, administer and evaluate the examination. The result is reported to the Office of Admissions and the Office of the Registrar where a "P" grade is recorded if the examination result is "C" or better. No fee is required.

4.8 Graduate Credit Hours for a Senior.

A senior who is graduating from OSU at the end of a semester or summer session may take a limited number of courses for graduate credit during the last two semesters or summer sessions. The written request to receive graduate credit must be made before the end of the fifth week of class instruction of a regular semester or the second week of a summer session. Such credit may be earned under the following conditions:

- a. the student must meet the same admission requirements and be subject to the same possible probationary or provisional restrictions as students admitted in graduate status. The student must achieve an overall 3.00 grade-point average in all courses and make no less than a "B" in those courses for which he or she wants graduate credit;
- b. the credits must not be required or needed for the baccalaureate degree;
- c. the total registration must not exceed 18 credit hours for a semester or nine credit hours for a summer session;
- d. the student must either complete the requirements for the baccalaureate degree at the end of the semester or summer session or be within 12 semester credit hours of completing such requirements at the beginning of the semester or summer session in which graduate credit is requested;
- e. admission to courses taken for graduate credit must have the approval of the course instructor, the head of the

department in which the courses are offered and the dean of the Graduate College;

- f. not more than 15 semester credit hours taken while a senior may be approved for graduate credit, and a minimum of 15 semester credit hours must be completed in residence after the student registers in the Graduate College. Courses taken for graduate credit during the senior year may not be accepted for graduate credit at institutions other than OSU;
- g. the use to be made of the graduate courses will be determined by the adviser when the student registers in the Graduate College and submits a plan of study for an advanced degree.

4.9 Semester Credit Hour. A semester credit hour is equivalent to (a) 16 50-minute class sessions (including examinations) conducted under the guidance of a qualified instructor plus 32 hours of preparation time, or (b) 16 3-hour laboratory sessions, or (c) 16 2-hour laboratory sessions plus 16 hours of preparation time. These same equivalencies apply to extension courses, short courses and other learning formats for which academic credit is awarded.

4.10 Foreign Language Credit for Native Speakers. A native speaker of a foreign language cannot enroll in or earn credit toward graduation in lower-division (1000- or 2000-level) courses in that language. A native speaker of a foreign language is defined as a person whose high-school level instruction was conducted principally in that language.

Native speakers may occasionally have valid reasons for establishing credit in a lower-division course. Requests for such consideration should be directed to the dean of the student's college for recommendation to the head of the Department of Foreign Languages and Literatures.

5. Enrollment

5.1 Course Numbering System. All courses are identified by numbers composed of four digits. The first digit indicates the class year in which the subject is ordinarily taken, although enrollment is not exclusive as to student classification; the second and third digits identify the course within the field; and the last digit indicates the number of semester credit hours the course carries. For example, a course numbered 1123 should be interpreted as a freshman, or beginning, level course carrying three hours of credit. A course number beginning with zero indicates that the course does not carry University credit. A course number ending in zero indicates that the course carries variable credit.

5.2 Maximum Semester Credit Hour Load. All semester credit hours above 19 (nine during a summer session) are excessive and require written approval *in advance* of enrollment by the student's adviser and the dean of the college. Excessive hours will be limited to the number of semester credit hours 50 percent greater than the number of weeks in the applicable academic semester or summer session.

5.3 Adding Courses. Approval of the student's academic adviser is required for adding a course. The end of the first week of a regular semester or the third class day of a summer session is the last day a course may be added (nonrestrictive). A short course may be added no later than the first day of the short course. With instructor approval, a course may be added during the second week of classes of a regular semester or the fourth or fifth day of a summer session (restrictive).

5.4 Dropping Courses. Dropping refers to the dropping of one or more courses while remaining enrolled in at least one course for a given semester. At any time prior to the end of the second week of a regular semester or the first week of a summer session, or during the proportionate period for block or short courses, a student may drop a course, and no record of the course will appear on the student's academic record.

Beginning with the Fall 1998 semester, after the deadline for dropping with no record, but prior to the end of the 12th week of a regular semester or the sixth week of a summer session, or proportionate periods for block or short courses, a student may drop a course and the grade of "W" (dropped) will be recorded on the student's academic record.

After the 12th week of a regular semester, or the sixth week of a summer session, or proportionate periods for block or short courses, a student may not drop a course and will be assigned only the grade of "A," "B," "C," "D" or "F," or (when appropriate) "I," "NP," "P," "S," "U," or "X" by the instructor at the end of the semester. (Exceptions to this policy may be allowed by petition due to extraordinary circumstances. A petition requires the signatures of the student's instructor, adviser and dean with the grade of "W" or "F" assigned by the instructor.)

No course may be dropped without the approval of the student's academic adviser.

A student may not drop any course in which a formal charge of academic dishonesty is pending against the student. If the student is absolved of the formal charge, he or she may drop the course with either a "W" or "F" (according to the drop grade policy), appearing on the

academic record. If the student is found guilty, the instructor may take appropriate disciplinary action, including assigning the grade "F" for the assignment or the course.

5.5 Concurrent Enrollment. A student who desires to earn credits concurrently at another institution or through correspondence, or DANTES (Defense Activity for Non-traditional Education Support) examinations while enrolled for residence credit at OSU, must secure approval *in advance* from his or her dean if he or she expects this institution to accept those credits. Armed Forces personnel will be granted 60 days from the date of their first enrollment to establish, through DANTES examinations, advanced standing in subject matter that they mastered while in the Armed Forces.

5.6 Prerequisites to Upper-division and Graduate-division Courses. When no prerequisites are listed for courses numbered 3000 or 4000, it is understood that the prerequisite is 60 credit hours of work completed, or 45 credit hours of work completed with an overall grade-point average of 3.25. The prerequisite for courses at the 5000 or 6000 level is graduate standing in addition to any other prerequisites listed. Instructors may waive prerequisites when the student's background justifies this action. Prior approval of the instructor may be required in problems courses, independent study, internships, thesis and dissertation courses, and courses taught in a professional school.

5.7 Class Enrollment Maxima. The maximum numbers of students permitted to be enrolled in each section of a course is determined by the department head and can be increased or decreased only by the department head or dean.

5.8 Priority Enrollment. Currently enrolled/continuing students register for summer and fall classes during the latter part of the preceding spring semester, and for spring classes during the latter part of the fall semester. In order to facilitate access to courses required for timely degree completion, a student's priority for enrollment generally follows academic class level with seniors having the highest priority. Some exceptions to this basic priority may be necessary to accommodate bona fide student needs, such as a special priority for physically disabled students. The Office of Academic Affairs determines enrollment priorities, and enrollment schedules and priorities are published in the Schedule of Classes each semester.

5.9 Late Enrollment. A student is permitted to enroll during the first week of a semester or through the third day of a summer session or on the first day of a summer short course. A student enrolling

late will pay a late enrollment fee. The late enrollment fee will not be charged on or prior to the first day of a summer short course.

5.10 Payment of Tuition and Fees. Each student is provided an estimate of their tuition and fees at the point of registration. All fees (required and optional) and tuition associated with the student's enrollment are due in the Office of the Bursar no later than 4:30 p.m. on the 15th day of each month following billing. Failure to receive a bill, which is mailed to the student's local address or specified billing address, does not relieve the student from the financial obligation, any finance charges, and other penalties that may occur if the account is not paid by the monthly due date. Fall semester fees are due by September 15, spring semester fees are due by February 15, and summer session fee due dates vary depending on the session. All accounts not paid in full by the due date will accrue an interest penalty at the rate of 1.5 percent monthly (19.56 APR). Accounts must be cleared before the student can obtain the release of any records, obtain a transcript, receive a diploma, or enroll at OSU for subsequent semesters.

5.11 Audit. A student who does not wish to receive credit in a course may, with the approvals of the student's adviser and the instructor of the course concerned, attend the class strictly as a visitor. A student who applies to audit a course promises that he or she will not use the audit to avoid the rule against excessive hours, and that he or she will not petition or ask in any way for the privilege of taking an examination to obtain credit after he or she has audited the course. The audit form is available in the Office of the Registrar. (Laboratory courses, private music lessons and art courses are not open for audit.)

If a student is already enrolled for credit in a course, but wishes to change to auditing that course, the student must officially drop the course (or, if appropriate, withdraw,) at the time the student changes to audit.

A student who has established a permanent record at OSU may have the audited course recorded on his or her transcript with "AU" appearing in place of the grade. Not later than one week after the close of that semester, the student must present to the Office of the Registrar the instructor's copy of the audit form with a signed statement from the instructor, on the reverse side, that it is appropriate for the course to be recorded on the student's transcript.

Any individual 65 years or older may audit a class at no charge.

5.12 Minimum Class Size. The minimum number of students required in order for a class to meet is as follows: 20 students for lower-division classes, 12 students for upper-division classes, and eight students for graduate-level classes.

6. Grades and Grading

6.1 Official Transcripts. All official transcripts of the student's academic record at OSU are prepared and released by the Office of the Registrar. Copies of transcripts from other institutions cannot be furnished.

6.2 Grade Interpretation. The quality of student performance in all classes is indicated by the following letter grades: "A," "B," "C," "D," "F," "I," "NP," "P," "S," "U," "W," or "X." Descriptions of the grades are:

Grade "A"	Excellent
Grade "B"	Good
Grade "C"	Average
Grade "D"	Below average
Grade "F"	Failure

Grade "I." This grade is given to a student who satisfactorily completed the majority of the course work and whose work averaged "D" or better, but who has been unavoidably prevented from completing the remaining work of the course. The conditions, including appropriate time limits, for the removal of the "I" are indicated on the official class roll by the instructor. A condition that the student must repeat the course in order to remove the "I" is not permitted. The maximum time allowed for a student to remove an "I" is one calendar year. The dean of the student's college may recommend to the Office of the Registrar the adjustment of this period in exceptional circumstances. It is the responsibility of the student to satisfy the requirements stipulated by the instructor at the time the "I" is assigned; it is the responsibility of the instructor to initiate action to have the new grade entered as soon as possible after the student fulfills the requirement. The new grade does not result in the deletion of the "I" symbol from the transcript. Upon completion of the course requirements, a second entry is posted beside the original "I" on the transcript to show the final grade for the course. The incomplete grade which is not removed within the allotted period becomes a permanent incomplete.

Grade "NP." This grade is given for unsatisfactory work (including that evaluated as "D") in courses on the pass-no pass grading system. Both credit hours and grade-points are ignored in calculating grade-point averages.

Grade "P." This grade is given for passing work in OSU courses approved

for pass-no pass and pass-fail grading systems. Both credit hours and grade-points are ignored in calculating grade-point averages.

Grade "S" or "U." This grade is given for satisfactory (equivalent to a "C" or better) or unsatisfactory work in remedial courses in English, mathematics, reading, and science. Both credit hours and grade points are ignored in calculating grade-point averages, and neither grade is counted in total hours. Effective Fall 1995, these courses were CIED 0123, ENGL 0003, 0123, MATH 0123, and UNIV 0111.

Grade "W." This grade indicates that the student dropped the course.

Grade "X." This grade is given to a student in a thesis or dissertation course (5000 or 6000) or a master's degree creative component course, when course work is still in progress. It is the responsibility of the instructor to initiate action to have the grade entered as soon as possible after the student completes the course work. The new grade does not result in the deletion of the "X" symbol from the transcript, but a second entry is posted beside the original "X" on the transcript to show the final grade.

Mark of "AU." An "AU" indicates that the student audited the course, and requested that it be recorded on the academic record. An "AU" is not a grade and is not used in calculating grade-point averages.

Mark of "N." An "N" indicates that at the time grades were due in the Office of the Registrar, a final grade was not reported by the student's instructor. An "N" is not a grade and will be changed to the grade earned within a reasonable time. It is not used in calculating grade-point averages.

6.3 Grade-point System. The following grade-point system is used in calculating the grade-point average.

Grade "A" yields 4 grade points per semester credit hour.

Grade "B" yields 3 grade points per semester credit hour.

Grade "C" yields 2 grade points per semester credit hour.

Grade "D" yields 1 grade point per semester credit hour.

Grade "F" yields 0 grade points per semester credit hour.

6.4 Grade-point Average Calculating. In calculating grade-point averages, the total number of grade points earned is divided by the total number of hours attempted. The grade of "I," "NP," "P," "S," "U," "W," "X" or the mark of "AU" or "N" will not affect the grade-point average.

Semester Grade-point Average. For purposes other than retention, all grades

are included in the calculation. For retention purposes, activity and remedial courses are excluded from the calculation. These courses remain on the transcript identified with an ampersand (&).

Graduation and Retention Grade-point Averages. All courses in which a student has a recorded grade are included in the calculation, excluding any courses repeated (with an original grade of "D" or "F") or reprieved and excluding remedial courses and physical education activity courses. (See "Academic Forgiveness.")

Cumulative Grade-point Average. All courses in which a student has a recorded grade are included in the calculation.

6.5 Freshman Progress Reports. The faculty will report grades for all freshmen on the dates as printed in the official University calendar. The date will normally be Friday of the eighth week of classes. Progress reports are made available to freshman students shortly after mid-semester. Copies are made available to the students' advisers and the students' deans.

6.6 Pass-No Pass Grading System. An undergraduate student may elect to take no more than four courses or 15 hours (whichever is greater) during his or her academic career with the pass-no pass grading option. The option is restricted to those students who:

- have passed 28 or more semester credit hours;
- have at least a 2.50 grade-point average in all hours attempted;
- have met all of the prerequisites for enrollment in the course in question;
- do not need the course in question for meeting any requirements for graduation or certification other than as a general (unrestricted) elective;
- have approval of the academic adviser.

A student who chooses the pass-no pass option must do so by the last date on which a course may be added. Once the deadline has passed, a student may not change the choice of grading systems. The pass-no pass option is not identified on the official class roll and thus is not known to the instructor. The instructor assigns a normal grade based on the quality of the work performed. The grades of "A," "B" and "C" are recorded on the transcript as "P"; the grades of "D" and "F" are recorded as "NP." "W" and "I" grades are recorded without change. The pass-no pass grade will not affect the grade-point average.

Graduate students should refer to the "Graduate College" section of the *Catalog*.

6.7 Pass-Fail Grading System. Some courses are taught only on a pass-fail basis. Such courses are so designated in the "Course Listings" section of the *Catalog*. Students who pass the course are awarded the grade of "P"; those who fail the course are awarded the grade of "F."

Graduate students should refer to the "Graduate College" section of the *Catalog*.

6.8 Grade Reports. Reports of the grades of all students are compiled and released shortly after the end of each semester by the Office of the Registrar. These reports are made available to the students, the students' advisers and the students' deans.

6.9 Correcting Grades Reported in Error. An instructor who reports an incorrect grade to the Office of the Registrar may request that Office to correct the grade. The request must be in writing and must have both the department head's and the dean's approvals. In no case will a grade be lowered after the student has been graduated.

6.10 Grade Appeals. A student may appeal a grade given by an instructor in cases in which he or she believes the grade awarded is inconsistent with announced grading policy. (See "Student Rights and Responsibilities" or contact the Office of the Provost and Vice-President for Academic Affairs.)

6.11 Honor Rolls. Full-time Students. Full-time undergraduate students (12 or more semester credit hours in a regular semester or six or more in a summer session) who complete all enrolled hours with a semester (not cumulative) grade-point average of 4.00 (i.e., all "A's") and with no grade of "I" in any course are placed on the President's List of Distinguished Students. The grade of "P," "S" or "W" or grades earned through correspondence may not be included in meeting the minimum enrollment required or grade-point average required for an honor roll. Students who have completed their courses under the same requirements as outlined above, with a grade-point average of 3.50 or higher and no grade below "C," are placed on the Dean's List of Distinguished Students. (See also "Grade-point Average Calculating.")

Part-time Students. Part-time undergraduate students (11 or fewer semester credit hours in a regular semester or five or fewer in a summer session) who have accumulated at least 12 semester credit hours of "A" during the most recent consecutive enrollments at OSU, and who complete all enrolled hours with a combined grade-point average of 4.00 (i.e., all "A's") and with no grade of "I" in any course, are placed on the President's List of Distinguished Students. The grade of

"P" or "S," or grades earned through correspondence may not be included in meeting the minimum enrollment required or grade-point average required for an honor roll. Dropping a course prohibits a part-time student from being listed on an honor roll. Special (non-degree-seeking) students are not included on an honor roll. Students who have completed their courses under the same requirements as outlined above, with a combined grade-point average of 3.50 or higher and no grade below "C," are placed on the Dean's List of Distinguished Students. (See also "Grade-point Average Calculating.")

Once a part-time student is placed on an honor roll, the student must complete an additional 12 credit hours, before the student is considered again for an honor roll. The student must meet all the above criteria at the time of subsequent consideration.

(Beginning Spring 1995, and retroactive to include Fall 1994, the Dean's List grade-point average was 3.50.)

6.12 Academic Dishonesty or Misconduct. Academic dishonesty or misconduct is neither condoned nor tolerated at Oklahoma State University. Academic dishonesty is behavior in which a deliberately fraudulent misrepresentation is employed in an attempt to gain undeserved intellectual credit, either for oneself or for another. Academic misconduct is behavior that results in intellectual advantage obtained by violating specific directions, rules, or accepted academic standards, but without deliberate intent or use of fraudulent means. (See also *Policy and Procedure Letters*.)

6.13 Academic Forgiveness (Undergraduates). Repeated Courses. A student may repeat a course and have only the second grade, even if it is lower than the first grade, included in the calculation of the graduation and retention grade-point averages up to a maximum of four courses but not to exceed 18 credit hours in which the original grade was a "D" or "F." If a course is repeated more than once, all grades except the first attempt are included in the grade-point averages. The original course and grade remain on the transcript identified with an asterisk (*). All other repeated courses, those in excess of the 18-hour, four-course maximum and those with a grade of "C" or better in the original course, are included in the grade-point averages and identified with an "at" sign (@) on the transcript.

Academic Reprieve. A student may request an academic reprieve for all courses in one semester or two consecutive semesters if the following conditions are met: (a) at least three years must have elapsed between the period in

which the grades being requested relieved were earned and the reprieve requested; (b) the student must have earned a GPA of 2.00 or higher with no grade lower than a "C" in all regularly graded course work (a minimum of 12 hours) excluding activity, performance and remedial courses since the semester requested to be relieved; (c) the student has not previously been granted an academic reprieve for a semester; (d) there were extenuating circumstances which caused the student to perform poorly during the semester.

The request for an academic reprieve must be submitted on the appropriate form to the Office of the Executive Vice-President. A faculty committee appointed by that office reviews each request and either approves or denies a request based on whether or not the student meets the conditions stated above and the committee's judgement concerning the extenuating circumstances reported by the student. The courses for a semester that is relieved are excluded from the graduation and retention grade-point averages and identified with a pound (#) sign on the transcript.

7. Graduation

7.1 Graduation Requirements. The responsibility for satisfying all requirements for a degree rests with the student. Advisers, faculty members and administrators offer help to the student in meeting this responsibility.

7.2 Residence Requirements. A minimum of one-half of the upper-division requirements in a student's major field must be earned in residence at OSU. (See "College Enrollment Requirement.") Including the last 18 semester credit hours the student must have earned a total of not less than 30 semester credit hours at OSU taken in not less than two semesters, or one semester and one summer session, or three summer sessions. Courses taken as part of a required internship, such as in medical technology, may not be used in meeting this requirement. In the College of Business Administration the last 30 hours must be earned in residence.

7.3 College Enrollment Requirement. A candidate for graduation must be enrolled in the college from which he or she wishes to receive the degree for at least two semesters, or one semester and one summer session, or three summer sessions immediately preceding graduation. For the award of a second baccalaureate degree, this requirement may be waived by the dean of the college awarding the second degree. (See "Residence Requirements" and "Second Baccalaureate Degree.")

7.4 Residence Waiver for Certain Pre-medical Students. Students who complete at least 94 semester credit hours in a recognized premedical science program and then transfer to a professional program leading to the doctoral degree at an accredited professional school of medicine, osteopathic medicine, veterinary medicine, dentistry or optometry will be awarded the appropriate baccalaureate degree upon the successful completion of 30 semester credit hours in basic medical science courses applicable to the OSU major. This option is available only to students who have completed all other degree requirements for the major and have taken at least the last 30 semester credit hours of work at OSU prior to transferring to a professional school. (See "Residence Requirements.")

7.5 Minimum Hours for Graduation. Each degree program requires a specific minimum number of semester credit hours for graduation, as indicated in the *Catalog*. No degree program shall require fewer than 120 semester credit hours for graduation. (By OSRHE policy, these 120 hours are exclusive of physical education activity courses.) No student shall be permitted to graduate having completed fewer total hours than the requirement specified for that degree. At least 40 hours of upper-division course work shall be required in every baccalaureate degree program. (By OSRHE policy, these 40 hours are exclusive of physical education activity courses.) Hours of "S" or "U" earned in remedial courses may not count toward total hours.

7.6 Grade-point Average for Graduation. A graduation grade-point average of 2.00 or higher is required for all courses in which a student has a recorded grade, excluding any courses repeated or reprieved and excluding remedial courses and physical education activity courses. (See "Academic Forgiveness.") This is in addition to the 2.00 or higher grade-point average required by the department in the major or minor fields.

7.7 Payment of Graduation Fees. Beginning Fall 1996, the basic graduation cost is included in the records maintenance fee. Information on procedures and deadlines is given to students at the time they complete their enrollment.

7.8 Requirements for Honors Degrees. The individual colleges have specific requirements for degrees with honors. Students should consult the office of their academic dean for information. (See "Honors Programs" in the *Catalog*.)

7.9 Diploma Application. Each candidate for graduation shall file a diploma application in the Office of the Registrar within two weeks following enrollment in a

regular semester or one week in a summer session in which the student wishes to be graduated.

7.10 Presence at Commencement Exercises. The University will hold one Commencement exercise each year at the close of the spring semester. Students who met the graduation requirements the preceding fall semester and students who plan to meet the graduation requirements at the close of the following summer session are invited and encouraged to participate in the Commencement exercises. Students who plan to meet requirements during the summer session (whether they are currently enrolled or not) should contact the Office of the Registrar to participate in Commencement.

The University encourages all candidates for degrees to be present at the Commencement exercises. Attendance is not compulsory. However, candidates who cannot be present should notify the Office of the Registrar of the addresses to which diplomas can be mailed.

7.11 Graduation with Distinction. Beginning with the Fall 1997 semester, students who earn an OSU undergraduate degree can also earn a level of distinction based upon the final graduation/retention grade-point average. (See also "Grade-point Average Calculating.") The level of distinction added to the diploma and transcript is:

Graduation/retention grade-point average	Distinction
3.90 to 4.00	<i>Summa cum laude</i>
3.80 to 3.89	<i>Magna cum laude</i>
3.70 to 3.79	<i>Cum laude</i>

This grade-point average calculation is two decimal places only, e.g., 3.69. In actuality, this GPA may be 3.69785 if additional digits were to be added. However, the value used to determine distinction is 3.69 which does not qualify for a level of distinction.

Degree Programs Offered

The type of degree offered in each major is listed along with an indication of the college(s) in which each may be earned. (Some majors are offered with more than one type of degree, e.g., Bachelor of Arts *and* Bachelor of Science. Many have options within the major. See the department narrative for details.)

B Bachelor's
M Master's
D Doctor's
S Specialist

Ag Agricultural Sciences and Natural Resources
A&S Arts and Sciences
Bus Business Administration
Ed Education
En Engineering
HES Human Environmental Sciences
Gr Graduate College
OM Osteopathic Medicine
T Technology
VM Veterinary Medicine

Accounting (B,M) Bus/Gr
Agribusiness (B) Ag/Bus
Agricultural Communications (B) Ag
Agricultural Economics (B,M,D) Ag/Gr
Agricultural Education (B,M,D) Ag/Gr
Agriculture (M) Gr
Animal Science (B,M) Ag/Gr
Animal Breeding and Reproduction (D) Gr
Animal Nutrition (D) Gr
Applied Behavioral Studies (M,D) Gr
Applied Educational Studies (D) Gr
Architectural Engineering (B,M) En/Gr
Architecture (B,M) En/Gr
Art (B) A&S
Aviation Sciences (B) Ed
Biochemistry (B) A&S
Biochemistry and Molecular Biology (B,M,D) Ag/Gr
Biological Science (B) A&S
Biomedical Sciences (D) Gr
Biosystems Engineering (B,M,D) En/Gr
Botany (B,M) A&S/Gr
Business Administration (M,D) Gr
Cell and Molecular Biology (B) A&S
Chemical Engineering (B,M,D) En/Gr
Chemistry (B,M,D) A&S/Gr
Civil Engineering (B,M,D) En/Gr
Communication Sciences and Disorders (B) A&S

Computer Science (B,M,D) A&S/Gr
Construction Management Technology (B) T
Control Systems Engineering (M) Gr
Counseling and Student Personnel (M) Gr
Curriculum and Instruction (M,D) Gr
Design, Housing and Merchandising (B,M) HES/Gr
Economics (B,M,D) A&S/Bus/Gr
Education (S) Gr
Elementary Education (B) Ed
Secondary Education (B) Ed
Educational Administration (M,D) Gr
Electrical Engineering (B,M,D) En/Gr
Electrical Engineering Technology (B) T
Engineering and Technology Management (M) Gr
English (B,M,D) A&S/Gr
Entomology (B,M,D) Ag/Gr
Environmental Engineering (M) Gr
Environmental Science (B,M,D) Ag/Gr
Family Relations and Child Development (B,M) HES/Gr
Finance (B) Bus
Fire Protection and Safety Technology (B) T
Food Science (M,D) Gr
Foreign Language
French (B) A&S
German (B) A&S
Russian Language and Literature (B) A&S
Spanish (B) A&S
Forest Resources (M) Gr
Forestry (B) Ag
General Business (B) Bus
General Engineering (M,D) Gr
Geography (B,M) A&S/Gr
Geology (B,M) A&S/Gr
Health (B) Ed
Health, Physical Education and Leisure (M) Gr
Higher Education (M,D) Gr
History (B,M,D) A&S/Gr
Horticulture (M) Gr
Horticulture and Landscape Architecture (B) Ag
Hospitality Administration (M) Gr
Hotel and Restaurant Administration (B) HES
Human Environmental Sciences (D) Gr
Industrial Engineering and Management (B,M,D) En/Gr
International Business (B) Bus
International Studies (M) Gr
Journalism and Broadcasting (B) A&S
Mass Communications (M) Gr
Leisure Studies (B) Ed

Management (B) Bus
Management Information Systems (B) Bus
Management Information Systems /Accounting Information Systems (M) Gr
Management Science and Computer Systems (B) Bus
Manufacturing Systems Engineering (M) Gr
Marketing (B) Bus
Mathematics (B,M,D) A&S/Gr
Mechanical Engineering (B,M,D) En/Gr
Mechanical Engineering Technology (B) T
Medical Technology (B) A&S
Microbiology (B) A&S
Microbiology, Cell and Molecular Biology (M,D) Gr
Music (B) A&S
Music Education (B) A&S
Natural and Applied Sciences (M) Gr
Nutritional Sciences (B,M) HES/Gr
Occupational and Adult Education (M,D) Gr
Osteopathic Medicine (DO) OM
Pedagogy and Performance (M) Gr
Philosophy (B,M) A&S/Gr
Physical Education (B) Ed
Physics (B,M,D) A&S/Gr
Physiology (B) A&S
Plant Pathology (M,D) Gr
Plant and Soil Sciences (B,M) Ag/Gr
Crop Science (D) Gr
Soil Science (D) Gr
Plant Science (D) Gr
Political Science (B,M) A&S/Gr
Premedical Science (B) A&S
Pre-veterinary Science (B) Ag
Psychology (B,M,D) A&S/Gr
Sociology (B,M,D) A&S/Gr
Speech (B,M) A&S/Gr
Statistics (B,M,D) A&S/Gr
Technical Education (M) Gr
Technical and Industrial Education (B) Ed
Telecommunications Management (M) Gr
Theater (B) A&S
Trade and Industrial Education (M) Gr
University Studies (B) All colleges
Veterinary Medicine (DVM) VM
Veterinary Biomedical Sciences (M,D) Gr
Wildlife and Fisheries Ecology (B,M,D) A&S/Gr
Zoology (B,M,D) A&S/Gr

Summary of degrees offered:

Bachelor's	79
Master's	66
Doctor's	44
Specialist	1

College of Agricultural Sciences and Natural Resources

Samuel E. Curl, Ph.D., Dean

Edwin L. Miller, Ph.D., Associate Dean for Academic Programs

C. Wesley Holley, Ed.D., Assistant Dean for Academic Programs

James E. Osborn, Ph.D., Assistant Dean for International Programs

Science, technology, business, education, research, production and environment are key elements in America's largest industry. In order to feed and clothe the five billion people of the world, the agricultural industry needs human capital—scientists and specialists with needed skills in molecular genetics, human nutrition, soil and water sciences, international marketing, systems analysis, biosystems and agricultural engineering and other specialties.

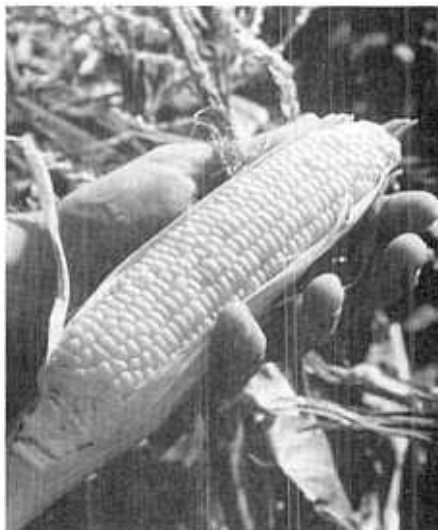
The diverse careers available in agriculture offer many choices, and college graduates are needed to fill a wide variety of jobs in American agriculture. Graduates are needed in scientific research, marketing, financial services, and the processing of information, as well as production. OSU graduates can be a part of the modern agricultural technology that will bring new discoveries and techniques to the world.

The College of Agricultural Sciences and Natural Resources prepares students to analyze information, explore opportunities and solve problems. Students are prepared in the science and technology of agriculture, and they also receive a solid general education in communications, humanities and social sciences. In the new agriculture, the graduate will have a rewarding career that will last as long as food is consumed and fiber is grown on this earth.

Accreditation

Agricultural Sciences and Natural Resources include broad and diverse professions and do not have a single accrediting society as do some other professions. Programs in agricultural education, agricultural engineering, forestry, and landscape architecture are accredited by their professional organizations.

In addition, each department's program is reviewed at least once every five years by a panel of scientists and other



professionals with national or international reputation for excellence in that respective discipline.

Academic Programs

Undergraduate Programs. The *Bachelor of Science in Agricultural Sciences and Natural Resources* degree is offered in the following major fields of study: agribusiness, agricultural communications, agricultural economics, agricultural education, animal science, biochemistry and molecular biology, entomology, environmental science, forestry, horticulture and landscape architecture, plant and soil sciences, and pre-veterinary science. The *Bachelor of Landscape Architecture* is also offered in the College of Agricultural Sciences and Natural Resources.

Graduate Programs. Graduate study is available in all academic departments in the College. In addition to the *Master of Agriculture* and *Master of Science* degrees that may be obtained through several departments, the *Doctor of Philosophy* degree (Ph.D.) may be earned in the following areas: agricultural economics, agricultural education, biosystems engineering, animal breeding, animal nutrition, biochemistry and molecular biology, crop science, entomology, food science, plant pathology, soil science, and forestry and horticulture through crop science, environmental science, and plant science.

High School Preparation and Admission Requirements

The high school preparation and admission requirements for the College are the same as the general University requirements. A solid background in English, algebra, and natural science is important preparation for the many academic programs in the various agricultural disciplines.

Transfer Students

Students who transfer from an accredited college or two-year college must meet the general University admission requirements. All transferred courses are recorded on the OSU transcript; however, no more than 65 hours from a two-year college will be used to meet the College's degree requirements. Specific departmental requirements needed for graduation are determined by the department in which the student plans to earn his or her degree.

Scholarships

Students enrolled and entering the College of Agricultural Sciences and Natural Resources are annually awarded more than \$400,000 in scholarships from the College and its departments. The following areas will be considered in the awarding of scholarships: scholastic standing in high school or college; leadership qualities which have been shown in school, church, community or youth groups; financial need; sincere interest in agriculture.

Applications and additional information may be obtained from the Office of the Associate Dean, College of Agricultural Sciences and Natural Resources, Oklahoma State University, 136 Agricultural Hall, Stillwater, OK 74078. Applications for new students may also be obtained from local high schools. Applications are available beginning November 15.

Academic Advising

All students in the College have the advantage of being advised by a faculty member working in the individual student's academic discipline. Such advisers are readily available to students and work closely with the students throughout their academic careers.

Special Academic Programs

Honors Program. The Honors Program in the College of Agricultural Sciences and Natural Resources is designed to provide outstanding students with opportunities to pursue new challenges and academic excellence. Honors courses, seminars, and special honors contracts provide for discussions and independent thought by students who have the desire and ability to explore academic subjects beyond the normal class work material. Honors awards available in the College are:

1. General Education Honors.
2. Departmental Honors.
3. The bachelor's degree, with honors.

Awards (1) and (2) may each be earned independently of the other. Award (3) is earned by satisfying the requirements of both (1) and (2). The completion of each award is noted on the student's transcript. Students who complete all three receive the bachelor's degree with honors diploma.

All entering freshmen who have ACT composite scores of 27-29 and a high school GPA of 3.75 or better, or an ACT composite score of 30 or higher and a high school GPA of 3.50, are eligible to become a part of the Honors Program. Sophomores, juniors, and seniors, with minimum cumulative grade-point averages of 3.25, 3.37, and 3.50, respectively, may enroll in the Honors Program.

Additional information may be obtained from the director of the University Honors Program, 510 Library.

Pre-veterinary Medicine Curriculum. The program in pre-veterinary medicine as offered in the College of Agricultural Sciences and Natural Resources includes all courses required for admission to the College of Veterinary Medicine.

A minimum grade-point average of 2.80 is required in the courses listed below:

English composition (6 hours minimum): ENGL 1113 and 1213; or 1313 and 1413.

Technical/Professional writing or English elective (2 hours minimum).

Chemistry (17 hours minimum):

1. General chemistry (8 hours minimum): CHEM 1314 and 1515.
2. Organic chemistry (5 hours minimum): CHEM 3015 (or 3053, 3153, and 3112).
3. Biochemistry (3 hours minimum): BIOC 3653.

Physics: PHYS 1014 or PHYS 1114 and 1214.

Mathematics (3 hours minimum): MATH 1513 (or any higher level mathematics).

Biological science (14 hours minimum. Courses must cover botany, genetics, microbiology and zoology. Each course, except genetics, must include laboratory work).

1. Principles of biology: BIOL 1304, 1604.
2. Microbiology: MICR 2124.
3. Genetics: (ANSI 3423 or AGRON 3554 or BIOL 3024.)

Although these course requirements may be completed within two years, most pre-veterinary medicine students complete at least three years of preparatory course work or a bachelor's degree. For information as to required tests and application procedures, refer to the "College of Veterinary Medicine" section in the *Catalog* and the current *Veterinary Medicine at Oklahoma State University* brochure. Students are also encouraged to contact the Office of the Assistant Dean for Academic Programs in the College of Agricultural Sciences and Natural Resources.

Pre-veterinary Science Degree. A Bachelor of Science in Agricultural Sciences and Natural Resources degree with a major in pre-veterinary science may be obtained after the completion of one year in the College of Veterinary Medicine. General education and other requirements for graduation in the College of Agricultural Sciences and Natural Resources must be met. Specific plans of study may be obtained from the Office of the Assistant Dean for Academic Programs, 136 Agricultural Hall.

General Education Requirements

The College of Agricultural Sciences and Natural Resources is committed to providing graduates both a depth of knowledge in their chosen field of study as well as breadth of knowledge outside their major. General education requirements are the same as those of the general University. Specific course offerings are given in the respective plans of study.

Graduation Requirements

General University requirements for graduation are stated elsewhere in the *Catalog*. In addition, specific requirements must be met for the Bachelor of Science in Agricultural Sciences and Natural Resources and Bachelor of Landscape Architecture degrees. For the B.S. degree, the required total semester credit hours varies by department, major and option. The Bachelor of Landscape Architecture is a five-year program requiring 160 credit hours. A minimum of 40 semester credit hours and 100 grade-points must be earned in courses numbered 3000 or above.

Departmental Clubs and Honor Societies

Ag Communicators of Tomorrow
Aggie-X Club (agricultural economics)
Agriculture Ambassadors
Agriculture Student Council
Agronomy Club
Alpha Zeta (college honor society)
American Society of Landscape Architects
Associated Landscape Contractors of America
Block and Bridle Club (animal science)
Collegiate Cattlewomen
Collegiate 4-H
Collegiate FFA/Alpha Tau Alpha (agricultural education)
Cowboys for Christ
Dairy Science Club
Environmental Science Club
Food Industry Club
Forestry Club
Horticulture Club
National Agri-marketing Association
OSU Collegiate Cattlewomen
OSU Horseman's Association
Pre-veterinary Medicine Club
Rodeo Association
Sanborn Entomology Club
Sigma Lambda Alpha (horticulture and landscape architecture)
Society of American Foresters
Society of Range Management
Soil and Water Conservation Society
Xi Sigma Pi (forestry honor society)

Agricultural Communications

Professor and Head James G. Leising, Ph.D.

Modern agriculture, with its diversity and specialization, requires accurate communication between the industry's segments and with the general public. Education in agriculture and journalism trains the agricultural communications student to provide the necessary communications link.

By majoring in agricultural communications, a student may choose a special-interest area such as advertising, public relations, radio and television broadcasting, photography, reporting and newswriting, or research report writing.

Opportunities are also available for the student to develop a double-major program with other departments in the College of Agricultural Sciences and Natural Resources.

For the graduate with a bachelor's degree and a major in agricultural communications, career opportunities are abundant in agricultural production, industry, and service organizations as well as with publishing firms, broadcast stations or other media.

Agricultural Economics

Professor and Head Alan D. Barkema, Ph.D.

The Department of Agricultural Economics at Oklahoma State University offers programs of study leading to the B.S., M.S., M.Ag. and Ph.D. degrees in agricultural economics and the B.S. degree in agribusiness. Agricultural economics and agribusiness curricula study the economic relationships among individuals, firms and service agencies in agriculture and between the agricultural sector and other sectors of the economy. The department's courses emphasize the economic issues and concepts associated with producing, processing, marketing, and consuming agricultural goods and services and those used in the industry.

Undergraduate programs in agricultural economics and agribusiness combine instruction in technical agricultural sciences with education in the application of economic and business management principles and tools. The agricultural economist or agribusiness person draws upon the physical and social sciences to outline, understand, and solve economic problems created by agriculture's dynamic operating environment. Curricula in the Department of Agricultural Economics emphasize the decision-making and problem-solving skills used in the management of agricultural production and marketing firms.

Study in agricultural economics or agribusiness prepares students to excel in many challenging careers. Many graduates work to improve food production and processing throughout the world. Other graduates work with government policies that affect the food and fiber sector. Others assist rural communities to adjust and thrive in the rapidly changing world. Graduates also help protect and maintain natural resources and the environment for the greatest benefit of society. Many graduates chose

career paths that lead them far from the farm.

Agricultural Economics

The agricultural economics B.S. degree trains students to analyze problems and make decisions using a solid framework of economic and business principles. Study plans may be tailored to a wide variety of career interests. In addition to a base agricultural economics B.S. degree plan, the agricultural economics student can choose from four degree options: international agricultural marketing, a double major with accounting, a double major with agricultural education, and a double major with computer science. In addition, the base agricultural economics degree plan offers specializations in quantitative studies, environmental and natural resources, and community and regional analysis. Each of the study plans in agricultural economics equips students for a variety of employment opportunities at competitive salaries in private industry and government agencies.

Agribusiness

Like the agricultural economics degree the agribusiness B.S. degree trains students to analyze problems and make decisions using a solid framework of economic and business principles. In addition, the agribusiness degree targets the skills needed for careers in agribusiness firms, including all areas of food and fiber production, processing, and marketing. In addition to the base agribusiness degree plan, students may choose from six degree options: farm and ranch management, agribusiness management, agribusiness marketing, agribusiness finance, pre-law, or pre-veterinary business management. Agribusiness students also may develop a minor area of study or a double major by selecting various course electives. Employment opportunities for agribusiness graduates are widely diverse, including jobs with farms, agricultural advisors, processing firms, wholesalers and retailers of food and fiber products, farm input supply firms, banks and other financial services firms, utilities and educational institutions.

Graduate Programs

The department offers graduate work leading to the Master of Science, the Master of Agriculture and the Doctor of Philosophy degrees. Both thesis and

non-thesis options are available at the M.S. level. Ph.D. students complete a teaching practicum in addition to the research thesis as a part of the degree requirements.

The graduate program stresses development of superior professional competence, suited to the demands of the modern business, academic, government and research environments. Advanced courses concentrate on economic analysis applied to problems of production, distribution and consumption of agricultural products. Courses in economic theory, econometrics, mathematical economics, statistics, and computer science are an integral part of the program. Problems of agricultural policy, natural resource use and rural area development and planning are also important topics. The faculty give direction and individual guidance to student research in marketing, production, management of agricultural enterprises, price analysis, land and water use and development, rural development and planning, agricultural finance, international trade, farm appraisal and agricultural policy. Specialization is achieved through course electives and research topics. An advisory committee guides each student in the preparation of the program of study to ensure that background or prerequisite work and the graduate plan will lead to the desired depth and breadth of proficiency.

Admission Requirements. Prerequisites to advanced training in agricultural economics are (1) the desire to understand and solve the complex and changing economic problems faced by agriculture and rural society, and (2) the desire and ability to learn methods of rigorous logical analysis. In addition, differential calculus, three semester hours of statistical methods, and 15 semester hours of agricultural economics and economics, including intermediate micro- and macroeconomic theory, constitute a minimum background for advanced study in agricultural economics. In certain cases, a part of this work can be taken after admission but will not count toward a graduate degree.

Acceptance by an adviser in the department is not required prior to official admittance to the departmental graduate program.

Agricultural Education

Professor and Head James G. Leising, Ph.D.

The programs of study offered in agricultural education are designed to provide both comprehensive and specialized training to prepare graduates for careers in a wide range of fields of agriculture. In addition to being prepared for licensure as teachers, graduates are professionally prepared for work in cooperative extension and other federal and state programs and services, as well as international education endeavors. Graduates also may find employment as educational directors and consultants with agribusiness firms and organizations. Studies may culminate in the B.S., M.Ag., M.S. or Ph.D. degrees.

The undergraduate teaching option is designed to qualify the bachelor's degree recipient for the Oklahoma Agricultural Education Teaching License. This license is recognized as meeting requirements for initial employment as a teacher in most states. The professional service option is designed to focus on careers relating to education or service in agriculture, outside of the public school setting. Graduates look forward to careers ranging from cooperative extension educator to agricultural sales, marketing and production positions. Some students find it advantageous to elect a dual major, thus meeting requirements in both agricultural education and another major within the College of Agricultural Sciences and Natural Resources. The undergraduate options in agricultural education are structured to provide educational experiences in general education, agriculture and professional education.

Graduate Programs

Graduate programs in agricultural education are designed to (1) prepare students for entry into or advancement in teaching careers and (2) provide for further development of professional leadership skills for other educational careers in agriculture, agribusiness, government service, extension, or adult education. An attempt is made to develop individual study programs to meet needs of both international and domestic students.

The Master of Agriculture is offered to further knowledge and skills of agriculture and education in preparation for and advancement in teaching, extension administration and other professional areas. Two options are offered in the Master of Agriculture program. Option A requires 36 approved semester credit

hours of course work, including a two-credit-hour creative component, which may involve curriculum, teaching methods, literature or some similar area. Option B requires 36 approved semester credit hours of course work, which include six hours of credit for a professional internship.

The Master of Science develops the theoretical and research foundation for further graduate studies in addition to further knowledge and skills in agriculture and education. It is designed primarily for those students interested in research who may later wish to continue their graduate studies toward a specialist or doctoral degree. A total of 30 approved credit hours of course work, which includes a six-credit-hour formal thesis following the graduate college format, is required.

The Doctor of Philosophy program is designed to prepare graduates for careers in teacher education, supervision, administration, curriculum development and other areas of professional leadership in agriculture, agricultural extension or vocational education. Within the minimum 60 credit hour requirement, 20 credit hours must be completed in agricultural education. In addition, 13 credit hours must be completed in an area of specialization such as agricultural extension, technical agriculture, educational administration, or other similar area. The remaining 27 credit hours includes research design, statistics and the dissertation.

Full admission to the master's degree program requires a bachelor's degree in agricultural education, agriculture, education, or related area and a grade-point average of 2.80 or higher. For grade-point averages below 2.80, combinations of experience, references and standardized test scores can be considered. Provisional or deferred admission may also be granted.

Full admission to the doctoral degree program requires a minimum of a 2.80 undergraduate grade-point average and a 3.00 grade-point average in 24 or more graduate credit hours; a composite score of 1000 or higher on the Graduate Record Examination or 48 or higher on the Miller Analogy Test; three years of successful professional experience; written evidence of ability to express thought with reasonable clarity, correctness, and precision; and three strong letters of recommendation for graduate study. Alternative criteria may be considered by the graduate committee for those who submit ample supportive evidence of other exemplary qualifications.

Student fee waivers are available for qualifying master's degree candidates. A grant and loan program is available

through the Office of Student Financial Aid. Doctoral degree candidates may qualify for teaching and research assistantships. In addition to the assistantships, doctoral candidates may qualify for fellowships and fee waivers.

Agriculture

Professor and Assistant Dean
C. Wesley Holley, Ed.D.

Graduate Programs

The Master of Agriculture degree is designed for students interested in graduate professional training with a strongly applied research orientation. The degree is offered in the following areas of emphasis: agricultural economics, agricultural education, animal science, entomology, forestry, horticulture and landscape architecture, plant and soil sciences, and plant pathology.

Purpose. The purpose of this degree is to provide a program which will give additional specialization in technical fields, as well as increased breadth of training. Students who are interested in working toward the Ph.D. degree should follow the regular Master of Science degree program.

Character of Program. This program will provide a greater breadth of study than the Master of Science program. Emphasis will be given to practical application of the technical aspects of the discipline as well as discipline interrelationships. The principal focus, however, is on an applied research concept and a broader program than is normally available with the specialized research degree.

Admission Requirements. A baccalaureate degree in agriculture or a related field is required for admission. The candidate must meet requirements for acceptance into the Graduate College and be recommended by the departmental graduate committee responsible for the program.

Degree Requirements. The requirements for this degree are the same as those listed in the *Catalog*, "Graduate College" section, under "The Master's Degree."

In addition, each candidate approved for study under this program will be assigned an adviser and advisory committee with whom he or she will develop a plan of study in accordance with guidelines established in the department. A preliminary plan of study must be approved by the Office of the Associate Dean for Academic Programs and must be filed in the Graduate College Office

prior to enrollment for the 17th credit hour. Departmental comprehensive final examinations will be required of all Master of Agriculture candidates.

Degree Options. *Option A Requirements.* A total of 32 approved semester credit hours of work, including an approved report having a credit hour value of not more than two credit hours, is required.

Option B Requirements. A total of 36 approved semester credit hours of work is required and must contain a creative component. No report is required.

Option C Requirements. A total of 36 approved semester credit hours of work, including six hours of credit for a professional internship, is required. The internship includes professional practice and a report.

Animal Science

Professor and Head Donald G. Wagner, Ph.D.

The Department of Animal Science offers professional training at both the undergraduate and graduate levels. The undergraduate program leads to the Bachelor of Science in Agricultural Sciences and Natural Resources degree. Graduate studies culminate in the Master of Science, Master of Agriculture (emphasis in animal science) or the Doctor of Philosophy in nutrition, animal breeding and animal reproduction, or food science.

Animal science is concerned with the science, art and business of the production of beef cattle, dairy cattle, horses, poultry, sheep and swine. An animal scientist is concerned with the application of the principles of the biological, physical and social sciences to the problems associated with livestock production and management.

Animal science is also concerned with the products of food animals: meat, dairy foods and eggs. The food industry is one of the largest and most important industries in the United States. Students can gain expertise in the processing, quality control and marketing of meat, dairy and poultry products.

Undergraduate students may elect an option in the areas of animal biotechnology, business, food industry, food science, international, livestock merchandising, pre-veterinary animal science, production, and ranch operations, or a double major with agricultural communications or with agricultural education. In addition, students have the opportunity to concentrate their studies on one of the

animal groups (meat animals, dairy, horses or poultry). Internship programs providing three to six months of off-campus work experience are available in all options. Participation in undergraduate clubs (Block and Bridle, Dairy Science, Horsemen's Association or Food Industry clubs) or judging teams (livestock, meat, horses, dairy cattle, or poultry) improves social, communication and leadership skills.

Students interested in veterinary medicine may complete the pre-veterinary medicine requirements at the same time they are working toward a B.S. degree in animal science. In addition, pre-vet students gain valuable insight into the care and management of animals throughout the animal science curriculum.

Undergraduate students follow a similar curriculum during the first two years which includes basic courses in the physical, biological and social sciences, and a series of introductory courses in agriculture and business. Upper-class students take a basic core of advanced animal science courses including genetics, physiology, nutrition or food science. As seniors, students complete a series of advanced animal science courses which are designed to apply knowledge obtained in previous courses to livestock or food production systems. Every opportunity is taken in teaching to utilize the excellent herds, flocks and processing facilities owned or operated by the department.

Students completing a degree with a major in animal science have a wide choice of challenging careers including ownership or management of farms, ranches, feedlots; employment with state and federal agencies concerned with inspection, grading or regulation; sales and service positions with companies involved with feeds, pharmaceuticals or other livestock products; opportunities in agricultural extension or teaching; and work in the processing, distributing and merchandising of dairy, poultry and meat products. Students who earn the master's or doctorate can look forward to careers in teaching, research or extension with universities, the U.S. Department of Agriculture or private industry.

Graduate Programs

The Department of Animal Science offers graduate work leading to the Master of Science degree in animal science or food science. Research work at the M.S. level is available in the areas of animal breeding (genetics), animal nutrition, animal physiology or food science (meat or milk products). A Master of Agriculture degree in the emphasis area of animal science is also available. The

department offers programs leading to the Doctor of Philosophy degree in animal breeding and reproduction, animal nutrition, and food science.

Prerequisites. Admission to the graduate program requires an undergraduate major in animal science, dairy science or poultry science, or in closely-related biological sciences or biochemistry. In addition, students with a major in dairy manufacturing, microbiology, human nutrition, food science, or food technology can qualify for the program in food science. A student enrolling in a degree program must have been accepted by an adviser prior to official admission. In all cases, the student's graduate adviser or committee may recognize specific undergraduate deficiencies and require measures to attain proficiency.

Biochemistry and Molecular Biology

Professor and Head James B. Blair, Ph.D.

Biochemistry, the central scientific discipline linking the chemical, physical and biological sciences, exerts a profound influence on the progress of medicine and agriculture. By applying concepts and methods of chemistry and physics to the fundamental problems of biology, biochemists have made great progress in their effort to understand the chemistry of living organisms. Major discoveries concerning the biochemistry of genetic material provide the tools of molecular biology that are essential to contemporary life sciences research.

Biochemists and molecular biologists are concerned with living things. They must acquire some knowledge of the biological sciences. Since a biochemist's tools are the physical sciences, he or she must receive sound education in mathematics, physics and chemistry.

Challenging positions for well-trained biochemists and molecular biologists are available in colleges and universities, state and federal laboratories, research institutes, medical centers and in an increasing number of industrial organizations, particularly the pharmaceutical and food industries. Biochemists are involved with research on the chemistry of processes occurring in plants, animals, and various microorganisms, and with the discovery and development of antibiotics, vitamins, hormones, enzymes, insecticides and molecular genetic techniques.

At the undergraduate level a major in biochemistry and molecular biology administered by the Department of Biochemistry and Molecular Biology is available through the College of Agricultural Sciences and Natural Resources. The department also offers a B.S. degree in biochemistry through the College of Arts and Sciences. An honors program is available. The curriculum provides a broad background in chemistry and biological science and permits flexibility in meeting particular interests of the student. Courses in biochemistry are based on general, organic and analytical chemistry. The biochemistry and molecular biology curriculum provides students with sufficient background in the basic sciences of mathematics, physics, chemistry and biology to meet the needs for graduate study in most fields of modern science related to agriculture or medicine. The curriculum is excellent for preprofessional students of medicine, dentistry and veterinary medicine.

Graduate Programs

Because many of the opportunities in biochemistry require advanced course work, a major part of the program in the Department of Biochemistry and Molecular Biology is concerned with its graduate program leading to the M.S. or Ph.D. degree. This graduate program is an integral part of extensive basic research activities in the Oklahoma Agricultural Experiment Station. These research activities provide opportunities for part-time employment of undergraduate majors to improve their professional competence.

Prerequisites. Although the B.S. in chemistry or biochemistry is preferred, students with strong backgrounds in other biological or physical science disciplines are eligible. Individuals not having at least eight semester credit hours in each of organic and physical chemistry and calculus must take appropriate undergraduate courses to make up deficiencies. The results of the three general GRE exams (verbal, quantitative, analytical) are required for entrance. An advanced GRE subject matter exam (biochemistry, chemistry or biology) is also recommended. A cumulative GRE score of 1500 is normally required.

Degree Requirements. A more detailed description of the graduate study program in biochemistry is available from the department upon request. The requirements listed below complement the general graduate requirements described in the "Graduate College" section of the *Catalog*. After the first semester, continuous attendance and participation in the departmental seminar is expected.

The Master of Science Degree. Twenty-four credit hours of formal graduate courses are required, including BIOCH 5753 (or 4113), 5853, and 5930. In addition, a student must present an acceptable research thesis (six hours) and pass a final oral examination covering it and related material. Research advisers are selected at the end of the first semester.

A non-thesis Master of Science degree is also available. It does not require a research thesis, but requires a report and extensive technical training in the laboratory. The non-thesis M.S. is not recommended for students wishing to pursue a Ph.D. program later.

The Doctor of Philosophy Degree. The course requirements are determined with the aid of the student's graduate advisory committee. Usually they follow these guidelines: total of 30-40 credit hours of formal graduate course work which includes all the courses listed for the M.S. degree, at least four of the advanced graduate courses in biochemistry (6000 level) and two offerings of Special Topics (6820). Additional course requirements, appropriate to the student's interests, are determined by the advisory committee. The advisory committee is selected at the end of the second semester. Each student will take a series of cumulative examinations beginning in September of his or her first year. A more comprehensive qualifying examination is also given, usually at the end of the fourth semester of graduate study.

One year of a foreign language at the college level is required. The student must present, and defend in a final oral examination, an acceptable research thesis which contains a substantial original contribution to the field of biochemistry. The department offers research experience in a variety of areas of biochemistry.

Biosystems and Agricultural Engineering

Professor and Head Billy J. Barfield, Ph.D., P.E.

The School of Biosystems and Agricultural Engineering is administered jointly by the College of Agricultural Sciences and Natural Resources and the College of Engineering, Architecture and Technology.

Biosystems engineers are professionals who create and adapt engineering knowledge and technologies for the

efficient and effective production, processing, storage, handling and distribution of food, feed, fiber and other biological products, while at the same time providing for a quality environment and preserving natural resources. Specialization is provided in emphasis areas or options of food and bioprocessing, environment and natural resources, biomechanical, and general agricultural engineering.

Biosystems engineering courses integrate the engineering sciences with biological sciences and teach students to design solutions to real problems of society. Students work both as individuals and in teams to solve real world design problems provided by industrial firms who hire biosystems engineers.

The goal of the biosystems degree programs is to produce graduates who possess broad-based knowledge, skills and judgment that prepare them to succeed in the profession of engineering or in further studies at the graduate level. To achieve this goal, the specific objectives listed below are integrated throughout the program.

In the preprofessional portion of the biosystems engineering program (usually equivalent to two years of study) the focus is on the underlying biological, physical, chemical and mathematical principles of engineering, supplemented by appropriate general education courses in English, social sciences and humanities. Students who demonstrate proficiency in this portion of the program are eligible for admission to the professional school in biosystems engineering.

The professional school of biosystems engineering curriculum (typically two years) builds systematically upon the scientific knowledge acquired in the preprofessional curriculum. In professional school, students have the opportunity to focus on the option areas given above. Regardless of the option area, the degree is accredited at the basic level by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology under agricultural engineering and similarly named programs.

Each professional school course builds upon preceding engineering courses to develop in the student the ability to identify and solve meaningful engineering problems. The course work is specifically sequenced and interrelated to provide design experience at each level, leading to progressively more complex, open-ended problems. The course work includes sensitizing students to socially-related technical problems and their responsibilities as engineering professionals to behave ethically and protect occupational and public safety. The

program culminates in senior year design courses in which students integrate the analysis, synthesis and other abilities they have developed throughout the earlier portions of their study into a capstone experience. At this point, they are able to design components, systems and processes that meet specific requirements, including such pertinent societal considerations as ethics, safety, environmental impact and aesthetics. The students have also developed and displayed the ability to conduct experiments essential to specific studies and to analyze the experimental results and draw meaningful conclusions.

An integral part of this education continuum from basic science through comprehensive engineering design are learning experiences that facilitate the students' abilities to function effectively in both individual and team environments. Moreover, the program provides every graduate with adequate learning experiences to develop effective written and oral communication skills. State-of-the-art computational tools are introduced and used as a part of their problem-solving experiences. Finally, the students' experiences in solving ever-more-challenging problems enables them to continue to learn independently throughout their professional careers.

A wide variety of employment opportunities are available for biosystems engineers in industry, public service and education. Some of these opportunities include positions in governmental agencies, consulting, machinery industry, manufacturing and installation, and electric power management industries. Biosystems engineers have careers in foreign countries as well.

Students interested in a degree in biosystems engineering may initially enroll in either the College of Agricultural Sciences and Natural Resources or the College of Engineering, Architecture and Technology. Students who enroll in the College of Agricultural Sciences and Natural Resources should request a biosystems engineering adviser and transfer to the College of Engineering, Architecture and Technology by the end of their first semester.

Graduate Programs

The School of Biosystems and Agricultural Engineering offers three programs leading to post-baccalaureate degrees: Master of Biosystems Engineering, Master of Science and Doctor of Philosophy. The Master of Biosystems Engineering program places emphasis on design and internship in engineering experience. The Master of Science and Doctor of Philosophy degrees emphasize research and development.

Excellent facilities are available for students to explore research and design in bioprocessing and food engineering, physics, environmental, non-point-source pollution control, hydrology, water resources, water quality, air quality, wind erosion, machine development for biological systems, microelectronics, intelligent machines for biological production, irrigation design, and hydraulics.

Research projects are supported by the Agricultural Experiment Station and by state and federal grants. A well-trained faculty, many of them registered professional engineers with research, consulting and design experience, guide the graduate students' activities and plan programs to meet students' needs. Graduate students design experiments and special equipment to conduct their work. They are expected to demonstrate, by supporting research or by designs, the ability to identify a problem, define alternatives, propose a solution, organize a design or an experimental investigation, carry it to completion and report the results.

Admission Requirements. Admission to either the Master of Science or Doctor of Philosophy degree program requires graduation from an engineering curriculum accredited by the Accreditation Board for Engineering and Technology. Students without accredited degrees may be admitted provisionally and may be required to take additional courses.

Admission to the Master of Biosystems Engineering degree program is permitted for students who meet the prerequisites as stated in the "College of Engineering, Architecture and Technology" section of the *Catalog*, under "Master of Engineering." The departmental graduate committee evaluates the applicant's credentials to determine equivalency and specify requirements to overcome deficiencies. A student must be accepted by an adviser in the department prior to official admission to the graduate program.

Degree Requirements. A candidate for any of the graduate degrees listed above follows an approved plan of study which must satisfy at least the minimum University requirements for that particular degree.

Entomology

Professor and Head Russell E. Wright, Ph.D.

Entomology is the science and study of insects and related arthropods such as ticks, mites and spiders. This discipline offers students opportunities to explore the diversity of nature through the study

of arthropods. In addition, they may learn about the sophisticated biological and physiological phenomena associated with these organisms. Discovery of the importance of arthropods as competitors with human society for food and fiber is a central theme in entomology. Arthropods serve as vectors of human and animal diseases, biomedical research organisms and pollinators. These animals also form an intricate part of the food web; regulation of pest populations must be done in an environmentally safe manner.

A strong academic background in the physical and biological sciences is essential before enrolling in specialized subject matter in entomology. Specialized subject matter includes insect identification, biology, ecology, physiology, biochemistry, population dynamics, medical and veterinary entomology and pest management.

There are many diverse job and career prospects for graduates. Current undergraduates are preparing for careers in veterinary medicine, medicine, law and graduate school. Others gain employment with private industry, research laboratories, or county, state or federal agencies. Some develop their own businesses as consultants and entrepreneurs.

Graduate Programs

The department offers programs of study and research leading to the degrees of Master of Science and Doctor of Philosophy. Students making application must be accepted by an adviser and approved by the departmental graduate committee prior to being admitted to the Graduate College.

Each program of study will be under the direction of an advisory committee. The program will be adapted to the individual's needs but will comply with all departmental and Graduate College requirements. The thesis option for the M.S. requires a minimum of 30 credit hours. An oral examination is required of all candidates and M.S. students are also required to defend publicly. Graduate student candidates are required to meet with their advisory committees every six months for program reports and examinations. Doctoral candidates are required to present public defenses of their dissertations and must assist in teaching one or more courses. Students supported as half-time research assistants are expected to be active participants in the research projects of their major professors.

Environmental Science

Professor and Assistant Dean
C. Wesley Holley, Ed.D.

The College of Agricultural Sciences and Natural Resources offers an undergraduate major in environmental science. This program is an interdisciplinary study of the biological, chemical, and physical factors, coupled with human activities, that affect the environment. Such a science is designed to improve the current and future welfare of the human race with environmental policies based on sound scientific principles and in accordance with the true benefits and costs as evaluated by an informed society.

Since this major is interdisciplinary and science-oriented, the student will take basic courses in biology, chemistry, math, physics, statistics, and several social sciences. The student may choose one of three areas of emphasis (options): water resources, natural resources, or environmental policy. Depending on the option, upper-division course work will involve problem-solving work in water and soil quality, economic and social policy, political science, resource management and engineering. The student will also be immersed in general education subjects, including communications, philosophy, ethics and sociology.

A primary goal of this program of study is to enable graduates to solve environmental problems according to a solid science base and in accordance with society's needs. Through successful completion of this major the student earns the Bachelor of Science in Agricultural Sciences and Natural Resources.

The environmental science undergraduate major is directly supported by faculty from the departments of Agricultural Economics, Biosystems and Agricultural Engineering, Animal Science, Entomology and Plant Pathology, Forestry, Horticulture and Landscape Architecture, and Plant and Soil Sciences. The major and its students also benefit from working in and out of the classroom and laboratory with faculty who are conducting cutting-edge research involving environmental problems.

Graduates work in such areas as land-use planning, environmental control, natural resources management, waste disposal, water and soil quality, and policy analysis. Industries associated with the extraction, utilization and manipulation of natural resources have increased the number of employees with environmental training to address regulatory compliance, litigation, monitoring, public relations and management practices.

Graduates may also work with federal, state and local government agencies involved in regulation, resource management and policy development. Graduates, particularly those who have gone on to earn advanced graduate degrees, find employment with consulting firms that are involved with solving environmental problems. Many graduates go on to graduate school or pursue a degree from a professional school, such as law or medicine.

Forestry

Professor and Interim Head
Charles G. Tauer, Ph.D.

America's forests are an invaluable renewable natural resource. With proper decisions concerning management, forests can provide a bounty of uses and values for generations to come.

Professional foresters play a vital role in managing, sustaining and utilizing the forest and its diverse resources: timber, water, wildlife, range forage, recreation and wilderness. Foresters devote effort to protecting forests from the harmful effects of fire, disease and insects. Foresters are problem-solvers using a blend of ecology, technology, economics and sociology to provide benefits and services desired by society. Foresters may work with private landowners, city planners, teach and conduct research at universities, administer parks and recreation areas, manage the business of the forest industry, or manage public forest lands.

Graduates may be employed by federal agencies, including the U.S. Forest Service, Bureau of Land Management, the Natural Resources Conservation Service, the Fish and Wildlife Service, or the Bureau of Indian Affairs. In addition, state, county and municipal governments employ foresters in a variety of resource management and service positions. Wood-using industries retain foresters for land management, land and timber acquisition and harvesting positions as well as in mill production and administrative work. Foresters work for associations promoting the use of forest products and in many other public relations jobs. Some foresters are self-employed as consultants, specializing in timber and land appraisals, management planning and a variety of special services. Recipients of advanced degrees, especially the doctorate, may conduct industrial research or may enter the teaching profession.

The Department of Forestry offers a major in forestry leading to a Bachelor of Science in Agricultural Sciences and Natural Resources degree.

The forestry curriculum leads to the first professional degree in forestry and is accredited by the Society of American Foresters (SAF). SAF is recognized as the specialized accrediting body for forestry in the United States. Considerable breadth exists in the forestry curriculum, affording the student and faculty adviser the opportunity to develop a specialized curriculum focused on a wide array of natural resource specialties, such as water, recreation, range or wildlife. For the student with a research career in mind, course work in basic and applied science is available. Requirements for a B.S. degree include the successful completion of an eight-week summer camp and a total of 140 credit hours of course work. The summer camp is scheduled to follow the sophomore year and is held annually in diverse forest settings. Past summer camps have been held across the U.S. from Maine to Oregon, from Montana to Florida, and even in Brazil. Field forestry skills, forest ecology, and state-of-the-art operations are emphasized at camp.

The Department of Forestry maintains two research stations in southeastern Oklahoma in the midst of the Ouachita National Forest, and industrial timber holdings. Oklahoma has an active and progressive forest industry with one of the most modern highly mechanized timber harvesting systems in the world. One of the largest paper mills in the southern United States is located in the pine-oak forests of southeastern Oklahoma. Oklahoma forests are also prized for their clean water and recreational and wildlife benefits. Field trips to this area comprise part of the instruction in some forestry courses.

Graduate Programs

The Department of Forestry offers instruction leading to Master of Science degrees in forest resources and environmental science for students interested in graduate training with a research orientation. The Master of Agriculture degree with an emphasis in forestry is offered for students interested in non-research graduate work. Programs of instruction and research leading to a Doctor of Philosophy degree are available through cooperating departments, such as the Department of Agricultural Economics or Zoology, or interdisciplinary programs in environmental science, crop science, or plant science, with an adviser from the Department of Forestry.

Instructional programs are designed to serve the needs of individual students and allow concentration in the areas of: biometry, ecology, physiology, economics, genetics and tree improvement, silviculture, forest management, wildlife,

and watershed management. The prerequisite for graduate study in the Department of Forestry is a bachelor's degree in an area aligned with the students' research interests with an overall undergraduate grade-point average of 3.00 ("B" average). Students without a bachelor's degree in a field of study aligned with their research interests may be required to complete a core of supporting courses as determined by the student's adviser and graduate committee. Applicants for graduate study who are also requesting financial assistance from the Department of Forestry are required to submit test results from the Graduate Record Examination for full consideration.

Students preparing for the Master of Science in forest resources are required to complete 30 credit hours of course work including six hours of Research and Thesis (FOR 5000) (Plan I). Students preparing for the Master of Agriculture degree may elect to meet the requirements of Options A, B or C. (See the "Graduate Programs" section of "General Agriculture.")

A student must be accepted by an adviser on the Graduate Faculty in the department prior to official admission to the program.

Horticulture and Landscape Architecture

Professor and Head Dale M. Maronek, Ph.D.

Horticulture is the science and art associated with the culture, production, preservation and processing of flowers, trees, shrubs, turfgrass, vegetables, fruits and nuts. It also includes the proper environmental use and maintenance of plants in the landscape. Thus, horticulture is involved with the production and processing of a significant part of the nation's food supply and provides a major source of the beauty in and around homes, cities, parks, highways, golf courses and other public areas.

Today, horticulture requires highly trained and capable people to help meet the food demands of society and to be involved in activities that lead to a better quality of life. The horticulture student must have a good understanding of plant biology and commercial production/maintenance and business practices.

Educational opportunities for study in horticulture cover a wide variety of plants and subjects and range from the cellular

to the whole plant level. Factors such as nutrition, irrigation, genetics, propagation, control of flowering, and fruit and seed production are considered in their relationship to culture, production, harvesting, processing and storage. Students can prepare themselves for careers in public grounds administration (arboreta, parks and zoos), golf course management, horticulture business, sales and marketing, production, teaching, extension and research.

The training that the student obtains is related to the specific area of emphasis that is chosen. Regardless of one's interest, objectives, or area of emphasis, a good knowledge and understanding of horticulture is a necessity. A student can receive a B.S. degree and choose from the following two options:

Horticulture provides the training and expertise for production and preservation of fruits, nuts, vegetables, nursery crops, flower crops, etc. Training can be general, have a business or science orientation, or be chosen to emphasize a particular commodity area of horticulture.

Turf management provides the training for turfgrass production and for management of turfgrass in golf courses, parks, athletic fields, home landscapes, and along highways.

After the B.S. degree is completed, a qualified student may choose to pursue a graduate degree, specializing in any option. Students from other departments may also choose to pursue a formal academic minor in horticulture.

Public horticulture emphasizes the administration, leadership, and management of public gardens and their diverse operations. This four-year program is one of very few in the United States and is appropriate for individuals interested in careers in arboreta, botanic gardens, zoos, horticultural societies, park systems, museums, habitat restoration (especially disturbed areas and/or wetlands) civic garden centers, and other public sector institutions. Students complete a well-rounded selection of horticulture courses and courses in business management, design, leadership, education and botany. The option can also lead to graduate study in these same fields. Students enrolled in this option are required to perform an internship at a garden of their choice where they can gain valuable experience in all facets of public horticulture. Students have the opportunity to be involved in the Oklahoma Botanical Garden and Arboretum and the department's television show, *Oklahoma Gardening*.

Landscape architecture as a field deals with the planning and design or arrangement of natural and artificial elements on the land through preservation of existing

natural and synthetic resources, and through application of cultural and scientific knowledge.

There are two options in the landscape area:

Landscape architecture is the study of design of outdoor spaces, with supporting courses in art, construction, ecology, horticulture and social science in a five-year professional program leading to the accredited Bachelor of Landscape Architecture (B.L.A.) degree. The B.L.A. degree is accredited by the American Society of Landscape Architects. Typical employers include landscape architecture firms, architectural engineering firms and government agencies dealing with land planning, urban planning, parks and recreation.

In an effort to maintain an effective balance between students, faculty, and facilities, enrollment in the fourth and fifth years of the program is limited to 15 students each. Students will be evaluated during their third year by the faculty in order to select the most qualified candidates based upon academic achievement and professional potential. Minimum requirements may vary each year; however, a student must have completed a minimum of 60 credit hours.

Landscape contracting is a program that emphasizes the construction and management phases of landscape development. It is a four-year program leading to an accredited B.S. degree. The degree is accredited by the Associated Landscape Contractors of America. Course work includes basic landscape architectural design, construction technology, business and horticulture. Students have the option of specializing in either landscape construction or landscape management. Graduates are employed by landscape contracting companies, design-build firms, landscape maintenance companies and landscape nurseries.

Graduate Programs

The department offers programs of study leading to the degrees of Master of Science in horticulture and Master of Agriculture with specialization in horticulture, and to the Ph.D. degree in crop science, environmental science, and plant science, each with a specialization in horticulture. Areas of study include floriculture crops, fruit and nut crops, vegetables, ornamental nursery crops, and turf. In addition to commodity-oriented specialties, students may emphasize postharvest or stress physiology disciplines. Applicants should indicate their interest area(s). Research opportunities range from whole plant production/management studies to fundamental cellular studies.

Prerequisites. Admission requires a bachelor's degree in horticulture or a related field with at least a 3.00 ("B") grade-point average. Students with course work deficiencies in fundamental areas may be required to take remedial courses to attain proficiency in accordance with the advisory committee's guidance.

Prior to admission to the program, all horticulture applicants for advanced degrees must be approved by the graduate committee and an advisor on the Graduate Faculty in the department. The program of study and research will be directed by the student's graduate adviser and advisory committee.

Plant Pathology

Professor and Head Russell E. Wright, Ph.D.

Plant pathology is a broad discipline that ranges from basic studies of physiological and genetic aspects of plant diseases to the development of practical plant disease controls. It encompasses the science required to understand the causes of plant diseases as well as the art of preventing or controlling these diseases. Thus, the plant pathologist must have knowledge of plant biology as well as practical plant culture. Plant pathology, as a discipline, is actively involved in the newly emerging field of biotechnology.

Graduates in plant pathology (Ph.D.-level individuals) commonly find employment as research scientists in universities, the government (U.S. Department of Agriculture), industry or with various international development agencies. Graduates with the M.S. degree often work as research technicians in industries, universities or government laboratories or as sales or technical representatives in the agrichemical or plant breeding industries.

To qualify for graduate study in plant pathology an undergraduate student should obtain a solid background in the basic sciences, especially biology and chemistry, mathematics, English and communication skills.

In order to become a fully trained plant pathologist, one or more graduate degrees in plant pathology are required. The department offers both M.S. and Ph.D. programs with opportunities to specialize in a wide range of basic or applied research fields.

Graduate Programs

The department offers programs of study and research leading to the Master of Science, Master of Agriculture in the emphasis area of plant pathology, and Doctor of Philosophy degrees. Programs are concerned with the cause, development, and management of plant diseases. Research problems are involved with on-going projects in the Oklahoma Agricultural Experiment Station, which include investigations on disease management (chemical, cultural, biological, and genetic) soil-borne diseases, virology, phyto bacteriology, genetics, host-parasite physiology, and application of biotechnology and molecular genetics to basic plant disease research. Individual programs can be developed toward basic research or can be developed to provide a broad practical background in plant health and pest management.

Admission Requirements. It is desirable that applicants have a strong background in biological or agricultural sciences. All requirements of the Graduate College must be satisfied by each applicant. In addition, applicants for graduate programs in plant pathology are required to take the Graduate Record Examination and to submit their scores with their applications and transcripts. Approval for admittance will be determined by the departmental screening committee and the department head. During the first semester of enrollment, each student, after council with the department head, will select a faculty adviser. Each graduate program is under the direction of the major adviser and a selected faculty committee and is adapted to the needs of the graduate student. There is no graduate credit for courses below the 4000 level. Each student will follow a program of study and research approved by his or her committee and, except for the Master of Agriculture degree, must submit an approved thesis.

Plant and Soil Sciences

Professor and Head Robert L. Westerman, Ph.D.

The Department of Plant and Soil Sciences contains strong programs in the basic disciplines of plant breeding and genetics, biotechnology and physiology, crop production, range science, weed science, and soil science. The undergraduate major in agronomy includes options in agronomy, biotechnology, business, crop science, range management and soil science. Each of these

options provides a thorough preparation in the sciences relating to its specialization and permits students of varying backgrounds and experiences to attain a level of preparation commensurate with their capabilities and motivation. There are no specific prerequisites.

Modern agricultural production requires a highly technical approach to emerging issues in soil and water conservation, introduction of genetically engineered crops, range land utilization and management, prevention and abatement of agricultural sources of environmental pollution, use of agricultural chemicals, and land application of biosolids. In the vast field of agribusiness, technical preparation in plant and soil sciences is essential in supplying agricultural producers with up-to-date information, as well as improved seed, fertilizer, pesticides and management systems. Processing, distribution and marketing of food, fiber and feed crops require an integration of production technology with economics at all levels. Plant and soil scientists are in demand for research and marketing positions in universities, industry and government. Concern for future food supplies creates an urgency for technological advancement in food production that cannot be ignored.

A major challenge facing plant and soil scientists is the concern for preserving environmental quality while maintaining efficient food production systems. Plant and soil scientists are involved with detailed evaluation of the impact of crop and soil management practices on land, water and air resources. Recent concerns for environmental quality and food safety have created a high demand for professional plant and soil scientists to assist farmers in proper utilization of production input such as fertilizers and agricultural chemicals. New technologies for precision application of crop production input using global positioning systems or remote sensing methods are creating many jobs for plant and soil scientists. Advancements in basic science fields such as genetics and molecular biology have created a need for plant and soil scientists to develop new plant varieties using biotechnology. Land application of municipal biosolids and animal wastes requires plant and soil scientists to ensure that proper rates and methods are used.

Typical careers in plant and soil sciences include farm or ranch operation or management; crop consulting; technical sales and service for seed, fertilizer or agricultural chemical supply companies; federal employment in soil and range conservation; research positions as plant and soil scientists, with federal agencies, state experiment stations or private industries; teaching and extension posi-

tions with colleges and universities; and a broad range of employment or ownership in retail businesses supplying feed, seed, grain, fertilizers, equipment, agricultural chemicals and other agricultural supplies and services.

In addition to a standard plant and soil sciences academic program, study for the B.S. degree provides a thorough understanding of biological and physical sciences and communications, with sufficient elective hours to permit flexibility.

Graduate Programs

The Department of Plant and Soil Sciences offers programs of course work and research leading to the Master of Agriculture in the emphasis area of plant and soil sciences and the Master of Science degree in plant and soil sciences. The Doctor of Philosophy degree can be attained in crop science, environmental science, plant science, and soil science. Specific programs are available in the areas of plant breeding and molecular biology, biotechnology, cytogenetics, range management, forage management, weed science, crop physiology, soil morphology and genesis, soil microbiology, soil fertility and plant nutrition, soil physics, soil-water management, soil chemistry, and waste management. Applicants should indicate their specific area of interest upon application.

The graduate programs of the Department of Plant and Soil Sciences prepare individuals for successful careers in a variety of areas, including farming and ranching, extension education, agricultural business, research, teaching, environmental sciences, waste management, and all aspects of crop production.

Prerequisites. Admission to the graduate program requires a B.S. degree in plant and soil sciences, agronomy or a closely related field. Applicants should have completed basic courses in plant and soil sciences, agronomy, biology, chemistry and mathematics required of undergraduate majors. Deficiencies in fundamental course requirements will be met by the student with the direction of the student's advisory committee. Applicants must be accepted by an adviser in the department prior to official admission.

Degree Requirements. Students must follow approved plans of study that meet the minimum University and departmental requirements for the respective degrees they are pursuing.

The Master of Science degree in plant and soil sciences may be earned by using the thesis option.

This plan requires a minimum of 30 credit hours of course work, including six credit hours of AGRON 5000, master's thesis.

The Master of Agriculture degree may be earned by utilizing one of three options:

Option A—Formal report (non-thesis), minimum of 32 credit hours of course work, including two credit hours of AGRON 5000, master's thesis.

Option B—Minimum of 36 credit hours of course work and a creative component.

Option C—Minimum of 36 credit hours of course work including six hours of credit (AGRON 5230, Research) for a professional internship. The internship will consist of professional practice and an informal report. Internships for students with previously established vocations and career experience must be in areas other than the specific vocational field of the students.

The degree plans of study for the Doctor of Philosophy degree in crop science, environmental science, plant science, and soil science are developed individually for each candidate. Doctoral programs in crop science and soil science must include 10 credit hours of departmental courses at the 5000 level or above (excluding thesis), and meet certain requirements in basic disciplines such as statistics, mathematics, botany, and chemistry. Study of a foreign language is not required but can be incorporated if the student and advisory committee feel that it is desirable. Degree plans for doctoral students in plant science, that include molecular, organismal, or ecological programs of study, and in environmental sciences, that include a broad spectrum of soil, water, and waste management issues, are developed for candidates in conjunction with advisory committee approval.

College of Arts and Sciences

John McCullough Dobson, Ph.D.,
Dean

Bruce C. Crauder, Ph.D., Associate
Dean for Instruction

John A. Bantle, Ph.D., Associate
Dean for Research

Robert M. Brown, Ph.D., Director of
Extension

Robert L. Spurrier, Jr., Ph.D.,
Director of the Honors Program

William A. Ivy, Ph.D., Director of
Student Academic Services

The College of Arts and Sciences not only offers a wide variety of programs in teaching, research and extension, but also supports and reinforces all the other programs of the University.

Apart from strong programs in the natural and social sciences and in the liberal and fine arts, the College provides a number of more specialized and interdisciplinary strengths, and a variety of professional and preprofessional training. The College's 22 departments and two schools offer 44 degree programs at the bachelor's level, and in conjunction with the Graduate College, 23 master's and 14 doctoral degrees.

The Department of Economics in the College of Business Administration offers B.A. and B.S. degrees through the College of Arts and Sciences. The Department of Biochemistry and Molecular Biology in the College of Agricultural Sciences and Natural Resources also offers the B.S. through the College of Arts and Sciences.

The College of Arts and Sciences provides academic preparation for a wide variety of professions including: law, medicine, social work, nursing, optometry, veterinary medicine, graphic arts, teaching, writing, foreign service, urban and regional planning, journalism, public service, radio/TV, advertising, public relations, medical technology, military science, public affairs, corrections, child services, interpersonal communications, and fine and performing arts.

Accreditation

Refer to appropriate pages under departmental listings for information on accreditation of specific programs.

High School Preparation

The College of Arts and Sciences strongly recommends that high school students have: four years of English; four years of mathematics; three years of laboratory science; three years of social studies including American history and world history; at least two years of foreign language; one year of arts such as music, theater, or studio art, and familiarity with computers.

Scholarships

A number of undergraduate scholarships are available through the College and through the departments and schools within the College. Interested students should inquire in the Office of Student Academic Services for a list of available scholarships. Arts and Sciences students are also encouraged to apply for the variety of scholarships available through the University, which are listed in the "Financial Aid" section of the *Catalog*.

Academic Advising

The Office of Student Academic Services. The academic advising process in Arts and Sciences is coordinated by the Office of Student Academic Services. The counseling staff in Student Academic Services advise freshman, undecided and pre-health profession students. Departmental advisers provide advising for students who have declared their majors.

The Student Academic Services staff



also represent the College in the University's on-campus recruiting activities and represent the dean in such matters as petitions for extension and correspondence, change of major or college, and student withdrawals. Services also include graduation certification, information about college programs and requirements, and referral of A&S students to campus support services.

The general education program in the College of Arts and Sciences allows freshmen who enroll without having decided on a major to make progress toward most degrees for up to four semesters, while exploring possible fields of study with an academic counselor.

Responsibility and Assistance. The responsibility for satisfying all requirements for a degree, and for ensuring that a degree plan has been submitted, rests with the student. Advisers assist students in curriculum planning, and students are encouraged to consult fully with their advisers and not restrict their visits to the enrollment periods when only brief meetings may be possible.

Academic Programs

Undergraduate Programs. Requirements for all degree programs and options are detailed in the book *Undergraduate Programs and Requirements*, available in all Oklahoma colleges and high schools. Separate sheets, stating the requirements for any particular degree, may be obtained on request from the department or college in which the degree is offered.

Bachelor of Arts (B.A.): art, economics, English, French, geography, German, history, journalism and broadcasting, mathematics, music, philosophy, political science, psychology, Russian language and literature, sociology, Spanish, speech (communication consultancy), and theater.

Bachelor of Science (B.S.): biochemistry, biological sciences, botany, cell and molecular biology, chemistry, communication sciences and disorders, computer science, economics, geography, geology, journalism and broadcasting, mathematics, medical technology, microbiology, physics, physiology, political science, premedical science, psychology, sociology, speech (communication consultancy), statistics, wildlife and fisheries ecology and zoology.

Bachelor of Fine Arts (B.F.A.): art (graphic design and studio).

Bachelor of Music (B.M.): music (elective studies in business; performance); music education (instrumental/vocal certification).

Second Bachelor's Degree. To secure a second bachelor's degree, a student must complete a *minimum* of 30 semester credit hours in addition to those required for the first degree. The number actually needed depends on what a student must do to satisfy all the requirements for the second degree.

A student seeking a second degree in the College of Arts and Sciences at OSU should ask his or her second adviser to submit a degree plan for the second degree, clearly headed "second degree," and showing how *all* the requirements of the second degree are to be satisfied. The plan should also state the major, date of award and total credit hours of the first degree, and indicate those courses which represent the minimum of 30 additional hours. The second degree plan should be sent to the College of Arts and Sciences Office of Student Academic Services within two weeks after the student's last enrollment.

Students wishing to complete degrees in two different colleges at OSU should consult with each office of student academic services. Concurrent enrollment in two colleges is possible, but a student must be enrolled in a college for at least two semesters before becoming eligible for a degree from that college.

Second Majors and Minors. A student majoring in one field may also complete the specified requirements for a "major" or a "minor" in other fields, the additional majors or minors may be noted on the student's transcript. Such specified requirements may be obtained from the department in which the second major or minor is sought, or from the Office of Student Academic Services. The student should, at the end of his or her senior year, ask the adviser in the second major or minor to submit the request to the department head and then to the Office of Student Academic Services in the College of Arts and Sciences.

Graduate Programs. Master's degrees are offered in most undergraduate subjects, with doctoral degrees available in some. (For details, see the departmental entries that follow or consult the "Graduate College" section in the *Catalog*.)

Special Academic Programs

Honors Program. The College of Arts and Sciences has the longest standing and greatest participation in the Univer-

sity Honors Program among undergraduate colleges at Oklahoma State University. It provides outstanding students with the opportunity to study, conduct research, and interact with faculty and other honors students in a variety of settings designed to assist talented students who seek to make the most of their educational opportunities. Honors sections of many general education courses allow participating students the benefits of small classes taught by experienced members of the faculty, thus combining the extensive resources of a major comprehensive university with personal faculty attention to each student. Special honors seminars provide coverage of topical issues each semester in formats that encourage the exchange of ideas through discussion and writing. Honors seniors complete the requirements of the Honors Program by undertaking a senior honors thesis (or similar creative activity), and honors seniors also may earn honors credit by enrollment in graduate seminars.

Three Honors Program awards are available to A&S students—the General Honors award, the Departmental Honors award in the student's major field, and the Honors Program degree (which is earned by completing both General and Departmental Honors Program requirements with a minimum of 39 honors hours with 3.50 OSU and cumulative grade-point averages). These awards are reflected on the student's transcript, and a special honors diploma is awarded to students completing the requirements for the Honors Program degree.

Priority enrollment is provided for students who are active in the A&S Honors Program. This allows honors students to select honors courses and other courses taught by outstanding faculty at the earliest possible date each semester and facilitates the development of class schedules tailored to the special needs of honors students. Eligibility for admission to the A&S Honors Program as a first-semester freshman is based on an ACT composite score of 27 or higher (or comparable SAT score) with a high school grade-point average of 3.75 or higher. Later entry is permitted on the basis of OSU and cumulative grade-point averages. Transfer students are eligible on the basis of cumulative grade-point average.

Bachelor of University Studies (B.U.S.). The B.U.S. in the College of Arts and Sciences allows outstanding students with unique educational objectives that cannot be fulfilled by any of the regular degree programs to design an individual plan of study fitted to the student's particular needs. B.U.S. plans must be approved by a faculty committee, the Office

of the Dean of the College of Arts and Sciences, and the Office of the Executive Vice-President. At least 45 semester hours must be completed after the plan has been approved.

Area Studies Certificates. Area Studies certificates allow OSU students to pursue their cross-disciplinary interests and receive recognition for their efforts. An Area Studies certificate is granted upon successful completion of all requirements for a bachelor's degree in the student's major and the specific requirements for the certificate.

International Studies. Students at OSU are encouraged to add an international element to their education by earning an Area Studies certificate. Certificates are offered in Asian, Central Asian, Latin American, and Russian and Eastern European Studies. To receive a certificate, students must successfully complete five credit hours of second-year level instruction in a language of the area chosen and six upper-division courses (18 credit hours) pertinent to the area chosen.

American Studies. OSU students can complete Area Studies certificates in African-American, Native American, and Women's Studies. These programs offer an interdisciplinary curriculum focusing on the topical areas. Each certificate requires a minimum of 18 hours of approved course work.

Ancient and Medieval Studies. To receive an Ancient and Medieval Studies certificate, students must successfully complete (1) a minimum of second semester classical or koine Greek, classical or medieval Latin, Anglo-Saxon, or middle English; and (2) six upper-division (18 credit hours) approved courses.

Further information on these certificate programs may be obtained from the Office of the Arts and Sciences Student Academic Services, 202 Life Science East or on the World Wide Web (<http://www.okstate.edu/artsci/>).

Geographic Information Systems Certificate. The Geographic Information Systems (GIS) certificate provides a specialized course of study for interested students. The flexible program provides students with a theoretical and applied foundation concerning the rapidly growing field of GIS. The program is open to any student at Oklahoma State University. For more information, contact the GIS Certificate coordinator in the Department of Geography, 225 Scott Hall.

High School Teaching Preparation. Students earning degrees in the College of Arts and Sciences may, by completing certain courses, receive state licensure for teaching in the secondary schools. Full details may be obtained from departmental advisers or from the Office of

Teacher Education in the College of Education.

Students who wish to qualify for teaching licensure should consult as early as possible with the adviser in their fields of interest, and should apply for admission to teacher education as soon as possible, preferably before the end of their sophomore year.

It is possible to qualify for teaching licensure and the bachelor's degree within the 127 semester credit hours required for graduation. When it is not possible, students may meet the requirements for the degree and then complete the licensure requirements by taking additional courses.

Full teaching certification is awarded by the State Department of Education when the licensed candidate has successfully completed a period of teaching in a school system.

Preprofessional Programs in the Health Professions. *Premedicine, Pre-osteopathic Medicine, Pre-dentistry, and Pre-veterinary Medicine.*

The preprofessional curricula for physicians, dentists, podiatrists, optometrists and veterinarians have the same basic core because they must prepare students for professional schools whose admission requirements are almost identical. These include a strong foundation in math, chemistry, physics, and biology, the disciplines on which major advances in the health field depend. Included also are courses to develop written and spoken communication skills, which are highly important for a good relationship with patients, the public and other professionals.

Beyond this required core, preprofessional students may choose courses and a major as freely as any other students in the College of Arts and Sciences. Most students concentrate on some aspect of biology or chemistry, but other subject areas are not only acceptable but welcomed. Medical schools encourage study in the social sciences and humanities that contributes to the understanding of human beings in their entirety—their history and environment, their attitudes and values, their emotions, motivations, interpersonal relationships and cultural heritage. All of these may affect sickness and health.

Although most students entering a professional school in one of the above fields have a bachelor's degree, it is possible to apply for admission after three years of college work (two years for a few dental and veterinary schools). OSU permits preprofessional (health-related) students to choose between two alternative bachelor's degree programs: (1) in a specific discipline that requires a minimum of 127 semester credit hours at

OSU, or (2) a premedical science degree program which allows a "3 plus 1" approach, requiring at least 97 semester credit hours at OSU and up to 30 hours to be transferred from a medical, osteopathic, dental or veterinary school.

Some professional schools do not state a firm minimum grade-point average for admission, but a student should maintain better than a 3.00 grade-point average to be competitive. The specific admission requirements of medical, dental and veterinary schools are compiled in catalogs available in the offices of each preprofessional adviser and in the Office of Student Academic Services. The OSU premedical and pre-veterinary course requirements are listed in the "College of Veterinary Medicine" and "College of Osteopathic Medicine" sections of the *Catalog*.

All applicants for medical schools must take the Medical College Admissions Test (MCAT), dental applicants must take the Dental Admission Test (DAT), and optometry applicants must take the Optometry Admissions Test (OAT) prior to admission. The OSU College of Veterinary Medicine requires the General Test and the Advanced Biology Test of the Graduate Record Examination (GRE) taken within the previous four years.

Allied Health Professions. The allied health professions for which one can prepare at Oklahoma State University include dental hygiene, nursing, occupational therapy, pharmacy, physical therapy, physician's associate, and radiologic technology. Each of these programs requires that the final phase of the education and degree program (usually two to three years) be completed elsewhere in a professional program. The College of Arts and Sciences offers the general education and basic science courses which one must complete before he or she can be accepted into a professional program. Students whose goal is admission to a professional program in the allied health professions should consult with the counselor-coordinator of health professions advising for information regarding the specific requirements of particular programs and schools.

Medical Technology: See "Department of Microbiology and Molecular Genetics."

Pre-law Preparation. Law schools have no single preference for a specific undergraduate major. Admission to law school is primarily based upon a strong record achieved in a rigorous undergraduate program and a competitive score on the Law School Admission Test (LSAT). Other admission considerations include course of study and difficulty of curriculum, college activities, and

applicant's motivation and personality as revealed in a letter of application.

Law school admissions officers most frequently recommend that students include in their undergraduate programs courses in economics, literature and languages, psychology, history and government, mathematics, logic, philosophy, accounting and speech. Courses in these areas are especially helpful as one seeks to develop the verbal and analytical abilities that are particularly critical for success in law school.

Personal assistance in selecting an academic major, planning a solid pre-law curriculum, preparing and registering for the Law School Admissions Test, and applying to law school, is available through the pre-law adviser in the Office of Student Academic Services.

Graduation Requirements

General Education Requirements. The General Education Requirements for the degrees offered by the College are shown for each program in *Undergraduate Programs and Requirements*. At least 40 credit hours of General Education are required for all degrees.

All degrees include a common core of 12 credit hours. *Three credit hours of American history and three hours of American government* are required. These must be satisfied by HIST 1103, 1483 or 1493, and POLS 1113. *Six credit hours of English composition* is a University requirement, and this must be satisfied by ENGL 1113 or 1313 and 1213 or 1413. Students who obtain a grade of "A" or "B" in ENGL 1113 may substitute ENGL 3323 for ENGL 1213 with permission of their departments.

The remaining 28 credit hours must be distributed as follows: six credit hours of social sciences, six hours of humanities, eight hours of natural sciences, six hours of analytical and quantitative thought, and two hours of General Education elective.

College Requirements. In addition to the 40 hours of general education, the college requires one credit hour of orientation, (A&S 1111), for all degrees. For the B.S., nine additional hours of natural or mathematical sciences are required, as well as three additional hours from the humanities or arts. For the B.A., nine additional hours of humanities or arts are required, as well as three additional hours of natural or mathematical sciences and a course focused on non-Western culture. College requirements define the B.A. or B.S. degree in the College of Arts and Sciences.

Foreign Language Proficiency Requirement. The foreign language requirement for the B.A. and B.F.A. in Arts and Sci-

ences may be satisfied by 10 hours of college credit in the same language, or equivalent proficiency demonstrated by passing an advanced standing exam or completing a second-year or higher college-level course in the language. FREN and GRMN 3013, 3023, FREN and SPAN 4113, RUSS 3003, 3053, 3123, 4113, and 4223 do not satisfy this requirement.

The foreign language requirement for the B.S. and B.M. degrees may be met by presenting a high school transcript that demonstrates successful completion of two years of study in a single foreign language. It may also be satisfied by any of the three options listed above for the B.A.

The foreign language requirement for the Bachelor of University Studies degree will be determined based on the student's objective, but will be the requirement for either the B.A. or B.S.

Non-Western Requirement (B.A. and B.F.A. only). One three-hour course in Non-Western studies from: A&S 3603 (African or Asian studies); ART 3693, 4603, 4633, 4653, 4663, 4673; ECON 4643; ENGL 3173; FLL 3500, 3503; GEOG 3753, 3763, 3783; HIST 1713, 3013, 3203, 3403, 3413, 3423, 3433, 3503, 3513, 3523, 3980; JAPN 2115, 2123, 2223; MUSI 3583; PHIL 3943; POLS 3223, 3313; REL 3613, 4113.

International Dimension Requirement (all degrees). One course which fosters understanding of, or the ability to communicate with, peoples and cultures of other countries. Courses satisfying this requirement are designated "I" in the *Catalog* and a list is available from the Office of Arts and Sciences Student Academic Services or at the website of the Office of the Executive Vice President.

Scientific Investigation Requirement (all degrees). One course including an investigative laboratory that provides experience with scientific method. Courses satisfying this requirement are designated "L" in the *Catalog* and a list is available from the Office of Arts and Sciences Student Academic Services or at the website of the Office of the Executive Vice President.

The Non-Western, International Dimension, and Scientific Investigation requirements may be satisfied by courses used also to satisfy any other part of a student's degree program (i.e., in General Education, College, Major, or Electives requirements). No additional hours are required.

Additional College Requirements. For all degrees, six hours of general education designated courses (excluding courses in the major prefix) are to be taken at the 3000 level or above.

Major Requirements. At least 40 semester credit hours as specified by the department, including courses in the major and in supporting fields, must be completed. These 40 hours constitute the student's Major Requirements.

Upper-division Credit. A student must successfully complete at least 48 semester hours of upper-division credit, i.e. credit in courses at the 3000 or 4000 level.

Hours in One Prefix. If a student seeking a B.A. or B.S. degree takes more than 48 semester credit hours in one subject, including both lower-division and upper-division credit, the hours in excess of 48 will be added to the minimum total of 127 hours required by the College for a bachelor's degree.

This "48 hour maximum" applies to all courses taken in a subject, whether they are required or elective, with the exception of required courses in English composition and American history and government.

Total Semester Credit Hours and Grade-point Average. The minimum number of semester credit hours for graduation is 127. The minimum grade-point average is 2.00 and must be earned in all major courses, in Major Requirements, and in all courses applied toward the degree. A minimum cumulative grade-point average of 2.00, as calculated for graduation purposes, is also required. (See "University Academic Regulations" in the *Catalog*.)

Particular degree programs may specify higher grade-point requirements or exceed the 127 hours total. Details are given in *Undergraduate Programs and Requirements*.

Native Speaker Policy. It is the policy of the College of Arts and Sciences that native speakers of any foreign language (those whose language of instruction in high school was the language in question) may not normally be permitted to enroll in or establish credit in courses in that language at the 1000 or 2000 level. There are no restrictions on higher level courses. Exceptions necessitated by degree requirements may be determined by interview with the head of the Department of Foreign Languages and Literatures and the appropriate language section chairman.

Endorsement of Student's Plan (Graduation Check). Immediately after their last enrollment, and before their last semester, students should check with their advisers to ascertain that a degree plan has been sent to the Arts and Sciences Office of Student Academic Services.

Changes in Degree Plan. Once a degree plan has been submitted, a student

will not graduate until all requirements on it have been fulfilled. Any deviation in the plan must be recommended by the adviser on a "Change in Plan of Study" card, and sent to the Arts and Sciences Office of Student Academic Services for approval.

Checklist of Graduation Requirements.

1. **Total hours.** Minimum 127 (see degree sheet). Hours of "F" or "I," or in repeated courses (unless officially approved in course descriptions in the *Catalog*), do not count. ENGL 0123, MATH 0123, and all athletic participation and leisure activity courses are not applicable to a degree. Students must ascertain that grade changes for the removal of "I's" have been sent to the Office of the Registrar by the instructor who gave the "I."
2. **Grade-point average.** See individual degree sheets for all grade-point minima: overall, in major prefix, and in major requirements.
3. **Validity of credits.**
 - a. No more than two courses in any one subject or (eight hours in biological science) may be used to satisfy General Education and College requirements in the same breadth area.
 - b. A course used in the Major Requirements may not be used to satisfy any other degree requirement, except the international dimension, scientific investigation, upper-division general education, and non-Western requirements.
 - c. **Pass-No Pass Grading System.** Courses taken on this campus under the Pass-No Pass Grading System (see "University Academic Regulations") may be used only as elective hours. They cannot satisfy any other requirement (General Education, Departmental, Major Requirement, certification).
4. All degree requirements listed above and specified in "University Academic Regulations" and *Undergraduate Programs and Requirements* must be satisfied.
5. **Exemption.** A student who believes that he or she has a valid reason for exemption from a College requirement should file with the Office of Student Academic Services a written request that has been approved by his or her adviser. Although general and departmental requirements apply to transfer students, all or most of the student's previous work may be acceptable as substitutions. Students should consult with their advisers.

Departmental Clubs and Honor Societies

Advertising Club
Alpha Epsilon Delta (premedical honor society)
Alpha Epsilon Rho (broadcasting)
Alpha Kappa Delta (sociology)
American Association of Petroleum Geologists
American Chemical Society Student Affiliate (includes biochemistry)
American Fisheries Society, Oklahoma Student Chapter
Arnold Air Society
Army Blades
Arts & Sciences Student Council
Association for Computing Machinery
Biochemistry Club
Creative Writers Association
Delta Nu Alpha, Order of Biochemistry
Dobro Slovo (Slavic languages)
Economics Club
English Club
English Graduate Student Association
French Club
Friends of the Forms (philosophy)
Gamma Theta Upsilon (geography)
Geography Club
Geological Society
German Club
History Undergraduate Club
Japanese Club
Kappa Kappa Psi (band honor society)
Kappa Tau Alpha (mass communications)
Mathematical Association of America
Music Business Students Association
Music Educators National Conference
Mu Sigma Rho (statistics honor society)
Omicron Delta Epsilon (economics)
OSU Artisans (art club)
OSU Math Club
OSU National Student Speech-Language-Hearing Association
Paleontology Club
Pershing Rifles (any OSU student)
Phi Alpha Delta (pre-law)
Phi Alpha Theta (history honor society)
Phi Lambda Upsilon (chemistry honor society)
Phi Mu Alpha (music)
Phi Mu Tau (medical technology)
Pi Mu Epsilon (mathematics honor society)
Pi Sigma Alpha (political science honor society)

Political Science Club
Psi Chi (psychology honor society)
Psychology Club
Psychology Graduate Student Association
Public Relations Student Society of America
Ranger Company (military science)
Russian Club
Scabbard & Blade (military science)
Sigma Alpha Iota (music)
Sigma Delta Chi Society of Professional Journalists (journalism)
Sigma Delta Pi (Spanish honor society)
Sigma Pi Sigma /Society of Physics Students
Sigma Tau Delta (English honor society)
Silver Wings
Society of Physics Students
Society for Technical Communication
Sociology Club
Spanish Club
Speech Communication Organization
Statistics Club
Tau Beta Sigma (band honor society)
Wildlife Society, Student Chapter
Women in Communications, Inc.

Art

Professor and Head Nick Bormann, M.F.A.

The Department of Art provides courses for students interested in: (1) a strong general education background, (2) major concentrations in studio art, graphic design and art history, (3) minors in all three areas.

Two degrees are offered in art: Bachelor of Art (B.A.) with options in art history and studio art, that can be combined with teacher certification; and the Bachelor of Fine Arts (B.F.A.), a professional degree with options in studio art or graphic design. Fields of concentration are available in drawing, oil and watercolor painting, printmaking, graphic design illustration, ceramics, jewelry/metalsmithing, sculpture and art history.

Art majors must attain a grade-point average of 2.50 in art courses in order to qualify for licensure and graduation. Because of a large endowment, the department is able to offer substantial scholarships at all levels, freshman through senior.

The Department of Art maintains an exhibition gallery, the Gardiner Art Gal-

lery in the Bartlett Center for the Studio Arts, with approximately 200 linear feet of exhibition space and 2600 square feet of floor space. Works by artists of national and international reputation, faculty and student works and cultural artifacts are shown.

Biochemistry and Molecular Biology

Professor and Head James B. Blair, Ph.D.

Biochemistry, the central scientific discipline linking the chemical, physical and biological sciences, exerts a profound influence on the progress of medicine and agriculture. By applying concepts and methods of chemistry and physics to the fundamental problems of biology, biochemists have made great progress in their effort to understand the chemistry of living organisms. Major discoveries concerning the biochemistry of genetic material provide the tools of molecular biology that are essential to contemporary life sciences research.

Biochemists and molecular biologists are concerned with living things. They must acquire some knowledge of the biological sciences. Since a biochemist's tools are the physical sciences, he or she must receive sound education in mathematics, physics and chemistry.

Challenging positions for well-trained biochemists and molecular biologists are available in colleges and universities, state and federal laboratories, research institutes, medical centers and in an increasing number of industrial organizations, particularly the pharmaceutical and food industries. Biochemists are involved with research on the chemistry of processes occurring in plants, animals, and various microorganisms, and with the discovery and development of antibiotics, vitamins, hormones, enzymes, insecticides and molecular genetic techniques.

At the undergraduate level a major in biochemistry and molecular biology administered by the Department of Biochemistry and Molecular Biology is available through the College of Agricultural Sciences and Natural Resources. The department also offers a B.S. degree in biochemistry through the College of Arts and Sciences. An honors program is available. The curriculum provides a broad background in chemistry and biological science and permits flexibility

in meeting particular interests of the student. Courses in biochemistry are based on general, organic and analytical chemistry. The biochemistry and molecular biology curriculum provides students with sufficient background in the basic sciences of mathematics, physics, chemistry and biology to meet the needs for graduate study in most fields of modern science related to agriculture or medicine. The curriculum is excellent for preprofessional students of medicine, dentistry and veterinary medicine.

Graduate Programs

Because many of the opportunities in biochemistry require advanced course work, a major part of the program in the Department of Biochemistry and Molecular Biology is concerned with its graduate program leading to the M.S. or Ph.D. degree. This graduate program is an integral part of extensive basic research activities in the Oklahoma Agricultural Experiment Station. These research activities provide opportunities for part-time employment of undergraduate majors to improve their professional competence.

Prerequisites. Although the B.S. in chemistry or biochemistry is preferred, students with strong backgrounds in other biological or physical science disciplines are eligible. Individuals not having at least eight semester credit hours in each of organic and physical chemistry and calculus must take appropriate undergraduate courses to make up deficiencies. The results of the three general GRE exams (verbal, quantitative, analytical) are required for entrance. An advanced GRE subject matter exam (biochemistry, chemistry or biology) is also recommended. A cumulative GRE score of 1500 is normally required.

Degree Requirements. A more detailed description of the graduate study program in biochemistry is available from the department upon request. The requirements listed below complement the general graduate requirements described in the "Graduate College" section of the *Catalog*. After the first semester, continuous attendance and participation in the departmental seminar is expected.

The Master of Science Degree. Twenty-four credit hours of formal graduate courses are required, including BIOCH 5753 (or 4113), 5853, and 5930. In addition, a student must present an acceptable research thesis (six hours) and pass a final oral examination covering it and related material. Research advisers are selected at the end of the first semester.

A non-thesis Master of Science degree is also available. It does not require a

research thesis, but requires a report and extensive technical training in the laboratory. The non-thesis M.S. is not recommended for students wishing to pursue a Ph.D. program later.

The Doctor of Philosophy Degree. The course requirements are determined with the aid of the student's graduate advisory committee. Usually they follow these guidelines: total of 30-40 credit hours of formal graduate course work which includes all the courses listed for the M.S. degree, at least four of the advanced graduate courses in biochemistry (6000 level) and two offerings of Special Topics (6820). Additional course requirements, appropriate to the student's interests, are determined by the advisory committee. The advisory committee is selected at the end of the second semester. Each student will take a series of cumulative examinations beginning in September of his or her first year. A more comprehensive qualifying examination is also given, usually at the end of the fourth semester of graduate study.

One year of a foreign language at the college level is required. The student must present, and defend in a final oral examination, an acceptable research thesis which contains a substantial original contribution to the field of biochemistry. The department offers research experience in a variety of areas of biochemistry.

Botany

Professor and Head James D. Ownby, Ph.D.

Botany is the science concerned with all facets of plant life. Green plants are the constantly renewable source of food and fiber, and it is important that they be thoroughly understood as survival and ecological balance depend upon this knowledge. As populations increase, the need for more and better supplies of food and fiber also increases. The study of botany underlies several applied sciences such as agronomy, forestry, horticulture, plant pathology, range, lake and wildlife management.

To major in botany a student should have a strong interest in science with a good background in chemistry, physics and mathematics. Majors with a B.S. degree may qualify for secondary school science teaching licensure, for technical positions with the federal and state governments in plant inspection and plant introduction work, for plant breeding programs, and for various activities concerned with plants in private industry, such as plant biotechnology.

Facilities used in undergraduate teaching include well-equipped plant structure-function and ecology laboratories, constant-environment chambers, the 160-acre McPherson Preserve and herbarium with over 125,000 plant specimens. All of the faculty teach and do research in their specialty areas of botany: plant ecology, physiology, taxonomy, anatomy, developmental genetics, algal ecology, and molecular biology.

Graduate Programs

Programs of research and study leading to the degrees of Master of Science and Doctor of Philosophy are offered in many areas of botany, including plant cell biology, ecology, physiology, taxonomy, population biology, genetics and development, and biotechnology-related areas such as tissue culture.

Prerequisites. Applicants for admission must have received a baccalaureate degree from an accredited college and should have had 40 semester hours (or equivalent) in upper-division courses in the biological and physical sciences. A grade-point average of 3.00 (on a 4.00 scale) or above is required for unconditional admission. All applicants are required to submit scores for the Aptitude and Advanced Biology portions of the Graduate Record Examination.

Prerequisites for graduate degrees include successful completion of courses in the areas of plant taxonomy or field botany, plant anatomy, plant pathology or microbiology, plant physiology; genetics and ecology. Chemistry through organic and mathematics through trigonometry are also required. Students with an undergraduate major in plant science will have completed a substantial portion of this minimal list upon matriculation; those with a less closely related major may be required to take some background courses without graduate credit. Final authority for each student's plan of study, including courses to be taken at the undergraduate level, resides with the student's advisory committee.

A potential graduate student may be required to take one or more advisory examinations covering the various subject matter areas of botany. The examinations to be taken will be determined by the student's screening or advisory committee. The results will be used to determine course work needed or the level at which the student should proceed.

Demonstrated research competence through submission and acceptance of a thesis or dissertation is required for all graduate degrees. A minimum of one semester teaching experience is required of all M.S. and Ph.D. candidates.

This requirement may be satisfied by enrollment in a college teaching practicum course (GRAD 5990) or by one semester teaching experience. The requirement for competence in a foreign language will be determined by the student's advisory committee.

All graduate students are expected to attend and participate in departmental seminars.

The Master of Science Degree. Plans of study must contain 30 credit hours including at least 21 semester credit hours numbered 5000 or above, six credit hours of thesis and two credit hours of seminar. A minimum of 16 semester credit hours must be in the major department or field, above the prerequisites required for entrance into the M.S. program.

The Doctor of Philosophy Degree in Plant Science. The Department of Botany is one of seven departments participating in the multidisciplinary Ph.D. in plant science program. Students in this program have great flexibility in research and course work. The student who chooses botany as a home department has a botany faculty adviser from within the department, and will take BOT 6000 research hours in the department. To receive the Ph.D. in plant science, students must enroll in a total of 90 credit hours beyond the B.S. or 60 credit hours beyond the M.S. No fewer than 36 nor more than 60 hours of BOT 6000 are allowed in the plan of study. Two hours of seminar (BOT 5850) must also be included in the plan of study. Students may choose as a specialization area either cellular and molecular, organismal, or ecological plant science. After a Ph.D. candidate has completed most of the course work, qualifying examinations are scheduled. These exams cover major areas of the student's plan of study; all relevant subdivisions of plant science are included. The examinations are both written and oral.

Chemistry

Professor and Head Neil Purdie, Ph.D.

Chemistry is the science that deals with the composition, structure and interactions of matter of all kinds. Materials obtained from the earth, such as ores, petroleum and natural gas, as well as those from plants and animals, such as food, fibers and antibiotics, are all studied and modified through chemical means. The chemist creates from natural products new and useful substances that add to the enjoyment of life. He or she creates new agents to combat pests that

destroy great portions of food supplies and new drugs to fight diseases of many kinds. Chemists lead the fight against pollution of the environment that results from rapid multiplication of population and of use of energy. Chemists are at the forefront of the search for new energy sources and for ways to better use existing sources of energy.

A great curiosity concerning the physical world should be characteristic of one who is considering chemistry as a profession. The student should want to learn more about the changes of materials and to use his or her knowledge for the betterment of life. The student should have an interest in physics and mathematics, since those subjects' principles are basic to the study of chemistry.

Chemists are employed by most large companies in this country, especially those that produce foods, medicines, fuels and materials. These chemists work in the areas of research, sales and quality control. Many chemists become teachers in public schools or colleges. State and federal agencies employ chemists for research and analysis. Generally an M.S. or Ph.D. degree is desirable for those interested in research or college teaching.

The Department of Chemistry offers two bachelor's degrees: (1) a B.S. degree that is accredited by the American Chemical Society; and (2) a B.S. degree that requires less specialization.

The chemical laboratories are modern and well-equipped with instruments for determination of properties of chemicals and studies of reactions. Individual laboratory work is encouraged.

Graduate Programs

Prerequisites. The student should have at least eight semester credit hours (or the equivalent) in general, analytical, organic, and physical chemistry. The physical chemistry should have been based on mathematics through calculus.

A beginning graduate student must take diagnostic examinations covering one year of undergraduate study in analytical, organic, inorganic and physical chemistry before the student enrolls for the first time. If the student fails to pass one of these examinations, he or she will be required to take the appropriate courses without graduate credit at the first opportunity. No graduate credit may be earned for chemistry courses numbered below 4000. The student may enroll in graduate courses for which the student has passed the entrance examination.

Admission Requirements. Admission requirements are minimal. For admission without qualification a grade-point aver-

age of 3.00 or better is required. Deserving applicants with grade-point averages less than 3.00 are infrequently admitted under probationary conditions. Additional support of the application is sought in the form of three letters of recommendation. Graduate Record Examination scores are not used as a criterion for admission. Recommendations on admission to the Graduate College are made on behalf of the applicant by the departmental admission officer. Acceptance by a permanent adviser is not a prerequisite to admission to the program.

Degree Requirements. A more detailed description of the graduate study program in chemistry is available in a brochure which will be supplied by the department upon request. The requirements set forth below complement the general requirements stated in the "Graduate College" section of the *Catalog*.

Attendance and participation in the departmental colloquium and CHEM 5011 and 6011 are required.

The Master of Science Degree. Students must complete at least 30 credit hours of graduate course work in chemistry or related fields.

Each student must present an acceptable thesis dealing with a research problem and pass a final oral examination covering it and related material. Research on the thesis problem should be started as early as possible in the graduate program.

The Doctor of Philosophy Degree. Work is offered which leads to the degree with specialization in analytical, inorganic, organic or physical chemistry. A major in biological chemistry is offered by the Department of Biochemistry. The student must pass a qualifying examination in the student's field of specialization.

An acceptable dissertation must be presented which contains a substantial original contribution to the field of chemistry. The student must pass a final oral examination covering the dissertation and related material.

The Doctor of Philosophy degree requires the completion of at least 90 semester credit hours of work beyond the bachelor's degree.

The course requirements are determined by an advisory committee which is appointed for each student.

Communication Sciences and Disorders

Associate Professor and Head Arthur L. Pentz, Jr., Ph.D.

The Department of Communication Sciences and Disorders prepares students through the master's level to serve individuals of all ages who exhibit speech, language, cognitive and/or hearing disorders. The undergraduate program emphasizes the study of the development and functioning of the individual who presents normal speech, language and hearing. It also stresses academic course work and clinical observation experiences in the nature, symptoms and treatment of those with various kinds of communication disorders. Acceptance into the undergraduate program is considered on a grade-point average for 36 or more hours attempted.

The master's program is designed to provide students with intensive course work in the various communication disorders and a wide variety of challenging clinical activities. These include off-campus clinical practica which serve as an excellent transition from on-campus practicum to an actual professional position after graduation. Students who graduate from this program are prepared to take positions in public schools, hospitals, community speech and hearing centers, private practices and other related settings, or pursue additional graduate education at the Ph.D. level. All graduates meet the academic and practicum requirements for the Certificate of Clinical Competence in Speech-Language Pathology from the American Speech-Language-Hearing Association. In addition, most students elect to earn the state teaching certificate. The program is nationally accredited in speech-language pathology by the Council on Academic Accreditation of the American Speech-Language-Hearing Association.

Graduate Programs

Prerequisites. Other than the general requirements of the Graduate College, no other prerequisites are required for application to the graduate program. The amount of course work taken at the undergraduate level in communication sciences and disorders and related areas will determine the amount of time required for the degree. Students holding undergraduate degrees in other fields are encouraged to apply for admission. Undergraduate prerequisites will add

approximately 37 credit hours to the program.

Admission Requirements. Applicants should have a minimum grade-point average of 3.00 ("B") in all work and at least a 3.00 in the major, strong letters of recommendation from those familiar with the student's previous academic background, and GRE scores acceptable to the Graduate Faculty. Interviews are conducted prior to admission. Students with a baccalaureate degree are required to be admitted to a graduate degree program to take course work in this department. Admission is competitive and varies according to the number of places available in the program. Application deadlines can be obtained from the department.

International students follow the same application procedure as U.S. students with one addition. If English is not the student's native language he or she is required to score a minimum of 550 on the Test of English as a Foreign Language (TOEFL) and a minimum of 60 on the Test of Spoken English (TSE). It is especially important that students have readily intelligible spoken English, because they will be conducting therapy sessions in English. The International Student Services Office is available on campus to assist international students.

Financial Aid. All students are eligible to apply for graduate assistantships and fee waiver scholarships. Graduate assistantships qualify out-of-state students and international students for in-state tuition.

Program Requirements. The program leading to the Master of Arts provides a thorough exposure to the nature and causes of communication disorders and to clinical procedures. Clinical training occurs in the OSU Speech-Language-Hearing Clinic and in off-campus facilities including clinics, schools, adult day care and residential programs, and in acute care and rehabilitation hospitals. Research and independent study opportunities are also available.

The degree consists of a minimum of 28 semester credit hours in courses that examine the nature, causes, assessment, and treatment of communication disorders and related areas, and a minimum of nine semester credit hours in clinical practicum courses. All students enroll in a core curriculum of 18 hours. To complete degree requirements, students may choose from a variety of courses that provide additional study in particular clinical areas.

Examinations. Students may complete a master's thesis or pass a comprehensive examination and complete a portfolio.

Computer Science

Associate Professor and Head
Blayne E. Mayfield, Ph.D.

Computer science is concerned with theoretical and practical methods of storing, processing and communicating information by means of computers. Professional computer scientists obtain a formal education through the B.S., M.S. or Ph.D. degrees and apply their knowledge to many diversified fields of science, engineering, business and communications. Computer science offers opportunities to both specialists and generalists.

In little more than three human generations, the computing field has evolved from one associated primarily with engineering and scientific calculations of only casual interest to the layperson, to a factor of significant influence in almost every aspect of modern life. Technical careers in computer architecture and software design, as well as applications in the business and scientific areas, require a thorough knowledge of the principles of computer science. In addition, most managers in any field require some familiarity with computers, not only to be able to understand them, but also to incorporate them into their own decision-making processes.

The department offers the full range of degree programs—B.S., M.S. and Ph.D. For individuals interested in teaching computer science at a two- or four-year institution, an Ed.D. program is also available.

Most B.S. and M.S. graduates obtain positions in industry. Approximately half of the Ph.D. graduates take university teaching and research positions and half are employed in industry.

Computing facilities available include the University Computing and Information Services computers, an IBM 9672-R32, a DEC 3000-600, and a DEC 2100A-4/275. The Department of Computer Science has a Sun Microsystems Enterprise 3000 as its primary computing resource. There is a lab for graduate students with X-terminals available. There is also a special projects room for graduate students.

Computers can be accessed through the Computing and Information Services Network. There are a number of personal computer labs located in various buildings on campus. Some of the residence halls have personal computer labs available. All of these labs have access to personal computer application software and all mainframe computers on campus, as well as Internet access. Both the

University and the department's computers can be accessed 24 hours a day.

The department participates in the CSNET and USENIX networks for computer science research and UNIX users. (UNIX is a trademark of Bell Laboratories.)

Graduate Programs

The department offers degree programs leading to the Master of Science degree, the Doctor of Education degree in higher education, and to the Doctor of Philosophy degree. These programs are designed to prepare an individual to pursue a career in either an academic or an industrial setting. In addition to taking a prescribed set of core courses, a student must take sufficient courses in one specialized area. In addition to course work, a student must complete a thesis for an M.S. degree. A student must complete a dissertation in addition to course work for a Ph.D. degree.

The core course requirement assures the student of breadth of knowledge in computer science; the freedom to choose an area and additional research assures the student of enough depth in some facets of computer science to be able to carry out independent investigations in those areas and put concepts and ideas learned to practical use.

For a master's degree, 30 hours of graduate credit, including a six-credit-hour thesis, are required. A master's degree student is required to pass an oral examination over the thesis. There is no foreign language requirement for the M.S.

For an Ed.D. or a Ph.D., 60 credit hours beyond a master's degree or 90 hours beyond a bachelor's degree are required. A dissertation of no more than 30 hours is required. The Ph.D. dissertation must describe original research while the Ed.D. dissertation may be expository. Ed.D. and Ph.D. students must pass (at an appropriate level) written preliminary examinations in areas of specialization. For Ed.D. students, one of the speciality areas must be computer science education. Master's students who pass these examinations at the Ph.D. level are encouraged to pursue a Ph.D. program of study. In general, both academic and industrial positions exist for each Ph.D. graduate.

The candidate's baccalaureate degree need not be in computer science in order to enter this program. Admission to the program does require: (1) an undergraduate degree; (2) successful completion of a 10-hour calculus sequence; (3) demonstrated competence in programming with some procedure-oriented programming language such as C,

FORTRAN, or PASCAL; (4) qualifying grade-point average and Graduate Record Examination scores.

Economics and Legal Studies in Business

Professor and Head Joseph M. Jadow, Ph.D.

Economics is a science of choice. The study of economics centers around individuals' attempts to improve their living standards. It provides a comprehensive view of how a society is organized to transform the limited resources available into want-satisfying goods and services. It investigates the principles underlying the operation of the economic system, and seeks to determine its weaknesses and to prescribe policy measures that will improve its operation. In the process it ranges over a host of the most important problems confronting contemporary society—the causes of and remedies for depression and inflation, the determinants of and methods for improving income distribution, poverty problems and welfare measures, the role of the government in economic activity, the requisites for economic growth and development, pollution and congestion and their control.

The primary objectives sought in the undergraduate curriculum are to develop a broad understanding and perspective of the economic aspects of people's activities, coupled with thorough training in the fundamental tools of economic analyses. Toward these ends, the development of elementary mathematical and statistical skills is highly desirable, as is complementary study in the social and behavioral sciences, accounting and business administration.

A major in economics prepares students for positions with business firms, nonprofit private organizations and government agencies—both national and international. It provides an excellent background for the study of law, and an international economic relations option is offered. An economics degree qualifies competent students to undertake the graduate work necessary for professional positions in economic research and college or university teaching. A degree option in business economics and quantitative studies is offered through the College of Business Administration to provide additional training in analytical methods and communication

skill for both public and private sector occupations.

Graduate Programs

The department offers work leading to the Master of Science degree and the Doctor of Philosophy degree. The graduate program in economics prepares economists for academic careers as well as research and administrative positions in business and government agencies.

Graduate fields of specialization include monetary economics, public finance, international economics, economic development, econometrics, labor and human resource economics, industrial organization, and urban and regional economics. In addition, graduate courses are offered in the history of economic thought and in mathematical economics.

The initial admission to a graduate program is determined by an elected graduate studies committee on the basis of the applicant's previous academic record; verbal, quantitative and analytical scores of the Graduate Record Examination; and letters of recommendation.

The Master of Science Degree. Admission to the master's program in economics is granted to college graduates with superior academic records whose preparation has been broad and thorough. They need not have majored in economics as undergraduates but must be well grounded in economic fundamentals. A good background in one or more such fields as history, philosophy, mathematics, statistics, political science, English, sociology, accounting, finance, psychology, or management is particularly helpful to the graduate student in economics. An applicant whose prior preparation is deficient in some respect, may, if otherwise qualified, be admitted to the program but will be required to remove the deficiency, increasing somewhat the time needed to complete work for the degree.

Each graduate student is guided in the preparation of a program of study by a graduate studies committee. At the master's level there are two options. One option provides the student with a well-rounded program that avoids premature specialization in some particular area of economics. The candidate for the master's degree is required to show competence in basic economic theory and statistical methods, together with an understanding of the fundamental institutional operations of the United States economy. The second option is in applied economics which stresses communication skills, quantitative analysis and course work from other disciplines related to their career objectives.

Each program contains enough electives to permit considerable choice among areas of emphasis. A research report or thesis is required of all students who take only the M.S. degree. Those accepted for the Ph.D. program have the option of applying for and receiving the M.S. degree without the research report upon successful completion of the Ph.D. qualifying examination and the filing of an approved Ph.D. thesis topic with the Graduate College. A foreign language is not required.

The Doctor of Philosophy Degree. Admission to the doctoral program in economics is granted to college graduates who have satisfactorily completed at least one year of graduate work in economics and who have superior academic records.

This program stresses balanced preparation in economic theory and in mathematics and statistics, as well as competence in subject-area fields of specialization. The student is required to pass qualifying examinations in the theory core and in one field of specialization. (The theory core is not considered a field of specialization.) Competence must be demonstrated in second and third fields of specialization, either through course work or by passing a qualifying examination in each field. An advisory committee helps the student plan a program of study to achieve these objectives. A foreign language is not required.

A dissertation based upon original research is required of the candidate for a Ph.D. degree in economics. A final oral examination deals principally with the dissertation and fields to which it is most closely related.

English

Professor and Head Edward P. Walkiewicz, Ph.D.

The study of English literature and language is fundamental to any education. Not only does it provide familiarity with the literary works that shape cultural heritage, but it also develops the abilities to think analytically, to speak and write effectively, and to consider various points of view when dealing with people and ideas.

The Department of English prides itself on the diversity of its course offerings and on its small lecture and discussion classes. The B.A., M.A. and Ph.D. degrees are awarded through the department and a full range of courses are offered in seven areas: literature, creative writing, film, technical writing, linguistics,

teaching English as a second language, and composition and rhetoric. The number of students in any English class rarely exceeds 30; and in a writing class, including freshman-level classes, the enrollment limits range from 18-25. The maximum number of students in a graduate-level class is 10.

An undergraduate English major has four options: a traditional English major, secondary education teaching certification, creative writing or technical writing, each of which emphasizes literature and writing in varying proportions. English majors may choose from courses in all historical periods of British and American literature, from early to contemporary, and in all genres—novel, film, short story, poetry, and drama. Every literature course emphasizes literary appreciation and analysis and allows ample opportunity for discussion and writing. The student in the traditional major may also study fiction writing, poetry writing, and scriptwriting with practicing, published writers. Also available are courses in linguistics, which is the study of language, and technical writing, which is writing for science and industry.

Many English majors pursue careers directly related to their major, such as in technical writing or in teaching. An English major with a technical writing option would be well prepared to pursue a career as a writer, editor, publications manager, or information developer. Students who want to teach may earn secondary teaching certification in English through either the Department of English or the College of Education, or they may decide to go to graduate school in order to teach in a college or university. A great many English majors have found the teaching profession a rewarding and challenging one. Other students find that an English major is excellent preparation for law school because it develops the analytical and language skills lawyers use. But one need not have definite career goals to major in English. English majors regularly pursue careers not only in education, professional writing, and law, but also in medicine, the ministry, publishing, government, and business. Professional schools and businesses value English majors both for their communication skills and for their ability to think critically.

The Department of English serves a great many students other than those majoring in English. It offers a variety of writing courses to fulfill the University's composition requirements; and English courses in literature, technical writing, creative writing, and film are very popular electives for students in all majors. Many students choose to complement to first major with a second major or minor in English.

The Department of English actively participates in the University Honors Program. Students who qualify for Honors are eligible to enroll in restricted courses and to write a Senior Honors Thesis. The department offers Honors courses at all levels, including an Honors seminar on a different topic each year.

A Bachelor of Arts in English requires 39 hours of lower- and upper-division English courses. An English minor requires 18 hours of English, at least nine of which must be upper-division. (These hours do not include Freshman Composition.)

Graduate Programs

The Department of English offers programs leading to the Master of Arts and the Doctor of Philosophy. Masters students may choose among three programs: Master of Arts in English; Master of Arts in technical writing; and Master of Arts in teaching English as a second language (TESL). In consultation with their advisory committees, both masters and doctoral students have considerable flexibility in designing a degree that meets their own interests and professional goals. Students may take courses in creative writing, film, technical writing, composition and rhetoric, TESL, linguistics, literary theory, and all periods of British and American literature. The diversity of choices and the flexibility of the program prepare students to meet the demands of a changing academic marketplace.

Admission Requirements. Students seeking admission to the graduate program in English must be accepted by the Graduate College and by the departmental admission committee. In addition to the application and transcripts required by the Graduate College, students must submit to the Department of English graduate coordinator a statement of purpose; letters of recommendation; and a writing sample or the Graduate Record Examination general and subject area scores. Non-native speakers of English must submit scores for both the Test of Written English (TWE) and the TOEFL. For fall admission the early decision deadline is February 15; the final deadline is April 1. The deadline for spring admission is October 15. Prerequisites are listed under each degree below.

Teaching Opportunities. Depending on their levels of experience and areas of emphasis, graduate teaching assistants may tutor in the Writing Center or teach their own sections of freshman composition, composition for international students, technical writing, creative writing, or literature. All teaching assistants are required to take an appropriate pedagogy course during their first year of teaching.

The Master of Arts Degree. The M.A. in English allows students to develop expertise in a variety of areas: British and American literature, creative writing, literary theory and criticism, film, composition and rhetoric, technical writing, linguistics, and TESL. In consultation with their advisory committees, students devise an individualized curriculum that reflects their own intellectual interests and prepares them to enter a doctoral program or to teach at the college level. The degree programs in TESL and technical writing prepare teachers for the bilingual classroom and technical writers for industry.

Prerequisites include a baccalaureate degree with an English major, or at least 24 hours in English (excluding freshman composition). Successful applicants usually have a minimum grade-point average of 3.00 on a 4.00 scale, particularly in English courses.

The M.A. in English consists of 30 credit hours, including six hours of thesis. In addition to these hours, students must demonstrate reading knowledge of a foreign language, pass the M.A. qualifying examination, and pass an oral defense of the thesis. The thesis is a work of original research prepared with the guidance of the student's advisory committee. Creative writing students may present as their theses original works in poetry, drama (including screenplays), or prose fiction. The programs in technical writing and TESL have separate degree requirements described below.

Technical Writing. The M.A. in English program in technical writing consists of 30 credit hours (with thesis) or 33 credit hours (without thesis). In addition to these hours, students must fulfill the foreign language requirement and pass the M.A. qualifying examination in technical writing. Prerequisites are the same as those above.

TESL. The M.A. in English program in teaching English as a second language is designed to provide students with the skills necessary to teach English to non-native speakers in a variety of situations, e.g., teaching English as a foreign language in an overseas school, college or university; teaching English as a second language to international students studying in intensive English programs in the U.S.; or teaching English to bilingual and bicultural students in American public school systems and adult education programs.

Prerequisites are the same as those above except that the major may be either in English or in a field related to second language acquisition or teaching. In addition, applicants to the TESL program must have six hours in a foreign language with a grade of "B" or better, or

must complete this requirement prior to taking the qualifying examination.

The TESL program consists of 30 credit hours (thesis option) or 34 credit hours (nonthesis option). In addition to these hours, students must pass the M.A. qualifying examinations in TESL.

TESL is especially relevant to the public school classroom as a result of recent legislation concerning bilingual education. Teachers in English and other areas of expertise will find this program especially useful. Although the completion of TESL does not confer public school teaching certification, the TESL course work, when combined with selected courses from the College of Education, can lead to the student's obtaining an endorsement in TESL and/or bilingual education to *already-certified teachers*. (For more information, contact the Office of Professional Education in the College of Education and the State Department of Education in Oklahoma City.)

The Doctor of Philosophy Degree. The Department of English grants one doctoral degree, the Ph.D. in English. Students may, however, emphasize in their courses, their exams, and their dissertations a variety of areas: all periods of British and American literature, Native American literature and language, creative writing, literary theory and criticism, film, technical writing, composition and rhetoric, linguistics, and TESL. They may also choose an interdisciplinary emphasis. In consultation with their advisory committees, students devise an individualized curriculum that reflects their own intellectual interests and professional goals.

Prerequisites include a master's degree in English or a field related to the student's area of emphasis. Successful applicants usually have a minimum grade-point average of 3.50 on a 4.00 scale in their master's degrees. All Ph.D. students are admitted provisionally and must take the first-year examination during their first two semesters of enrollment.

The Ph.D. degree consists of 60 credit hours beyond the master's degree. Fifteen to 20 of these hours are devoted to the dissertation. In addition to these hours, students must take a first-year examination; demonstrate reading knowledge of two foreign languages or mastery of one language; pass the Ph.D. qualifying examination in two areas; and pass an oral defense of the dissertation. The dissertation is a work of original research prepared under the direction of the dissertation committee. Creative students may present as their dissertations original works in poetry, drama (including screenplays), or prose fiction.

Additional information and require-

ments may be found in the *English Graduate Guidelines*, available from the Graduate Office of the Department of English.

Foreign Languages and Literatures

The Department of Foreign Languages and Literatures offers French, German, Russian and Spanish as major fields of study. Minors may be earned in French, German, ancient Greek, Japanese, Latin, Russian and Spanish.

In all languages offered by the department, elementary courses are available for students with no previous experience. A special intensive course in Spanish (10 credit hours in eight weeks) is offered in the summer session. Students with previous foreign language experience may take placement tests to find the course best suited for their level of proficiency. A major in a foreign language is often supported by study of another language or work in other fields. Many language majors choose to qualify for an International Studies certificate. Several certificates, such as Asian, Central Asian, Latin American, Russian and Eastern European Studies and Ancient and Medieval Studies, are available.

The study of foreign languages is a vital and humanizing part of a general education. In a rapidly changing and shrinking world, it offers new cultural insights, breaks down insularity, fosters discipline of thought and expression and leads to a better understanding of one's native language. Foreign language majors may expect to find openings in a wide variety of careers in law, medicine, government, industry and commerce, all of which require a liberal arts degree. Job opportunities are greatly enhanced for those who combine foreign language study with a major or minor in other disciplines. Moreover, there is a growing demand for foreign language teachers in secondary education. Bachelor of Arts candidates may qualify for teaching licensure without increasing the number of hours required for graduation.

In addition to the standard courses in language, literature and civilization for individual languages, the department offers literature-in-translation courses for general education, and courses in German for reading knowledge and Russian for reading knowledge.

Geography

Professor and Head Thomas A. Wikle, Ph.D.

Geography is concerned with the surface of the earth and its immediate atmosphere. Geographers study the similarities, the differences and interactions among phenomena in this region. Geographers are interested in the economic, social, political and environmental qualities of places, and in how these attributes interact.

Geographers attempt to understand human behavior by answering such questions as: Where do people work? Where do they play? Where do they live? Why do people make these locational choices? What are the consequences of these decisions and behavior?

Because the physical environment is important in many explanations of spatial behavior and spatial patterns, geographers have traditionally concerned themselves with relationships between humans and their environment. What impact do people have on the land? What impact does the land have on people? How do people perceive their environment? How does this perception influence their activities?

Finally, geographers examine spatial patterns and behaviors in specific regional contexts. These analyses occur at many levels—world-wide, national and local. These kinds of studies lead to suggestions for change and improvement—the application of geography to contemporary rural, urban and regional problems. Thus many aspects of urban, regional and national planning are geographic in nature.

No academic discipline has broader interests than does geography, and the Department of Geography allows students the flexibility to pursue studies that lead to a wide range of educational goals and careers. Students with interests in environment, planning, real estate, economic development, international affairs, travel, remote sensing, geographic information systems, area studies, management or education are among those which can be accommodated. A geography minor program is also available for those who see geography as complementary to another field of study.

Those who wish to study geography tend to be interested in their own surroundings and in other places. They also possess a curiosity for maps, the basic tool of the field. Students of geography will become familiar with remote sensing, computer graphics, statistics, geographic information systems and cartography—tools which facilitate geographic

analysis.

Many careers are available to the geography major or minor. Recent graduates have been employed in urban and regional planning, community development, locational analysis in both the public and private sector, resource planning and management, various forms of domestic and foreign service, cartography and teaching. Geography also provides an excellent foundation for a liberal education and is a good basis for a career in business, industry or government.

The department possesses a simulations laboratory, the Center for Applications of Remote Sensing, a computer mapping facility, field mapping equipment such as global positioning system receivers, an interactive weather analysis system with satellite data feed, and an ARC-INFO equipped geographic information system laboratory. Three national journals are edited and published by faculty members in the department, the *Journal of Cultural Geography*, *Sport Place*, and the *Journal of Central Asian Studies*.

The department specializes in two areas: cultural and historical geography and resource management/GIS. Complementary course work supporting these specialized areas is available in other departments.

The Department of Geography offers the B.A. and B.S. degrees. An option in applied resource management is available within the B.S. degree. An advanced program leading to the Master of Science degree is also available. The department also sponsors students in the interdisciplinary M.S. and Ph.D. programs in environmental science.

Certificate in Geographic Information Systems (GIS). The certificate in GIS provides students with broad exposure to principles and applications of GIS. A student who has earned the certificate is well-versed in general GIS theory and has knowledge and/or practical exposure to the following: (1) hardware and software used in GIS, (2) planning and construction of spatial and nonspatial databases, (3) GIS analyses (performed on data related to the student's area of interest), and (4) representation of data in both mapped and tabular form. Requirements for the certificate are designed to parallel skills needed by GIS professionals. Through elective courses, students focus on one of several areas of specialization. Admission into the certificate program is open to anyone enrolled as an undergraduate student, graduate student or special student at OSU. To receive a certificate in GIS, a student must complete 21 hours of course work in GIS and related topics and hold a bachelor's or more advanced degree from OSU or an accredited college.

Students may work toward the certificate while completing their bachelor's or graduate degree.

Graduate Programs

The Department of Geography offers work leading to the Master of Science degree. This degree program emphasizes preparation for employment in positions which are enhanced by an ability to recognize and to interpret spatial distribution, and to analyze regions.

Particular emphasis is placed on the applied aspects of geography, with many graduates employed by private business as well as city, regional, state and national planning agencies. Recipients of the M.S. in geography have also gone on to a variety of successful careers in various fields, including retail store location analysis, banking, and university teaching and research.

The Master of Science Degree. Admission to the master's program in geography is granted to college graduates with superior academic records. An undergraduate geography major is not required. Majors from the social, physical, and behavioral sciences and from the humanities are encouraged to apply. Incoming graduate students must demonstrate competency in cultural geography, physical geography, statistics, and cartography. If deficiencies are apparent, they must be corrected, possibly increasing the time needed to complete the degree.

Two basic plans of study exist for the master's degree. One plan requires a minimum of 30 credit hours including a thesis, the other is a 36-credit-hour non-thesis option. Plans of study can be developed to accommodate many interests. Major faculty interests include resource management, cultural and historical geography, regional analysis and development, and cultural ecology.

School of Geology

Brown Monnett Professor, Regents Professor and Head Zuhair F. Al-Shaieb, Ph.D.

Earth is the residence of the human race. It is essential to develop a better understanding of the composition, internal and external processes, that affect the Earth. Earth is an outdoor laboratory filled with opportunities to observe Earth processes in action. By applying knowledge of forces that shape the Earth, geoscientists seek to reconstruct the

past and anticipate the future. Geoscientists provide information to society for solving problems and establishing policy for resource management, environmental protection, and public health, safety and welfare.

Geology is concerned with the processes, the history, and the characteristics of the rocks and sediments that shape the Earth. Human activities, predominantly on or near the surface, have utilized rocks and rock products, mainly petroleum and metals, to contribute to the quality of life. Because the Earth is dynamic—that is, the land surface is constantly changing—knowledge of earthquakes, volcanoes, plate tectonics, floods and landslides, to name a few dynamic events, is critical to minimize human suffering and economic loss. Within geology, different specialties, such as petroleum geology, ground-water geology (hydrogeology), geomorphology (study of surface processes), structural geology, and paleontology (study of fossils), have developed.

The School of Geology offers traditional academic program services, awards B.S. and M.S. degrees in geology and conducts various outreach programs. Geology majors are provided a quality education designed to develop leadership skills and enhance employment opportunities. The School of Geology has embraced two areas with great potential for growth: sedimentary/petroleum geology and hydrogeology/environmental geology. In both areas, the school has already established a sound infrastructure—appropriate faculty appointments, laboratory and computer upgrades, and a sound record of productivity. Geology undergraduates are eligible for one of at least 10 departmental scholarships available, based on academic achievement and need. Teaching assistantships, research assistantships, and fellowships are available for qualifying geology graduate students.

Geologists are employed extensively in applied and pure research and in teaching. Applied research includes the exploration for, and development of, oil and gas fields, metallic and nonmetallic mineral deposits, and reservoirs of ground water. The geologist is well-prepared to pursue and direct environmental studies. Careers in research may be found with private employers, government agencies or universities. Teaching positions in geology are available at all levels, beginning with secondary education. As with most other sciences, more employment opportunities will be available to students with advanced training and a broad background. In general, careers as teachers in a college or university and in research are open only to those with graduate training.

Graduate Programs

Prerequisites. The student should have at least 39 credit hours in geology. Additional undergraduate requirements to enter the master's degree program include: nine credit hours of chemistry, eight credit hours of physics, and four credit hours of zoology or botany. Deficiencies in course work must be made up by the student after entering the program. The Graduate Record Examination is recommended, but not required, for admission to the program.

The Master of Science Degree. Emphasis in the master's degree program is placed on applied geology, including sedimentary/petroleum geology, hydrogeology/environmental geology, paleontology, and structural geology.

Thesis Option—This option is recommended for students planning to continue graduate studies at the doctoral level. Each candidate must complete at least 30 semester credit hours of work beyond the prerequisites. As many as 12 of these may be taken in other departments of the University upon approval by the candidate's advisory committee. Each candidate is required to write a thesis. A final defense of the thesis and the research that it documents is required of all students.

Nonthesis Option—This option is recommended for students who do not plan to continue graduate studies. Each candidate must complete at least 33 semester credit hours of work beyond the prerequisites and three semester hours for the creative component.

Students who wish to pursue the Ph.D. degree upon completion of the M.S. have the option of entering the interdisciplinary program in environmental science administered through the Graduate College. Numerous Department of Geology faculty members currently advise students seeking the doctoral degree. Funding as a teaching or research assistant may be available to assist students seeking the Ph.D. in environmental science if the thrust of their research is related to geology.

History

Associate Professor and Head
William S. Bryans, Ph.D.

History is the record, explanation and interpretation of the totality of man's activities. The study of history is unique in its concern for the role of time in human development. History enhances the individual's knowledge of self and gives perspective and deeper meaning to

contemporary events. Courses in the Department of History are intended to give the student a broad understanding of the evolution of civilizations, peoples, countries and institutions, and an insight into the meaning of this evolution, as well as to prepare graduates for many types of employment.

Because history is basic to many special fields, the department's instruction is designed to aid students interested in education, law, journalism, scientific and technical disciplines, public service and business administration. Students in colleges other than the College of Arts and Sciences who wish to pursue the study of history are encouraged to enroll in courses of interest. The Department of History offers a number of courses that satisfy General Education requirements in the social sciences and the humanities. It participates actively in the Honors Program and offers to its majors the option of pursuing a special plan of study leading to a Departmental Honors certificate. The Department of History also participates actively in the Area Studies certificate programs and in the Women's Studies certificate program.

Graduate Programs

The Department of History offers programs leading to the M.A. and Ph.D. in history. In addition to the general Graduate College requirements, the candidate for the Master of Arts or Doctor of Philosophy degree with a major in history is expected to have prerequisites of approximately 30 semester credit hours (including 18 upper-division hours) of undergraduate history courses, with an undergraduate grade-point average of at least 3.00.

The Master of Arts Degree. Admission to the master's program requires submission of scores for the verbal, quantitative aptitude, and analytical sections of the Graduate Record Examination. Candidates for the Master of Arts degree choose one of three alternative plans. Requirements common to all three plans include completion of a course (HIST 5023) in historical methods of research and writing, several graduate seminars, and a two-hour oral examination at the end of the program. Students must maintain at least a 3.00 ("B") grade-point average. An advisory committee will be appointed for each student during the first semester of enrollment. The three plans are designed for different careers, and the distinctive requirements of each are summarized below:

Plan I—(This plan is recommended for those planning to continue graduate studies at the doctoral level.) Students must complete a minimum of 30 hours of graduate courses in three fields (at least

one in United States history and one in non-United States history). These hours must include at least nine hours of seminar offered by the department (reading and/or research), Historical Methods (HIST 5023), and six hours of thesis (HIST 5000). With the consent of the advisory committee, students may substitute a field in a related discipline for one field in history. Students must take at least six hours in the related discipline. The specific courses used to comprise this field must be taken at the graduate level and have the approval of that member of the advisory committee representing the related discipline.

Fields of study include:

Ancient Mediterranean world
 Medieval Europe
 Early modern Europe to 1789
 Europe since 1789
 East Asia
 England to 1714
 Latin America
 Middle East
 Russia and East Europe
 United States to 1877
 United States since 1877
 Women's history

Students must demonstrate satisfactory reading knowledge of one foreign language.

Plan II—(Students must be pursuing applied history.) Students must complete a minimum of 33 hours of graduate courses. These hours must include at least three hours of research seminar, six additional hours of seminar offered by the department (reading and/or research), Historical Methods (HIST 5023), an internship (HIST 5030), and two hours of report (HIST 5000). With the approval of the student's advisory committee, as many as 9 of these hours may be taken in related disciplines.

Plan III—Students must complete a minimum of 36 hours of graduate courses in three fields, at least one in United States history and one in non-United States history. (See "Fields of Study" listed under Plan I.) The 36 hours must also include at least three hours of research seminar, nine additional hours of seminar offered by the department (reading and/or research), Historical Methods (HIST 5023) and a three-hour creative component (master's research paper). The creative component requirement is satisfied by the course HIST 6120, Special Studies in History. At least six hours of the course work must be in United States history and at least six hours in non-United States history. With the approval of the student's advisory committee, as many as nine of these

hours may be taken in related disciplines.

The Doctor of Philosophy Degree. Admission to the doctoral program requires a satisfactory score on the Graduate Record Examination, including the Advanced Examination in History. Each applicant must also meet Oklahoma State University requirements for the M.A. degree in history, with a grade-point average of at least 3.20 (on a 4.00 scale) in previous graduate work in history.

No definite course requirements apply to all students. Work necessary to prepare the student for his or her written and oral examinations will be indicated in a plan of study which is prepared and approved by an advisory committee. Generally, a minimum of 60 semester graduate credit hours beyond the M.A. degree with a "B" grade average for all courses is required.

The prospective doctoral student must offer four fields for examination, one of which may be a pertinent field outside of history. Students specializing in United States history must offer for examination:

1. The United States history field.
2. One chronological or topical field from the following:
 - Early America to 1787
 - Nineteenth-century United States, 1787-1877
 - Modern United States, 1877-present
 - United States economic
 - United States military
 - United States social and intellectual
 - United States South
 - United States West
3. Two fields from the following:
 - Ancient Mediterranean world
 - Medieval Europe
 - Early modern Europe to 1789
 - Europe since 1789
 - East Asia
 - England to 1714
 - Latin America
 - Middle East
 - Russia and East Europe
 - Women's history

With the consent of the advisory committee, a student may substitute for one of these fields a pertinent field outside history. At least 12 hours of graduate course work in a field outside history would normally be expected.

Students specializing in non-United States history must offer for examination:

1. Three fields from the following:
 - Ancient Mediterranean world
 - Medieval Europe

Early modern Europe to 1789
 Europe since 1789
 East Asia
 England to 1714
 Latin America
 Russia and East Europe
 Middle East Women's history

2. Any field in United States history.
3. With the consent of their advisory committee, students may substitute for one of the fields (except United States history) a pertinent field outside history. At least 12 hours of graduate course work in a field outside history would normally be expected.

Upon admission to do graduate work at the doctoral level, the student's temporary adviser is the departmental director of graduate studies. Before the middle of the student's second semester, an advisory committee is appointed to assist the student in preparing the plan of study. This committee will consist of four members of the departmental graduate faculty (one from each of the examination fields), including the student's major adviser, who acts as chairperson.

No student is admitted to candidacy until he or she has (1) demonstrated a reading knowledge in at least one foreign language; (2) completed all course work on the plan of study; (3) completed with a "B" grade graduate courses in historical methods and historiography; (4) obtained approval of a proposed dissertation topic; and (5) passed comprehensive written and oral examinations in each of the areas of concentration.

Upon admission to candidacy, the student begins work on the dissertation. Supervised by the major adviser and members of the advisory committee, the dissertation provides the student an opportunity to do original research on a topic within the major area of study. The final dissertation must be submitted to the Graduate College in accordance with the regulations contained in the "Graduate College" section of the *Catalog*. Upon completion of the dissertation, the student undergoes a final examination. Oral in nature and no more than two hours in length, the examination is primarily a defense of the dissertation.

School of Journalism and Broadcasting

Professor and Director
Paul Smeyak, Ph.D.

At Oklahoma State University, the professional areas of mass communication are grouped in the School of Journalism and Broadcasting (SJB). These areas seek to complement each other with a minimum of duplication.

A modern democratic society cannot live by its ideals if its mass media practitioners are merely competent technicians who worry less about *what* is reported to the people than *how* it is reported. Citizens must have accurate information about social, political and economic problems as well as knowledge of actions taken by government agencies at all levels. From village council to Supreme Court, there can be no exception from the rule that public business is the public's business.

To speak to people through radio, television or the printed page requires a knowledge of the people to whom one wishes to speak and an understanding of the world in which they live. Therefore, the curricula of the School of Journalism and Broadcasting are designed to offer more than training in communication techniques. Three-quarters of the SJB student's time at the University is devoted to a liberal education in the arts and sciences. At the same time, the student gains competence in a professional field through courses in the SJB.

In brief, then, the purposes of the School of Journalism and Broadcasting are:

1. To provide thorough, broadly-based professional education for the mass-media professions.
2. To encourage liberal and cultural background in the arts, literature, languages, and social, biological and physical sciences.
3. To promote scholarly research and professional performance.
4. To provide media leadership and assistance in extension and public service through high school and college educators and professional communication associations.
5. To emphasize high standards of ethics and responsibility in mass communication.

Accreditation

The undergraduate programs of study in the School of Journalism and Broadcasting are accredited by the Accrediting Council on Education in Journalism and Mass Communication.

Special Requirements

Any student who elects a specific option from those listed in succeeding pages should meet with an SJB faculty adviser as soon as possible. The ability to type a minimum of 30 words a minute and a computer course or computer literacy are required for registration in all writing courses beginning with the course *Mass Media Style and Structure* (JB 2003). In addition, competence in typing is expected of all majors in the School. Prospective students are advised to prepare for this requirement before enrolling at the University.

Advertising and Sales

Ideas ranging from the introduction of new products and services to public service messages are communicated to mass audiences through advertising. Advertising also provides the economic base for the mass media—newspapers, radio and television, magazines, cable—thus freeing them from the political control found in many countries.

Upon a strong liberal arts foundation, majors in advertising build educational experiences that prepare them for work in copywriting and layout, production, management, media selection, market analysis, sales and campaign planning. Basically, the program focuses on decision-making and problem-solving, and includes courses in marketing, psychology, sociology, management and economics. Opportunities for part-time jobs, summer internships and participation in the Advertising Club round out the student's experience.

The program is also designed for students who wish to write, sell and produce commercial messages, and to move into management or ownership positions on radio and television stations.

The program is affiliated with the American Association of Advertising Agencies, the Advertising Federation of America and the Point of Purchase Advertising Institute.

News-Editorial

News coverage today has gone beyond routine reporting on police and city hall activities. The modern newspaper or

broadcasting station tries to spotlight the diverse components of our complex society. This objective calls for writers with broad interests and special knowledge in politics, religion, science, business, economics, art and public welfare. From the ranks of these reporters come the future print and broadcast journalists.

The news-editorial program prepares students for writing and editing positions on newspapers, magazines, and trade journals, in radio and television news departments, and in book editing and publishing.

Students may combine other areas of interest and journalism to prepare for specialized work in technical writing and editing.

Journalism majors assist in the publishing of a campus newspaper, *The Daily O'Collegian*, in the newsroom of radio station KOSU, and in audio and video news programming cablecast over a local cable station. Many juniors and seniors find this work a source of revenue to assist them in the cost of their education. Advanced news-editorial students also spend one summer on an internship with a commercial newspaper or broadcasting station, and some spend the spring or fall semester on a daily newspaper. Some hold part-time jobs as campus correspondents for various publications or work for media in the Stillwater area. Part of the laboratory work in JB 3263, 3313, 4313, and 4413 is done on *The Daily O'Collegian* or other publications.

The journalism program is affiliated with the Oklahoma Press Association, Southwest Journalism Congress, Society of Professional Journalists, and the Association for Education in Journalism and Mass Communications.

Public Relations

Public relations practitioners perform a variety of tasks. As writers, they prepare news releases, speeches, trade-paper and magazine articles, texts of booklets, radio and television copy, product information and stockholder reports. They may supervise the company newspaper, magazine or newsletter, or other company communication programs.

The public relations option is related to and draws upon the news-editorial curriculum, as do the public information departments of government, business and industry. The public relations program is affiliated with the Society of National Association Publications, International Association of Business Communicators, and the Public Relations Society of America.

Radio-TV

The programs in radio-television are designed to prepare students for careers in broadcasting. They offer graduates a chance to develop abilities in announcing, production, copywriting, news, documentary, sports, sales and management.

The undergraduate degree is offered in the professional option broadcast journalism. It is intended for students who wish to write, edit and produce news, discussion and documentary programs for broadcasting stations, networks and cable companies.

The facilities of the University's color-equipped Telecommunications Center, a full-time radio station, KOSU, an electronic news-gathering laboratory (ENG), and access to a channel on local television, make it possible for majors to acquire experience along with professional studies. Radio-television is affiliated with the National Association of FM Broadcasters, Radio Advertising Bureau, Oklahoma Association of Broadcasters, Oklahoma Broadcast Education Association, National Association of Broadcasters, Broadcast Education Association and National Public Radio.

Graduate Programs

The School of Journalism and Broadcasting offers courses leading to the degree of Master of Science in mass communication. The School also cooperates with the College of Education in planning and supervising study leading to a Doctor of Education degree with emphasis in mass communication.

Prerequisites for unqualified admission to the master's program include a bachelor's degree in an area of mass communication with an overall grade-point average of 3.00. The Graduate Record Exam (GRE) is required. Potential doctoral candidates must have a bachelor's or master's degree in a mass communication area, in addition to professional experience. Graduates of a non-mass communication discipline may enter the Master of Science program, with the stipulation that they complete, without graduate credit, foundation courses relevant to career interests before they take graduate courses.

Basic emphasis is on application of current communication theories and research methods and designs to the professional aspects of mass communication. Electives in the behavioral sciences are encouraged.

Mathematics

Professor and Head Benny Evans,
Ph.D.

Contemporary mathematics is concerned with investigations into far-reaching extensions of such basic concepts as space and number and also with the formulation and analysis of mathematical models arising from varied fields of application. Mathematics has always had close relationships to the physical sciences and engineering. As the biological, social and management sciences have become increasingly quantitative, the mathematical sciences have moved in new directions to develop interrelationships with these subjects.

Mathematicians teach in high schools and colleges, do research and teach at universities, and work in industry and government. In industry mathematicians usually work in research, although they have become increasingly involved in management. Firms employing large numbers of mathematicians are in the aerospace, communications, computer, defense, electronics, energy, and insurance industries. In industry a mathematician typically serves either in a consulting capacity, giving advice on mathematical problems to engineers and scientists, or as a member of a research team composed of specialists in several fields. Among the qualities which he or she should possess are breadth of interests and outlook, the ability to think abstractly and a keen interest in problem solving.

An undergraduate specializing in mathematics will begin with calculus or sometimes with college algebra and trigonometry. Well-prepared students are encouraged to establish credit in elementary courses by passing advanced standing examinations. All majors take courses in differential equations, and linear and modern algebra and modern analysis. The remainder of the field of concentration is determined by the student's interests and future plans. Students are encouraged to acquire proficiency in computer programming and to take substantial work in related fields in which they have a special interest.

Undergraduate degree options are available to prepare students for: (1) employment in industry; (2) secondary school mathematics teaching; and, (3) graduate study in mathematics. Students choosing secondary school teaching complete all requirements for state licensure as part of this program.

Many of the more challenging positions in mathematics require study beyond a bachelor's degree. For example,

university teaching requires a Ph.D., while teaching in a junior college requires at least a master's degree and possibly a doctorate. Approximately 25 percent of the students receiving a bachelor's degree in mathematics go on to graduate work.

Graduate Programs

The Department of Mathematics offers programs leading to the Master of Science and Doctor of Philosophy degrees.

Prerequisites. A student beginning graduate study in mathematics is expected to have had, as an undergraduate, at least 18 semester hours in mathematics beyond elementary integral calculus including courses in differential equations, linear algebra and modern algebra. An applicant whose preparation is deficient may be admitted to the program, if otherwise qualified, but will be required to correct the deficiency, increasing somewhat the time required to complete work for the degree. Prospective graduate students are advised to take at least introductory courses in related fields such as physics, statistics, and computer science.

The Master of Science Degree. The department offers two programs in the Master of Science degree, one in mathematics and one in applied mathematics. Each degree requires 32 credit hours of graduate course work in mathematics or related subjects. Two of these hours are waived if a master's thesis is written. Each student must pass a comprehensive exam on the basic graduate courses of his or her program.

The Doctor of Philosophy Degree. Admission to the Ph.D. program is granted only to students with superior records in their previous graduate or undergraduate study. A minimum of 90 semester credit hours of graduate credit beyond the bachelor's degree is required for the Ph.D. degree. This may include a maximum of 24 hours credit for the thesis. Each student has an individual doctoral committee which advises the student in the formulation of an approved plan of study for the degree. Candidates for the Ph.D. in mathematics must demonstrate, by examination, a reading knowledge of one foreign language, usually French, German or Russian.

The most important requirement for the Ph.D. degree is the preparation of an acceptable thesis. This thesis must demonstrate the candidate's ability to do independent, original work in mathematics, or mathematics education.

The Doctor of Education Degree. The department supervises an Ed.D. program which is run in conjunction with the Department of Higher Education and

Administration. Course requirements are similar to those for the Ph.D., except that 12 credit hours are required in educational theory. No language exam is required. An expository thesis can be accepted.

Microbiology and Molecular Genetics

Professor and Interim Head
James T. Blankemeyer, Ph.D.

Microbiology

Microbiology is the study of bacteria, viruses and fungi and their many relationships to humans, animals and plants. Microbiologists apply their knowledge to public health and sanitation, food production and preservation, industrial fermentations which produce chemicals, drugs, antibiotics, alcoholic beverages and various food products, prevention and cure of diseases of plants, animals and humans, biodegradation of toxic chemicals and other materials present in the environment, insect pathology, and other activities which seek to control microbes, to enhance their useful activities and prevent those which are harmful. Microbiology also is the basis for the exciting and expanding new field of biotechnology which endeavors to utilize living organisms to solve important problems in medicine, agriculture and environmental science.

Microbes are also studied as living in a great variety of environments and carrying out many of the processes found in higher organisms. They are thus interesting in their own right as model systems for the study of reactions which occur in higher organisms. As subjects for research in biochemical and molecular genetics, microbes have contributed most to the current knowledge of genetics at the molecular level (microbial systems are in the forefront of genetics engineering).

Opportunities for employment exist at all scholarly levels, in many local, state and national government agencies and in varied industries. The record for employment of microbiologists has been excellent for many years and with the increased interest in biotechnology, job prospects look even brighter for the future.

Students interested in careers in microbiology should have broad interests

in the biological sciences and an aptitude for biology and chemistry. For some areas of specialization, an aptitude for mathematics and physics is also essential.

Departmental courses are designed to provide comprehensive training and the skills required for working with microorganisms, as well as a broad understanding of all aspects of microbial life. Many of the microbiology positions require graduate level studies. In addition to the B.S. degree, the department offers graduate studies leading to the M.S. and Ph.D. degrees in various areas of concentration including virology, microbial physiology, microbial genetics, microbial anatomy, immunology, and several applied areas.

Cell and Molecular Biology

Cell and molecular biology is the study of how cellular components interact to promote life processes. It includes the study of how DNA and RNA are synthesized, how genes are expressed to allow differentiation of a single-celled egg into a complex multicellular organism. Cell and molecular biologists study protein synthesis, cell ultrastructure, organelle structure and function, enzymology, and the collection of concepts and procedures commonly known as "biotechnology" or "genetic engineering."

With the advent of modern molecular biology, studies of the fundamental processes of living cells have taken dramatic strides. The cell and molecular biology major at Oklahoma State University has been designed to allow students to acquire training in a multidisciplinary atmosphere that prepares them for employment in the rapidly growing field of biotechnology. Students following this avenue of study will be well prepared to continue toward the M.S. or Ph.D. degrees at this or other institutions or to find employment directly upon graduation.

Opportunities for employment exist at all scholarly levels, in many local, state and national government agencies and in varied industries. The record for employment of cell biologists has been excellent for many years and with the increased interest in biotechnology, employment opportunities look even brighter for the future. It is estimated that between 35,000 and 50,000 new jobs in biotechnology will be created during the next five years in the San Francisco area alone, and in the Boston area approximately 20,000 individuals trained in biotechnology will be in demand.

These fields require a solid knowledge of other sciences and students should

take high school courses in mathematics, biology, chemistry and physics. Students should have broad interests in how living cells work and have aptitudes for biology and chemistry.

Graduate Programs

Programs of course work and research leading to the degrees of Master of Science and Doctor of Philosophy are offered by the department in microbiology or cell and molecular biology. Students may elect either microbiology or cell and molecular biology within the M.S. and Ph.D. program.

Prerequisites. Applicants for admission must have received the baccalaureate degree from an accredited college and must have completed a minimum of 30 semester credit hours in biological and physical sciences. The Aptitude Test portion of the Graduate Record Examination is required of all applicants. An applicant will not be accepted unless at least one member of the departmental graduate faculty agrees to act as the applicant's adviser at the M.S. level. A majority of the departmental graduate faculty must approve an applicant at the Ph.D. level.

The Master of Science Degree. In addition to the general requirements for the degree, the following departmental requirements must be met in attaining 30 credit hours with thesis. The plan of study must include six credit hours in MICR 5000 and one credit hour in MICR 5160.

All candidates for the M.S. degree are expected to attend and participate in all departmental seminars. A final oral examination covering the thesis is administered by the advisory committee.

The Doctor of Philosophy Degree. The study plan of a student entering the program with a bachelor's degree must include 30 credit hours in courses other than MICR 5000 and MICR 6000. Those entering with a master's degree must include 15 hours in courses other than MICR 6000 which were not included in the master's study plan. Three hours of MICR 5160 must be included.

Candidates for the Ph.D. degree must pass both a written and an oral qualifying examination. The final examination covering the dissertation research is given promptly after the candidate has given a public seminar on his or her research work.

Medical Technology

The program in medical technology is designed to give the student the broad general education and the highly technical skills that are required for a successful career in this important medical

science. The minimum requirement for the B.S. degree in medical technology is three years of university work and one year of clinical laboratory education (internship) in an approved school of medical technology.

Clinical Laboratory Education. For the B.S. degree and certification, the students will, after three years of university work, complete one year of clinical laboratory education (internship) in a school of medical technology accredited by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS) and currently affiliated with Oklahoma State University. Schools of medical technology at the following hospitals are currently affiliated:

Comanche County Memorial Hospital,
Lawton, Okla.

Muskogee General Hospital, Muskogee,
Okla.

St. Anthony's Hospital, Oklahoma City,
Okla.

St. Francis Hospital, Tulsa, Okla.

St. Mary's Hospital, Enid, Okla.

Valley View Hospital, Ada, Okla.

Students entering their twelve months of internship must enroll in Medical Technology Clinical Laboratory (MTCL) courses for 12 credit hours during the equivalent fall and spring semesters and for six hours during the equivalent summer session, as follows: Fall—MTCL 4117, 4125; Spring—MTCL 4236, 4246; Summer—MTCL 4325, 4351. A grade of "I" will be given for the first two semesters of internship. Final letter grades will be awarded upon receipt of the final official transcript showing final letter grades in the six MTCL courses from the school of medical technology by the University medical technology coordinator. If a student fails to complete the entire 12-month internship, no course credit will be awarded. Students will pay the regular tuition for the credit hours in which they are enrolled, except that the facilities fees will be waived for the 30 hours of MTCL courses. Students who earn a B.S. degree prior to entering hospital internship will not be required to enroll and pay tuition during internship unless they desire to earn a second B.S. degree in medical technology.

Preprofessional Courses. NAACLS requires a minimum of 16 hours of chemistry, including organic and/or biochemistry and 16 hours of biology, including immunology. The University requirement for the B.S. degree in medical technology is as follows: two semesters of general chemistry; organic chemistry and biochemistry; immunology, genetics, anatomy and physiology, and two upper-division courses in microbiology; college algebra and computer science.

Residence Requirements. Although the MTCL courses are considered to be resident credit, the student is required to complete additional resident requirements from regular on-campus courses as follows: 30 hours of resident courses, including 18 hours of upper-division courses listed under Major Requirements on the current degree requirement sheet in the *Undergraduate Programs and Requirements*.

Grade-point Average Requirements. Students, to be qualified for the B.S. degree, must earn a grade-point average of not less than 2.00 overall and 2.00 in upper-division major courses. Students with less than 2.80 overall grade-point average may find it difficult to gain acceptance to a school of medical technology under current conditions of competition.

Applications and Admission to Internship. Students should apply directly to one or more schools of medical technology about 10 months prior to the beginning date for internship. Approximately 70 percent of students applying for internship are accepted, depending upon the degree of competition in any particular year. The decision on acceptance of any applicant is entirely at the discretion of the hospital-based school of medical technology. Enrollment is limited by the size of the classes in the affiliated hospital-based programs. Satisfactory completion of the clinical laboratory education is required for eligibility to take a certifying examination. The B.S. degree in medical technology is not dependent on a passing grade on the certifying examination.

Departments of Military Studies

Coordinator Smith L. Holt, Ph.D.

In agreement with the U.S. Air Force and the U.S. Army, OSU recognizes separate departments of Aerospace Studies and of Military Science as integral academic and administrative departments of the University. These two departments are administered within the framework of the College of Arts and Sciences. The two departments provide instruction under the basic and advanced Reserve Officers' Training Corps (ROTC) programs.

Scholarships

Both the Army and Air Force ROTC offer full scholarships each year for students enrolling in the program. ROTC scholarships provide full payment of

tuition, fees and books and \$150.00 per month subsistence allowance. Additionally, OSU will provide \$2,000 each year for up to four years for selected scholarship winners. Applications for four-year scholarships may be obtained through local high school principals or advisers and the ROTC departments. Information concerning three-year scholarships may be obtained by direct contact with the ROTC departments located on campus in Thatcher Hall.

Flexibility

ROTC at OSU offers a variety of programs, giving the student considerable flexibility in charting a path to commissioning in the Army or the Air Force. Programs are designed so that individuals in all OSU colleges, departments and majors can tailor their academic/ROTC curriculum in order to attain commissioned status. Opportunities also exist in both Army and Air Force ROTC for the student to "test the water" early in his or her academic program by participating in basic familiarization courses. Those interested in learning more about ROTC at OSU, or in enrolling, are urged to contact the professor of aerospace studies or professor of military science in Thatcher Hall on campus.

Aerospace Studies

Professor of Aerospace Studies and
Head Lt Col Russell D. Miller, M.S.

The basic, four-year Air Force ROTC program consists of one classroom hour and one leadership laboratory period per week during the freshman and sophomore years. Basic courses give students a thorough background in United States Air Force (USAF) structure and history, as well as drill and ceremony, military customs and courtesies, and wear of the uniform. No military obligation is incurred by non-scholarship cadets enrolling in the freshman- and sophomore-level courses. During the spring of the sophomore year, students compete for selection into the Professional Officer Course (POC); those selected will attend either a four- or five week field training encampment during the summer between the sophomore and junior years. For students getting a late start into the Air Force ROTC program, there are both two- and three-year programs that can lead to POC entrance and eventual commissioning.

Following completion of field training, students spend at least three semesters as POC cadets; academic courses consist of three classroom hours and one leadership laboratory per week, for three

hours of credit per semester. Class work and laboratory involvement are designed to prepare the student for his or her future role as a leader in the U.S. Air Force. In addition, students are given the opportunity to gain practical leadership experience by holding various positions of responsibility in the Cadet Wing. POC cadets not on three- or four-year scholarships are eligible for partial scholarships of \$1000 per semester, in addition to \$150 per month living expense, if they maintain at least a 2.35 semester GPA.

All students have the opportunity to participate in various cadet wing-sponsored extracurricular activities during the year. These include visits to active Air Force installations to gain first-hand knowledge of the duties of junior Air Force officers; cadets are often taken on incentive flights in USAF aircraft. Cadets are also given the option to apply for numerous summer programs. These include expanded base visits, and even survival training, free-fall parachuting, and glider training programs in conjunction with the U.S. Air Force Academy.

Students who successfully complete the POC program are commissioned as second lieutenants in the United States Air Force, with a four-year obligation. Those who are selected for pilot or navigator training incur a eight-to-10-year commitment.

Military Science

Professor of Military Science and
Head LTC Charles T. Payne, M.A.

Students desiring to expand the scope of their education, while preparing for a dynamic and rewarding career as an officer in the United States Army, active duty, National Guard, or Army Reserve, choose the Army Reserve Officer Training Corps program (ROTC) as an adjunct to their chosen field of study. With courses dealing in a wide range of subjects from leadership to tactics, taught both indoors and out, the Army ROTC program produces 3,800 second lieutenants each year across the nation.

The Army ROTC program consists of a basic course and an advanced course. Students desiring to see what the program is like may enroll in up to 10 hours of military science with no commitment to the United States Army. During this basic course, emphasis is placed upon leadership, war gaming, individual skills, problem solving, rappelling, and land navigation. All lower-division ROTC courses are open to the entire University community regardless of year in school.

Students committing themselves to a commission in the United States Army

are permitted to enroll in the Army ROTC advanced course upon completion of the basic course or equivalent. The advanced course consists of 12 hours of academic work taken during the junior and senior year. In addition, participation in a five-week summer camp is mandatory. The advanced course emphasizes further development of leadership skills, offensive and defensive tactics, physical conditioning, ethics, military law, professional and basic military knowledge and skills. Additionally, advanced course students are responsible for use of required military skills as they act as assistant instructors during laboratory periods, plan leadership laboratories, plan and conduct field training exercises and are responsible for coordinating and supervising departmental extracurricular activities.

All advanced course students must satisfy directed professional military education (PME) requirements prior to receiving a commission. The PME consists of two essential parts—a baccalaureate degree and at least one undergraduate course from each of the following fields of study: military history, computer literacy, and communication skills.

Students interested in the Department of Military Science are encouraged to visit with departmental faculty members at any time for further information concerning departmental course offerings and class sequence. A number of two- and three-year scholarships are available through the department. Prior enrollment in military science is not a prerequisite for departmental scholarship application.

Music

Professor and Head
William L. Ballenger, M.A.

The music program at OSU serves students who plan careers in the field of music as well as those who desire to participate in any element of a comprehensive music program. Professional instruction prepares students for careers in performance, teaching, or the music industry. The OSU undergraduate degrees are also excellent preparation for graduate school and for church positions.

The student planning to major in music at the university level should consider his or her background carefully. It should include a strong interest in music during high school years and a talent for performance in vocal or instrumental music. Individual lessons, fundamental theory knowledge, and basic piano ability will

also be helpful.

The music major may choose from the following degrees: (1) Bachelor of Music (B.M.) in performance, (2) B.M. in instrumental/vocal music education, (3) B.M. with elective studies in business, and (4) Bachelor of Arts (B.A.) in music. In addition, the Bachelor of University Studies allows the student to combine an interest in music with another outside field.

The student majoring in a discipline other than music may participate with music majors in all ensembles (choirs, opera, orchestra, wind ensemble, marching band, concert band, jazz bands, and chamber groups) and courses, as well as individual lessons for academic credit.

An active scholarship program provides assistance to music majors as well as non-majors. Students are invited to write for audition information.

Faculty members, students and ensembles present over 100 concerts and recitals annually. The department also supports an active program of extension and outreach opportunities.

The Department of Music is accredited by the National Association of Schools of Music (NASM). Students wishing to major in music should contact the Department of Music to arrange for an entrance audition and interview.

Graduate Programs

The Department of Music offers a Master of Music in pedagogy and performance. Consult the "Master's Degree Programs" section of the "Graduate College" in the *Catalog* for general regulations and requirements relating to admission.

The Master of Music in pedagogy and performance combines the salient elements of music performance and the pedagogy of music. Its intent is to adapt to the changing complexion of today's musical world by melding the areas of pedagogy and performance into a single, functional degree.

There are two tracks of study available to students enrolled in the Master of Music in pedagogy and performance. The conducting track facilitates the development of rehearsal techniques, an understanding of the pedagogical issues surrounding ensemble building, and the shaping of conducting skills. The applied music track is designed for students who wish to hone their performing and pedagogical skills on a specific instrument.

Students accepted to the Master of Music in pedagogy and performance program are required to take a placement examination in music theory and

history prior to their first semester of enrollment. Prior to graduation, all students must pass a final oral examination.

The following classes are required for students enrolled in the conducting track: MUSI 5004, 5113, 5512, 5522, 5712, 5722, 5733, 5742, 5750, 5973. An additional six hours of elective credit must be earned toward this 32-credit degree.

The following classes are required for students enrolled in the applied music track: MUSI 4890, 5004, 5113, 5490, 5733, 5750, 5842, 5973. An additional four hours of elective credit must be earned toward this 32-credit degree.

Admission Requirements. To participate in the pedagogy and performance program, a student must first make application to the Graduate College. Prospective students must have earned a Bachelor of Music from an NASM accredited institution, or the equivalent. Students interested in the conducting track must audition on campus, or submit a videotape of their conducting, and fill out the department of music application for admission. Students interested in the applied music track must audition on campus, or submit an audiotape of a recent performance (minimum of 20 minutes of music), and fill out the Department of Music application for admission.

Financial Assistance. The Department of Music offers a myriad of assistantships with areas of specialization including music appreciation, class piano, instrumental techniques, accompanying, and music technology. Additional scholarships may be awarded through the Department of Music.

Philosophy

Professor and Head Edward G. Lawry, Ph.D.

Philosophy is an intellectual activity to be practiced and a subject matter to be studied. As an activity, philosophy seeks to analyze, evaluate, and often reformulate the ideas, principles and arguments by which experience is understood and explained and by which action is directed and justified. Every area of experience or behavior—aesthetic, political, religious, scientific or moral—is considered by philosophy. The writings produced by great philosophers are worthy of study as models of thought and as artifacts of historical influence and cultural significance. In this latter role philosophy is related to the development of every academic discipline.

Courses offered in philosophy fall into three general groups: broad introductory courses that cover a variety of topics, historical courses that proceed chronologically through a sequence of thinkers, and special topic or field courses. Some offerings combine the latter two characteristics. Few undergraduate courses are intended primarily for majors. The B.A. program in philosophy has been approved for offering at OSU-Tulsa.

Students may pursue work in philosophy as part of their general education, as a support to their major area of concentration, as a minor, as a major leading to a B.A. degree, as a second major or in connection with a graduate program. The program in the major accommodates students of three sorts. The "general" track is designed for students who wish to explore philosophy as a general path to the refinement of their thinking, writing and speaking, and a deepening appreciation of the most fundamental and guiding ideas and values of civilization. It is a very flexible program, requiring two lower-division introductory courses, two upper-division historical survey courses and 19 hours of additional unspecified philosophy courses numbered 3000 or above. The "preprofessional" track is designed for students who wish to ground their professional interests (such as law, medicine, business, public service, the ministry), on a philosophic basis. Though requirements are technically the same for these students as ones on a general track, they are assigned a second adviser who helps to coordinate curricular and other activities for the best career preparation possible. The "graduate preparation" track is designed for students who are interested in pursuing graduate studies in philosophy. It requires an additional six hours of upper-division philosophy and mandates more specific courses than either of the other tracks. Students may shift from track to track at any time in their matriculation without prejudice.

A minor or a second major in philosophy will complement any other area of study. A philosophy minor requires 18 hours of unspecified philosophy courses, 12 of which must be numbered 3000 or above.

Graduate Programs

The Department of Philosophy offers a Master of Arts degree in philosophy. Consult the "Master's Degree Programs" section of the "Graduate College" in the *Catalog* for general regulations and requirements relating to admission.

The Master of Arts degree in philosophy offers a broad-based curriculum designed to serve the interests of three kinds of students:

1. *Teaching Emphasis:* for the student who wishes to pursue his or her study of philosophy and prepare for a career teaching philosophy at a community college or small four-year institution;
2. *Professional Emphasis:* for the student who wishes to pursue his or her study of philosophy as a supplement to preparation in a wide variety of professions including business, law, government, the health professions, the ministry, or counseling;
3. *Ph.D. Emphasis:* for the student who wishes to pursue his or her study of philosophy as a preparation for Ph.D. studies in philosophy at another institution.

Students interested in the *teaching emphasis* have the opportunity to intern at a community college, take collateral courses in second areas of teaching interest, and incorporate course work in pedagogy in the College of Education at OSU. They will typically complete their M.A. requirements under the "Courses Option" (see below).

Students interested in the *professional emphasis* have the opportunity to choose from a wide variety of courses that support their career plans (biomedical ethics, business ethics, philosophy of law, philosophy of religion, and cognate courses in other disciplines). They will typically complete their M.A. requirements under the "Reports Option" (see below).

Students interested in the *Ph.D. emphasis* have the opportunity to enhance their understanding of the history of philosophy, logic, and metaphysics and epistemology. They will typically complete their M.A. requirements under the "Thesis Option" (see below).

Students in all of these programs are able to compete for teaching assistantships and may teach either Critical Thinking or Introductory Moral/Social Problems courses.

The Master of Arts degree in philosophy may be earned through any of three options: (1) Courses Option (usually 12 three-credit-hour courses); (2) Reports Option (usually 10 three-credit-hour courses and a two-credit-hour report); and (3) Thesis Option (usually three-credit-hour courses and a six-credit-hour thesis). The Courses Option requires 36 hours, the Reports Option requires 32 hours and the Thesis Option requires 30 hours.

Prerequisites for admission to the program are 24 semester credit hours (at least 18 at the upper-division level) in philosophy including courses in the history of ancient, medieval, and modern philosophy (PHIL 3113 and 3213 or equivalents) and a course in logic

(PHIL 4303 or equivalent). Students without these prerequisites, but otherwise admissible, may be granted "qualified" or "provisional" status until the prerequisites are satisfied.

All candidates for the Master of Arts in philosophy degree are required to pass a six-hour written examination on selected major Western philosophical works. This exam must be passed before a student will be allowed to begin work on either a thesis or the report and normally will be taken about two-thirds of the way through the required course work for the degree. Each student is supervised by a three-person advisory committee appointed for, and in consultation with, the student. This committee arranges and administers the written examination, and is responsible for determining the student's plan of study, thesis, report topics, and any other special requirements that may need to be fulfilled.

Master of Arts in Philosophy, Courses Option:

Thirty-six hours of course work in classes and seminars approved by the student's advisory committee and/or the graduate adviser.

Master of Arts in Philosophy, Reports Option:

1. Thirty hours of course work in classes and seminars approved by the student's advisory committee and/or the graduate adviser.
2. Two hours of PHIL 5910, in which two research papers are prepared. These papers typically will have their origin in graduate seminars taken as part of the plan of study, or in classes related to the professional field the student wishes to enter.
3. An oral examination and defense of these reports required in a formal presentation to the departmental faculty and additional invited persons with interest or expertise in the topics.

Master of Arts in Philosophy, Thesis Option:

1. Twenty-four hours of course work in classes and seminars approved by the student's advisory committee and/or the graduate adviser.
2. Six hours of PHIL 5000, in which a well-reasoned, substantial piece of research on a narrowly defined topic is written as a thesis.
3. An oral examination and defense of the thesis before the departmental faculty and additional invited persons with interests or expertise in the topic.

A student may also, in accordance with the policies of the Graduate College, select a graduate minor in connection with any of the three programs, thus permitting a concentration of work in

broad areas such as social thought, cognitive science, or religion. Interdisciplinary work is encouraged for students pursuing the Professional Emphasis and the Teaching Emphasis.

Under the auspices of the Department of Educational Administration and Higher Education (EAHE) and with the cooperation of the Department of Philosophy, a student can earn the degree of Doctor of Education in higher education with special emphasis in philosophy. General requirements concerning the Ed.D. in higher education are listed in the "Doctor of Education" and "Educational Administration and Higher Education" sections of the *Catalog*.

Departmental acceptance is required for admission to the M.A. program and the Ed.D. program. Persons who meet the stated prerequisites for the M.A. degree are encouraged to apply directly to the Graduate College for admission. Applications are forwarded to the department for evaluation and recommendation of admission status. Persons interested in the M.A. program but who do not meet the prerequisites should contact the head of the department prior to application. Application for admission to the Ed.D. program must be initiated through the Department of Educational Administration and Higher Education.

Students pursuing a master's or doctor's degree in another field may elect philosophy as a graduate minor. Selected courses and seminars in philosophy can broaden and complement work in such areas as economics, education, engineering, English, history, psychology, and sociology.

Physics

Regents Professor and Head
Stephen W. S. McKeever, Ph.D.

In today's technological society, professionals in many diverse fields need to possess critical skills of observation and quantitative evaluation. Increasingly, persons trained in physics can be found in career positions in finance, medicine, business and many other fields where analytical skills are now a necessity for competitive survival. The program in physics at OSU is aimed at developing these skills in both experimental and theoretical settings. Curriculum plans are available for degrees in fundamental physics, or in applied programs that combine physics with biology, business, computer science, engineering, mathematics, premedicine, and others.

During the first two years, the physics program provides a basic, quantitative

and intuitive understanding of the physical world, from the classical ideas of Newton and Maxwell to the modern relativistic and quantum laws of Einstein and Schrodinger. At the same time, mathematics and computer skills are developed in application to physical problems. After two years, a student in the physics program may elect to pursue more advanced courses in theoretical and experimental physics, leading to a B.S. degree in physics and graduate studies in physics, or a related field. Alternatively, the student may elect to replace certain upper-division physics courses with upper-division courses in one of the above mentioned fields, leading to a B.S. degree in applied physics.

Continued communication, beginning with the student's first semester in the Department of Physics, establishes a productive rapport between the physics major and his or her faculty adviser. A physics minor is also possible and the requirements can be obtained from the department head.

Graduate Programs

Prerequisites. Thirty semester hours of physics beyond the elementary course work, and mathematics courses through advanced calculus and differential equations are required.

The Master of Science Degree. Students can choose between a thesis or non-thesis option. The thesis option requires the successful completion of 30 semester credit hours beyond the B.S. and the submission of an acceptable thesis (six credit hours of PHYS 5000) based on original and independent research, on a topic chosen in consultation with the student's adviser. The student must successfully defend the thesis in an oral examination. In addition, nine semester credit hours of electives must be completed in physics, mathematics or an allied field. The non-thesis option requires 32 semester credit hours beyond the B.S. degree, including a one credit hour seminar program, and two credit hours of library research (PHYS 5000) on a topic chosen in consultation with the student's adviser. The completed written report must be orally presented to the student's advisory committee. Fourteen hours of electives are allowed within this program, including up to nine credit hours of senior level courses, depending upon the student's background. For both options, the required courses are PHYS 5113, 5313, 5413, 5453 and 5613. The electives must be chosen in consultation with the student's advisory committee. For example, an advanced course in mathematics along with Solid State I and II may be reasonable choices for someone

with a materials specialization. For others, more courses in electrical engineering may be preferable.

Also available is an M.S. program in photonics, with a specialization in physics, offered through the interdisciplinary M.S. in natural and applied sciences major, in association with the departments of chemistry and electrical engineering. Students may pursue one of three options, all of which require 24 credit hours of course work with at least one course taken outside the student's specialization. Beyond this, the first option (30 credit hours) requires an additional six hours of research and a successful defense of a thesis. The second option (32 credit hours) requires an additional six hours of course work and a two-credit-hour report. The third option (36 credit hours) requires 12 additional credit hours of course work with a creative component. For the second and third options at least two courses must be outside the field of specialization and a successful oral presentation of the report or creative component may be required.

The Doctor of Philosophy Degree. Prior to the appointment of the advisory committee, as described in the "Graduate College" section of the *Catalog*, a comprehensive written examination must be taken. This examination will cover the content of the course work required up to and including the M.S. degree, and will be given once a year. It will be given in four parts of three hours each. The results of this examination will be included in a review by the Department of Physics to determine whether the student should be admitted to Ph.D. candidacy.

The following physics courses are required: PHYS 5213, 5313, 5413, 5453, 5613, 6313. Four additional PHYS prefix courses at the 5000 or 6000 level, including at least one course not in the student's specialization, must be completed. Additional courses reflecting the candidate's specialization may be required by the advisory committee. Ninety semester hours of credit beyond the bachelor's degree are required. A minimum of two-thirds of the graduate course credits must be in physics. No more than six credit hours of physics at the 4000 level can be counted toward graduate credit and no more than 12 total credit hours in all subjects at the 3000 or 4000 level can be counted toward graduate credit. Courses taken at another institution will be evaluated by a faculty committee to determine whether they satisfy any requirements.

The most important single requirement for the Ph.D. in physics is the presentation of an acceptable dissertation which represents original research work by the student and which demonstrates the

student's ability to do independent study as well as to plan and carry out future research in his or her field.

Political Science

Associate Professor and Head
Michael W. Hirlinger, Ph.D.

Political science is, on the one hand, an ancient discipline with roots in Plato and Aristotle, and on the other, it is one of the most recent of the social sciences with roots in the early twentieth century. Political scientists study political institutions, the political behavior of individuals and groups, the formulation of public policy, the relations among states, and also enduring moral issues, such as what is justice and how leaders should be chosen. Political science by its very nature blends normative and empirical issues. Questions about democracy, participation, justice and representation have both empirical and evaluative components. It attempts to understand who participates in the political process and, when they do not, what it means for a democratic society. There is fundamental rethinking of the relations between the executive branch and the legislature, the distribution of power between the national and state governments, and the policy and budget priorities of the American people. It is a fascinating period in American political history and a major in political science offers the student a front row seat in the analysis of these changes.

The principal fields of study in political science are political theory, public law, comparative politics, international relations, public administration, and American political behavior. Students may pursue the Bachelor of Arts (45 hours of political science and related course work in addition to General Education and college requirements), or the Bachelor of Science degree (51 hours of political science and related course work in addition to General Education and college requirements) in political science with a concentration in any of the fields of study. Either degree option requires a minimum of 24 hours of political science courses numbered 3000 or above. Additional courses numbered 3000 or above from related areas of economics, English, foreign languages and literature, geography, history, philosophy, psychology, religion or sociology are necessary to reach the required hours of the degree option. The minimum GPA is 2.50 with a minimum grade of "C" in all upper-division political science and related upper-division course work.

Additional flexibility in the degree program is offered through internships and opportunities to work with professors in developing independent study courses in areas where the department may not offer regular courses work. Students may also pursue political science as a second degree or as a minor to complement other areas of study. The minor in political science requires 15 hours of course work numbered 3000 or above, and must include three fields of political science. At least three of the hours must be taken in a field other than American politics, public law, and public administration. The required GPA is 2.50.

The political science major prepares the student for a wide range of careers, including administration of national, state and local government agencies; preparation for admission to law school; teaching at the secondary level; urban and regional planning; political journalism; the conduct and analysis of foreign policy; and preparation for graduate study in political science. At a more general level, political science has great career versatility for students. While the major does focus on the subject matter of government and politics, it also develops students' critical analysis, effective written and oral communications, leadership and judgment. Such skills, along with a substantive knowledge of government and politics that are central to all aspects of activity, prepare students for a wide range of options throughout their professional lives.

Graduate Programs

Candidates for the Master of Arts degree in political science may choose from three plan options. Plan A is a traditional political science option that permits specialization in two areas of political science offered by the department. Students may choose from the following six areas: American politics, comparative politics, international relations, public administration, public policy, and women and politics. The plan is designed to prepare professional political scientists for careers in research and teaching, as well as government and public service. Plan B is for students interested in public administration. The objective of this plan is to prepare students for careers in administrative and policy positions in local, state or national government. Plan C is a specialization in fire and emergency management. This program is designed to provide an educational foundation for those who are currently serving or aspire to serve as managers or administrators in fire services or emergency management.

Admission Requirements. Any student having a bachelor's degree with an overall 3.00 grade-point average (on a

4.00 scale) is admitted as a student in full standing. Those with less than an overall 3.00 grade-point average are considered for admission on a probationary basis. The Graduate Record Exam (GRE) is not required. As a prerequisite course, all graduate students must have completed an undergraduate statistics class, or must be willing to take such a class during their first semester as a graduate student.

A complete application for admission to the master's program must include:

1. A completed Graduate College application submitted with a non-refundable application fee.
2. An official copy of undergraduate transcript(s).
3. Two letters of recommendation with at least one from an employer or faculty member familiar with the applicant's academic abilities.
4. TOEFL results for students for whom English is a second language. Students must have a score above 549 to be considered for admission.
5. A brief letter indicating interests and other information the applicant considers relevant.

Degree Requirements. In addition to the general requirements of the Graduate College, requirements for the Master of Arts degree with a major in political science are listed below.

Plan A: Government, Politics and Policy.

1. A minimum of 33 credit hours in political science or closely related courses, including three hours of quantitative methods. A minimum of 18 hours of political science graduate seminars (seminars numbered 5000 or above); either a six-hour thesis or a three-hour creative research paper; and additional graduate level courses in political science to complete the 33-hour requirement. The student must successfully defend the thesis or creative component orally before the faculty committee.
2. Satisfactory completion of three-hour comprehensive exams in the last semester of the student's program in two of the following areas: American politics, comparative politics, international politics, public administration, public policy, or women and politics.
3. Minimum 3.00 grade-point average, with only one grade of "C" allowed.

Plan B: Public Administration and Public Policy.

1. A minimum of 36 credit hours in political science or closely related courses; either a six-hour thesis or a three-hour creative research paper; and the following required courses: Seminar in

Public Program Evaluation, Seminar in Public Management, Seminar in Public Policy Analysis, Seminar in Public Organizations, and Seminar in Public Personnel Administration.

2. An optional three-to-six-credit hour internship.
3. Satisfactory completion of a four-hour comprehensive exam in the last semester of the student's program.
4. Twelve to 15 hours for an area specialization tailored to the needs of the student, that can include courses taken outside the department.
5. Minimum 3.00 grade-point average, with only one grade of "C" allowed.

Plan C: Fire and Emergency Management.

1. A minimum of 39 credit hours in political science or closely related courses; completion of a three-hour practicum that represents the student's creative component; and the following required courses: Readings in Public Administration, Seminar in Public Organizations, Seminar in Public Program Evaluation, Seminar in Public Budgeting and Finance, Seminar in Public Management, Seminar in Public Personnel Administration, Seminar in Public Policy Analysis, Seminar in Quantitative Methods, and Seminar in Fire and Emergency Management.
2. An optional three-credit hour internship.
3. Satisfactory completion of an assessment center.
4. Nine hours of electives to complete degree requirements.
5. Minimum 3.00 grade-point average, with only one grade of "C" allowed.

Pre-law. Many degrees are applicable. See "Arts and Sciences Special Academic Programs—Pre-law."

Premed and Pre-vet. Many degrees are applicable. See "Arts and Sciences Special Academic Programs—Preprofessional Programs in the Health Professions."

Psychology

Associate Professor and Head
Maureen A. Sullivan, Ph.D.

The student pursuing a B.A. or B.S in psychology is provided with a background which can be of great value in dealing with the personal, social and vocational areas of his or her life. The course of study applies the scientific method to the study of the behavior of an individual and behavior between individuals. The understanding of such ma-

terial can be directly related to functioning in a job or career.

A bachelor's degree in psychology is useful in a wide number of occupations in business, education and industry. The range of positions obtained by graduates covers almost all occupations requiring direct personal contact with other people. Some examples are supervision, training, sales, public relations and interviewing. Also included are positions with city, state and federal agencies, and in applied research. Although there is no licensure or certificate to teach psychology in the schools, it is possible to get a teaching certificate or licensure in social studies education with endorsement in psychology while pursuing a major in psychology. Persons interested in such teaching should contact the Office of Teacher Education. (See "Teacher Education Programs" in the "College of Education" section of the *Catalog*.)

Graduate Programs

Employment in the professional field of psychology requires a graduate degree. Psychologists with advanced degrees have exclusive claim to some professional positions.

The Department of Psychology offers two programs of study leading to the degree of Doctor of Philosophy, one in clinical psychology and one in experimental psychology. Students applying for the doctoral degree should have the following prerequisites: introductory psychology, quantitative psychology, experimental psychology, history and systems. Abnormal psychology is recommended for students applying to the clinical program.

Students in the doctoral program first work toward a Master of Science degree. In addition to meeting the general requirements of the Graduate College, for completion of the Master of Science, students must also:

1. Complete two semesters of quantitative psychology along with other course credits totaling 30 credit hours.
2. Complete a thesis project, supervised and reviewed by appropriate faculty members.

Following the completion of requirements, the student may be admitted to doctoral status in clinical psychology or experimental psychology.

Religious Studies

Professor Bruce C. Crauder, Ph.D.

Courses in religious studies are a vital part of a liberal arts education. The field involves the objective study of religious belief, literature and practice around the world. Opportunity is given for serious and objective study of these aspects in relation to major religions of past and present cultures. Special attention is given to the historical bases of world religions as well as to their effect upon present-day societies, in both the East and West. Courses are offered in several world religions, biblical studies, religious thought, and religion and culture.

Courses are open to all students without regard to personal views or affiliations. No attempt is made to promote a particular view. Emphasis is placed on the academic study of religion rather than the practice of a particular form of religion. The undergraduate courses enable students to satisfy humanities requirements and also provide an excellent background for many types of graduate and professional programs.

Sociology

Professor and Head Patricia A. Bell, Ph.D.

Sociology is the scientific study of human society and social behavior. As such, sociologists study a broad array of social phenomena ranging from the dynamics of social interaction to the composition and workings of entire societies.

Many different points of view are represented in the areas of expertise of the departmental faculty. The diversity of the faculty is reflected in many different types of courses offered. Topics include community organization, criminology and corrections, gerontology, social problems and deviance, environmental sociology and population studies, social psychology, race, ethnicity and gender issues, industry and work, and rural sociology. The department also offers courses in anthropology. The department emphasizes pure as well as applied research. Many undergraduate majors elect to have supervised work-related internship experiences in work settings of their choosing.

Course offerings in anthropology provide students with a basic introduction to concepts and principles of physical anthropology, archeology and cultural anthropology. Regular course offerings

include an emphasis on North American Indian cultures and archaeology. Other courses deal with anthropological methods and theory.

The Department of Sociology offers B.A. and B.S. degrees in general sociology and applied sociology. The general sociology degree provides students the opportunity to obtain a strong liberal arts degree with a maximum number of electives, and provides a good base for pursuing a professional or graduate degree in sociology and in several other fields of study. The applied options provide practical experience for work in research and data analysis, the helping professions, and fields dealing with social problems.

Graduate Programs

The Department of Sociology offers the Master of Science and Doctor of Philosophy degrees. Programs are designed to prepare students for appointments to the faculties of colleges and universities, to work in private industry and in social service agencies, and for research positions in business and in government. The department offers concentrations in environmental sociology, social inequality, complex organizations, deviance and criminology, and social psychology. The department also offers a Master of Science degree with special emphasis in corrections.

The department offers employment to a limited number of graduate students as teaching assistants or as research assistants. These teaching and research experiences constitute an invaluable part of the student's professional preparation.

Admission Requirements. Students seeking admission to graduate programs in sociology must be accepted by the Graduate College and the departmental graduate committee prior to official admittance. A combination of several criteria are used to evaluate an applicant's suitability for full admission to either of the programs. These include grade-point average, Graduate Record Examination scores, and letters of recommendation. Conditional or probationary admittance is considered under specified circumstances. Details on admission criteria are provided in the departmental *Graduate Student Manual* that can be obtained by contacting the Department of Sociology or the director of graduate programs.

Degree Requirements. The M.S. in sociology requires a minimum of 30 hours of course work. For students pursuing a specialty area in corrections, a minimum of 33 hours is required. For students pursuing the Ph.D., a minimum of 90 semester credit hours beyond the baccalaureate, or 60 hours beyond the

master's degree, is required. Each student is required to take nine hours of sociological theory, six hours of research methods, and nine hours of statistics. In addition to the 90 semester credit hour requirement beyond the baccalaureate degree, the doctoral candidate must satisfy either a foreign language or international studies component. Detailed information on each program is available by writing to the department and requesting a *Graduate Student Manual*.

Speech Communication

Courses in speech communication enhance the student's ability to effectively communicate in interpersonal, small group, organizational and public contexts. The department stresses both conceptual knowledge and practical application. B.A., B.S. and M.A. degrees are offered. Speech communication graduates are well-prepared to begin careers in business and industry, or to enter graduate or professional schools.

Graduate Programs

Prerequisites. To enter the program, the student should have a minimum of 12 semester credit hours of undergraduate courses in speech communication or the equivalent.

Admission Requirements. Applicants normally should have at least a "B" grade-point average at the undergraduate level and strong recommendations from those familiar with the student's previous academic background.

Program Requirements. The complexity of today's society requires an individual capable of solving a wide range of problems. To meet this need, the speech communication graduate program aims at producing: (1) individuals capable of fulfilling the role of a communication consultant or interventionist within governmental, business and industrial, public service, educational and community organizations; (2) individuals capable of using methods and procedures of the behavioral sciences in investigating and solving practical as well as theoretical problems in communication; (3) individuals with the background to pursue graduate degrees in speech communication or other professional degrees; and (4) competent teachers of communication for two-year and four-year colleges as well as the common schools.

The student may earn the Master of Arts degree under one of the following plans:

Plan I—A minimum of 24 semester hours of speech communication courses and a thesis for which six credit hours is earned.

Plan II—A minimum of 30 semester hours, no fewer than 24 of which must be in speech communication, and a project for which two hours may be earned.

Plan III—A minimum of 36 semester hours, no fewer than 24 of which must be in speech communication, with no thesis or project.

The plan that a student chooses must be approved by the graduate faculty of the department.

Examinations. The student following Plan I must pass an oral examination over his or her thesis. The student following Plan II must pass a written and oral comprehensive examination, and an oral examination over his or her project. The student following Plan III must pass a written and oral comprehensive examination.

Statistics

Professor and Head
William D. Warde, Ph.D.

Statistics is the science of learning from data. It is concerned with the development of theory and with the application of that theory to the collection, analysis and interpretation of quantitative information.

Because statistics is important in many scholarly disciplines, a degree in statistics provides the opportunity to enter not only the statistics profession but also many other fields which make extensive use of statistics. The areas of application include agriculture, the biological sciences, engineering, the physical sciences, the social sciences, education, business and home economics, among others. Statistics also promises to be important in emerging endeavors such as pollution and environmental research, energy utilization and health-care administration.

Those who pursue the study of statistics should be interested in scientific inquiry and should have a good mathematical background. In addition it is desirable that they have a genuine interest in some other subject which uses statistics.

Careers in government, industry and education, involving the disciplines previously mentioned, are open to the

statistics graduate. In government and industry a statistician usually serves as a researcher or as a consultant to research scientists and decision-makers. In education, of course, the teaching function is added to those of research and consultation. In almost all careers, the statistician uses the computer.

The Statistical Laboratory operates within the department to provide statistical consulting to researchers—both faculty and student—across the campus.

The Department of Statistics offers the B.S. and M.S. degrees to those interested in applications of statistics, and the Ph.D. degree to those who wish to make original contributions to the theory of statistics.

Graduate Programs

Admission Requirements. It is necessary to have an undergraduate degree, not necessarily in statistics or mathematics, to begin a program of study toward the master's degree in statistics. In some instances, it may be advantageous to have an undergraduate degree in another field. However, the student should have acquired a good mathematical background as an undergraduate. This should be equivalent to the required mathematics courses in the bachelor's program (MATH 2145, 2155, 2233, 3013, 4013). Students admitted to the program with deficiencies will be required to remedy such deficiencies.

The Master of Science Degree. The Master of Science degree in statistics may be completed by following one of the three plans listed in the "Graduate College" section of the *Catalog*. Normally, the all-course work plan will be initiated at the suggestion of the faculty. Each student will be required to attain an introductory knowledge of some field of application outside of statistics, mathematics and computer science. This requirement may be satisfied by having taken a three-hour graduate course in an approved field of statistical application. Each student is required to have completed CS 2113 or to have demonstrated competence in a procedure-oriented language such as FORTRAN.

The Doctor of Philosophy Degree. The Ph.D. requires the completion of 90 hours beyond the B.S. degree. A maximum of 30 of these credit hours may be earned by research for the dissertation. Each student will be required to attain an introductory knowledge of some field of application which may be satisfied by taking two three-hour graduate courses outside the fields of statistics, mathematics and computing. Each student is required to have completed CS 2113 or to have demonstrated competence in a

procedure-oriented language such as FORTRAN.

Theater

Associate Professor and Head
Bruce Brockman, M.F.A.

The program in theater provides broad-based course work and practical experiences in all areas of the art form. The degree program emphasizes professional theater training in the context of a liberal arts education. In addition to a strong core of general theater courses, students may elect a specialization in acting/directing or design and technical production.

Course work is augmented by an active production program in two well-equipped theater spaces. The regular production schedule consists of four major productions each year and two to four fully mounted studio productions that are directed, designed and performed by students. Students also have the opportunity to study with a variety of guest professional artists during each academic year.

In addition to professional careers in theater, the study of theater can lead to careers in arts management, teaching, law, counseling, or any career area where self-awareness, problem solving, group collaboration and effective personal communication are essential.

Graduate Programs

The department offers work leading to the Master of Arts degree in speech. The enrollment in the program is typically small, allowing a great deal of individual contact with faculty members and considerable latitude in developing the plan of study.

Students are trained in all aspects of the discipline with the aim of producing graduates: (1) who will be effective teachers and artists in two- and four-year colleges as well as secondary schools; (2) who are artists and/or technicians highly qualified for professional positions; or (3) who have the appropriate background to pursue further study toward M.F.A. or Ph.D. degrees.

The Master of Arts degree may be achieved in accordance with any of the three plans described in the section "Master's Degree Programs" in the "Graduate College" section of the *Catalog*.

A limited number of teaching and technical assistantships are available to highly qualified students. Information and

application forms may be obtained from the department head.

Undergraduate credentials should be referred to the department head for evaluation to assist advisement and to determine any possible deficiencies which will affect the admission status.

Zoology

Professor and Head
James H. Shaw, Ph.D.

The Department of Zoology offers B.S. degree programs in biological science, physiology, wildlife and fisheries ecology, and zoology.

The degree in biological science is available for students wishing to obtain a broad program encompassing all of the life sciences. By including appropriate course work, students can obtain licensure to teach in the secondary schools. Requirements for admission to graduate school, as well as dental, medical and other health-related professional schools can be met through the biomedical option of the biological science degree.

The undergraduate degree in physiology also serves as preparation for graduate school or a medically-related professional school. The bachelor's degree in physiology requires participation in undergraduate seminars and course work in general biology, genetics, gross and microscopic anatomy, mammalian and cellular physiology, mathematics, physics, and chemistry.

The wildlife and fisheries ecology undergraduate program involves comprehensive study in the conservation of renewable natural resources, with an emphasis on the optimum balance between wild animal populations and habitat requirements. Courses in the wildlife and fisheries program fulfill the requirements for many other applied and professional careers in wildlife ecology, including preparation for graduate programs. Undergraduates majoring in wildlife and fisheries ecology may choose a degree emphasis from communications, fisheries, management/research or wildlife management/research areas. In communications, biological training is combined with course work in journalism, social sciences and the uses of electronic media. Management/research emphasizes applied wildlife and fisheries ecology and offers excellent preparation for graduate study.

The B.S. degree curriculum in zoology is designed to provide a background in biology with specialization in that area of zoology in which the student wishes to

focus. The B.S. degree requires courses in cell biology, ecology, evolution, genetics, and vertebrate and invertebrate zoology. To become a zoologist the student must also have a good foundation in the related fields of chemistry, physics, mathematics and botany. Zoology provides a background for graduate school, and for many applied and professional careers.

Graduate Programs

Programs of Study. Programs of study leading to M.S. and Ph.D. degrees are offered in wildlife and fisheries ecology, zoology and zoology-physiology. The department emphasizes (1) wildlife and fisheries ecology and conservation, (2) aquatic and terrestrial toxicology, and (3) ecology, evolution and behavior. Specializations of faculty include animal behavior, behavioral ecology, cellular physiology, cytogenetics, developmental biology, ecology, ecotoxicology, evolution, fisheries biology, herpetology, ichthyology, limnology, mammalogy, membrane physiology, molecular systematics, parasitology, physiological ecology, reproductive endocrinology, teratology, and wildlife nutrition. The department includes the Water Quality Research Laboratory and the Cooperative Fish and Wildlife Research Unit.

Teaching and research assistantships and out-of-state tuition waivers are available to qualified students. Information and application forms may be obtained from the departmental office.

Prerequisites. Applicants must have completed a baccalaureate degree including 40 semester hours in biology and related areas and have completed the Graduate Record Examination including the advanced test in biology.

The Master of Science Degree. In addition to the general Graduate College requirements, students are required to show competence in either a reading knowledge of a foreign language or a relevant research technique such as statistics, mathematics, or computer science. Students must prepare research proposals and complete either a thesis or a report. For the thesis option, 30 credit hours are required; for the report option, 32 credit hours. The plan of study must include at least two credit hours in a graduate seminar.

The Doctor of Philosophy Degree. In addition to the general Graduate College requirements, students are required to show competence in either a reading knowledge of a foreign language or relevant research technique such as statistics, mathematics, or computer science. This requirement is in addition to the competence demonstrated for the

M.S. degree. The plan of study must include 60 credit hours and at least four credit hours in a graduate seminar. A student must pass written and oral examinations, prepare a research proposal, and complete a dissertation based on original research worthy of publication.

Financial Aid. The department employs more than 30 graduate teaching assistants, and faculty members award approximately 20 research assistantships. Out-of-state students receiving either award are assessed in-state tuition. Students completing packets available from the Office of Scholarships and Financial Aid are eligible to compete for in-state tuition waivers. The application deadline is February 15.

Research Facilities

Oklahoma State University owns and operates the 19,364 acre Lake Carl Blackwell area, including a 3,380 acre lake, the Cross Timbers Experimental Range, and a captive animal facility. All are available for field studies. The department maintains laboratories in wildlife nutrition, flow cytometry, wildlife immunology, fish and wildlife toxicology, genetic toxicology, geographic information systems and remote sensing, and water quality. Specialized equipment within the department includes atomic absorption spectrophotometer, ultraviolet and visible spectrophotometer, spectrofluorometer, ion chromatograph, high pressure liquid chromatograph, liquid scintillation counter, ultracentrifuge, chromatograph-mass spectrophotometer with computerized data systems, ion specific electrodes, freeze dryer, tissue culture facilities, bright field and epifluorescent microscopes, workstation and PC computer lab, photo microscopy, and many other items. The University Library contains more than 1.4 million volumes and has computerized literature search systems.

Cooperative Fish and Wildlife Research Unit. The Oklahoma Cooperative Fish and Wildlife Research Unit has been affiliated with the department since 1948. Research is conducted on a wide variety of fisheries and wildlife topics in cooperation with the Oklahoma Department of Wildlife Conservation, U.S. Geological Survey's Biological Resources Division, and others. The Unit is designed to provide these cooperators with useful information on resource management issues. Students receiving support from the Unit enter one of the departmental graduate programs.

Ecotoxicology and Water Quality Research Laboratory. The Ecotoxicology and Water Quality Research Laboratory (EWQRL), affiliated with the Department

of Zoology, provides a unique combination of research and service in environmental quality problems related to water and soil toxicology. It serves researchers at OSU and other universities, individual citizens, industries, municipalities, state and federal government agencies, and has achieved national recognition. Specifically, the EWQRL conducts freshwater aquatic toxicity tests to meet NPDES biomonitoring compliance for industries and municipalities, customized bioassays in water and soil to meet research needs, field assessments of contaminated sites, and chemical analyses of water, soil sediment and tissue samples. Students in zoology, environmental sciences, and civil engineering have the opportunity to conduct research through the EWQRL.

College of Business Administration

Gary L. Trennepohl, Ph.D., Dean

**Gerald M. Lage, Ph.D., Associate
Dean**

**Margaret A. White, Ph.D., Associate
Dean**

**Julie L. Weathers, Ed.D.,
Director of Extension**

**Craig B. Robison, Ed.D., Director
of Student Academic Services**

Today's business world is one of excitement and challenge. It offers individuals a challenging professional future as well as an opportunity for meaningful social involvement and civic service. The mission and goals of the College of Business Administration (CBA) are guiding principles to help the College prepare students to meet the demands of new developments in technology, economics and innovations in management techniques and social responsibility. The students of the CBA are provided the opportunity for specialized study in selected areas of business.

The mission of the College of Business Administration, with internationally recognized areas of excellence and innovation, is to serve its stakeholders through its role as a professional college in Oklahoma's comprehensive land-grant university. The following six goal statements help direct the strategic thrusts of the College.

1. To prepare undergraduate, master's and doctoral students to excel in professional careers and leadership roles in a dynamic environment.
2. To conduct and publish scholarly research.
3. To develop and provide life-long learning programs that serve the needs of professionals.
4. To build strategic partnerships that support the College's mission.
5. To utilize leading-edge technologies in the pursuit of excellence in College activities.
6. To create and disseminate knowledge that is of value to stakeholders and that fosters the economic vitality and development of Oklahoma.

The CBA provides students with a broad educational experience by including studies in social sciences, communications, humanities, fine arts, natural science and mathematics. In addition,



the student is provided with an understanding of the functions of business and how they integrate within organizations.

Accreditation

The College of Business Administration at Oklahoma State University is fully accredited by the International Association for Management Education (AACSB), the only recognized accrediting organization for schools of business at the university level.

High School Preparation

Although a sound high school program is adequate preparation, prospective business students will benefit from a strong background in English and mathematics. Also, course work in history and government, science, geography, computer science, foreign language and public speaking will be quite valuable.

Scholarships

Oklahoma State University has an extensive scholarship program for entering freshmen, and applications should be sent to the OSU Financial Aid Office by February 1 during one's senior year in high school. College of Business Administration scholarships are primarily reserved for sophomores, juniors and seniors. Scholarship awards are based on academic performance, leadership and need.

Academic Advisement and Enrollment Procedure

Freshmen will plan their study in conference with a staff adviser in the Office of Student Academic Services of the CBA.

All students should tentatively select a major during their sophomore year. Each student will then be assigned to a faculty adviser from the major field of study. Thereafter, counseling will be provided by the assigned faculty adviser.

The dean and associate dean, as well as the director of the Office of Student Academic Services, are available to all students for counseling on special problems.

Academic Programs

Undergraduate Programs. *The Bachelor of Science in Business Administration* degree is offered by the four departments and one school of the College. Departmental majors are listed below.

Accounting, with a major in accounting.

Economics and Legal Studies in Business, with majors in economics and an option in business economics and quantitative studies; general business; and agribusiness. An option in prelaw is available with a degree in either economics or general business.

Finance, with a major in finance and an option in commercial bank management.

Management, with majors in management with an option in human resource management; management information systems; and management science and computer systems.

Marketing, with a major in marketing and international business.

Graduate Programs. *Master's Degrees.* Two types of master's degrees are available to students desiring to do advanced work in the business area. One of these is the *Master of Business Administration* degree (which allows concentrations in management, management science and computer systems, marketing or finance) and the other is the *Master of Science* degree, which requires completion of a graduate major in accounting, economics, or management information systems/accounting information systems. In

addition, a Master of Science in telecommunications management draws on the expertise of the College of Business Administration, College of Arts and Sciences, and College of Engineering, Architecture and Technology. Only persons admitted to a graduate degree program may take graduate courses in the College of Business Administration.

Doctor of Philosophy Degree. Graduate work toward the Doctor of Philosophy degree with a major in economics is offered in the Department of Economics. Graduate work toward the Doctor of Philosophy degree with a major in business administration is offered in the departments of Finance, Management, and Marketing and the School of Accounting.

Placement Service

Representatives of more than 100 business and industrial concerns and governmental agencies annually interview graduating seniors of the College of Business Administration.

General Education Requirements

The minimum general education requirements are summarized as follows: not less than 40 semester hours, including six hours of English composition, and 34 hours in the breadth areas. These include: six hours in American history and government and six hours in each of the areas—Social and Behavioral Sciences, Humanities, and Analytical and Quantitative Thought, and four hours in the area of Natural Sciences. No more than 18 of the 34 hours meeting breadth requirements may be in disciplines directly supportive of the major.

Two other requirements include: an "International Dimension" and a "Scientific Investigation" component. These may be met in any part of the student's program, and thus do not necessarily add to the number of hours required. The International Dimension simply requires each student to learn something about cultures and societies outside the United States. The Scientific Investigation requirement involves some kind of laboratory experience with student involvement. More detail concerning these and other requirements is found in the next section, "Lower-division Requirements."

Lower-division Requirements

Work in the freshman and sophomore years is planned in such a way as to give the student basic information in the general areas of (1) behavioral and social sciences, (2) communications,

(3) humanities and fine arts, (4) natural science and mathematics, and (5) business foundation courses. In order to ensure study in each of these five areas, courses totaling up to 59 semester credit hours are required. The student may also select additional hours from courses in these areas, with the opportunity of achieving either further breadth or a certain degree of depth by concentrating these hours in a particular area of interest. As part of the student's general education, one course must be selected that is identified as satisfying the International Dimension requirement.

During the freshman and sophomore years the student will complete courses in each of the following areas:

Behavioral and social sciences: American history, three semester credit hours; American government, three hours; and six hours elected from at least two of the following fields: anthropology, geography (except physical geography courses), history, political science, psychology and sociology.

Humanities and fine arts: Six semester credit hours elected from two different fields identified by the University as satisfying humanities (H) credit.

Natural science and mathematics: A minimum of 10 semester credit hours with the specific number of required hours in mathematics and natural science varying with the major chosen. Specific requirements for each major are published by the University in the book *Undergraduate Programs and Requirements*.

Communications: English composition, six semester credit hours, and introduction to public speaking, three hours.

Pre-business core: For business students, a minimum GPA of 2.00 in the following 30-hour pre-business core is prerequisite for MGMT 3123, MSIS 3223, MKTG 3213 and FIN 3113; ENGL 1113 and 1213; ACCT 2103 and 2203; ECON 2103 and 2203; MATH 1483 or 1513; MSIS 2103; STAT 2023; and SPCH 2713. For non-business students, the University prerequisite for upper-division courses applies. (See "Academic Regulations" elsewhere in the *Catalog*.)

General electives: In addition the student may elect courses from any area except lower-division aerospace studies and military science and HPEL activity courses to complete lower-division requirements.

Credits earned during the freshman and sophomore years in another institution may not be substituted for junior and senior course requirements in majors in the College of Business Administration.

Departmental Clubs and Honor Societies

Beta Alpha Psi (accounting honor society)
Beta Gamma Sigma (business administration honor society)
Business Honors Organization
Business Student Council
Delta Sigma Pi (professional business organization)
Economics Club
Financial Management Association
Human Resource Management Association
International Business Club
Marketing Club
MBA Association
MSTM Association
Mu Sigma Omicron (management information systems, and management science and computer systems)
National Association of Black Accountants
Phi Beta Lambda (business leadership)
Society for Advancement of Management
Taking Care of Business (business student club)
Toastmasters

School of Accounting

Professor and Head Lanny G. Chasteen, Ph.D., CPA

The School of Accounting offers three degree programs in accounting: (1) B.S. in Business Administration with a major in accounting, (2) M.S. in accounting, and (3) Ph.D. in business administration with emphasis in accounting. The School of Accounting also offers the M.S. in management information systems/accounting information systems (MIS/AIS) jointly with the Department of Management.

The common objective of the B.S. and M.S. accounting programs is to educate students to commence and continue to develop in a wide range of professional accounting careers. The specific objective of the B.S. in accounting program is to provide basic conceptual and business knowledge as a foundation for accounting career development; the objective of the M.S. in accounting is to provide candidates with a greater breadth and depth in accounting than is possible in the B.S. program, in order to

prepare graduates for careers as professional accountants in financial institutions, industry, nonbusiness organizations, and public practice.

Students who are considering a professional accounting career should have above-average aptitudes in mathematics and English, disciplined work habits, an interest in working with people and an attitude of service.

Currently, the B.S. in accounting is acceptable in lieu of three years of required public accounting experience required before a candidate may sit for the Uniform Certified Public Accountants Examination in Oklahoma. However, effective in the year 2003, candidates will be required to complete 150 hours of education, including 36 hours of accounting beyond principles of accounting, before they may sit for the CPA exam in Oklahoma. Students desiring to become CPAs are strongly encouraged to consider graduate education in accounting. The M.S. in accounting earned at Oklahoma State University satisfies educational requirements for C.P.A. candidates in all jurisdictions of the United States.

Considerable electives are available in both degree programs. Specialization in external reporting, internal reporting, or taxation is possible in the M.S. in accounting program. The M.S. in MIS/AIS is available for students desiring a specialization in systems.

Candidates for either of these degrees are encouraged to select some electives in quantitative and behavioral science areas.

Graduate Programs

The Master of Science in Accounting Degree. The specific objectives of the M.S. in accounting are to provide candidates with a greater breadth and depth than is possible in the B.S. program, in order to prepare graduates for careers as professional accountants in financial institutions, industry, nonbusiness organizations, and public practice, and to develop judgmental ability in accounting and related areas. Advanced courses provide a theoretical base for insight into significant problems confronting the accounting profession. In addition, a specialty in external reporting, internal reporting or taxation is available for interested candidates. The candidate receives assistance from the faculty in selecting a pattern of courses designed to prepare the student according to the chosen professional goals.

Graduates of recognized colleges and universities whose records indicate adequate intellectual capacity and desirable personal characteristics may qualify

for admission. The typical applicant admitted to the program has a GMAT score of 525 or above and an undergraduate grade-point average of 3.25 or above.

Prerequisites. The following are required: 24 semester hours of advanced accounting; six semester hours of business law; business calculus; three semester hours each in finance, management, marketing, production, quantitative analysis, business policy, intermediate microeconomics; and six semester hours in statistics. As many as eight semester hours of course deficiencies may be removed within the 32 semester hours required for the degree.

The Master of Science in MIS/AIS. (See "Business Administration.")

The Doctor of Philosophy Degree. The Ph.D. in the College of Business Administration with a major in accounting emphasizes flexibility to meet the particular needs and objectives of individual candidates. The program is designed to provide the highest degree of preparation for the individual student, enabling the student to make significant professional contributions in research, teaching, or in business or government positions.

Graduates of recognized colleges and universities whose records indicate adequate intellectual capacity and desirable personal characteristics may qualify if they have a good academic record and achieve satisfactory scores on the GMAT. Admission is competitive.

The Ph.D. program is designed so that a candidate may, at his or her option, specialize in one of the following accounting areas: auditing, managerial accounting, financial accounting systems, or taxation. All candidates are required to take a series of seminars that provide an overview of relevant academic literature. These seminars are restricted to Ph.D. candidates. Two minor areas, one of which may be outside the College of Business Administration, are required, in addition to competence in economics and quantitative analysis. The candidate's advisory committee is responsible for assisting in the development of a plan of study encompassing the above areas. Students in residence are required to do teaching or research on a quarter-time basis while earning the degree.

Business Administration

Graduate Programs

The Master of Business Administration Degree. The Master of Business Administration program provides graduate professional education for individuals preparing for administrative careers in either the private or public sector. It is a comprehensive, yet flexible program providing the knowledge and analytical tools to cope with the complexities of management within diverse environments.

The program develops fundamental knowledge in the areas of accounting, finance, information systems, management, marketing and economics. Further, it provides critical analytical and research capabilities through research design and computer-based decision courses. The program is a 50-hour, self-contained program. The length of the program for a full-time student is normally two years, but the degree may be earned in less time by attendance in summer session courses. Degree requirements may be reduced by a maximum of nine credit hours. To be eligible for this waiver, students must have earned a baccalaureate degree in business administration at an AACSB-accredited institution.

The individual course of study follows a personalized, interdepartmental curriculum developed in conjunction with the graduate adviser. Students may use elective courses either to continue broad managerial development or to emphasize studies in a functional area (finance, management, marketing or management science and information systems).

Outstanding students with baccalaureate degrees in any field of study may apply. All individuals admitted to the program are required to demonstrate proficiency in applied calculus and personal computer usage. The M.B.A. is an advanced studies program that assumes a fair degree of sophistication in mathematics, statistics, and computer technology.

Admission is granted to those students whose potential for successful graduate study is clearly indicated by the undergraduate grade-point average, the score on the Graduate Management Admissions Test, letters of recommendation from three sources, past work experience, extracurricular and community activities, and stated career goals.

The Master of Science in Telecommunications Management Degree. In response to industry's need for skilled and knowledgeable telecommunications management graduates, Oklahoma State University offers a Master of Science degree in telecommunications management. This program is offered not only through traditional means to on-campus students but also via distance learning technologies to students at remote locations.

The program is currently housed in the College of Business Administration. However, the telecommunications management program draws on the combined expertise of three OSU colleges—the College of Arts and Sciences, the College of Business Administration, and the College of Engineering, Architecture and Technology. As a result the telecommunications management student will have a traditional home department to achieve a depth of knowledge in one discipline, while developing broad knowledge in business, technical and communication disciplines.

This program prepares graduates for managing the telecommunications technologies as well as managing in a competitive environment with telecommunications systems. The graduates of this program are likely to be employed by providers or users of telecommunications technologies.

Telecommunications Management Curriculum. The program curriculum consists of a minimum of 35 credit hours, including seven core courses, one laboratory, one practicum, and three electives. Students may choose either a part-time or full-time sequence. Full-time students can complete the program in one and one-half years while part-time students may be able to complete it in two years.

Students may choose electives from one of two tracks. Track I is the technical track consisting of computer science, electrical engineering, or management science and information systems courses. Track II is the management/mass communications track.

Admission Requirements. Qualified graduates of colleges and universities of recognized standards are eligible to seek admission to the OSU Graduate College. Applicants must submit the completed application form to the Graduate College with official transcripts of all academic work and degrees received.

In addition to the OSU Graduate College's standard requirements, the telecommunications management program admissions committee will consider students' letters of recom-

mendation, GMAT or GRE scores, previous academic performance, and telecommunications experience.

Information about the program is available on the World Wide Web (<http://www.mstm.okstate.edu>).

The Master of Science in Management Information Systems/Accounting Information Systems (MIS/AIS) Degree. This degree program combines the technical and systems-based master's level theory from information systems and accounting to form an integrated body of knowledge for the students. Graduates of this program learn the business processes underlying management and accounting information systems, and they learn to develop, modify, use and audit enterprise-wide business computing systems.

The M.S. in MIS/AIS is a 33-hour program with two elective areas of concentration. One concentration, accounting information systems, emphasizes the accounting content of the degree. The second concentration, management information systems, focuses on technical information systems. The fundamental knowledge for the degree is attained through a shared 15-hour core of accounting systems and information systems classes, including a business practicum or graduate internship. This core is required of all degree candidates.

Admission requirements for the M.S. in MIS/AIS are similar to the admission requirements for other master's programs in the College of Business Administration.

The Doctor of Philosophy Degree. The Ph.D. in business administration is an interdepartmental program in the College of Business Administration. The degree emphasizes flexibility to meet the particular needs and objectives of individual candidates. The program is designed to provide the highest degree of preparation for the individual student, enabling him or her to make significant professional contributions in research, teaching, or in business or governmental positions.

Requirements. Students select *one major* area of study from either accounting, finance, management/management information systems/management science or marketing, and *two minor* areas. The dissertation is usually written in the student's major area. One of the minor areas must be taken in the College of Business Administration. The second minor may be taken from another department within the College of Business Administration or from a department outside the CBA.

All candidates for the Ph.D. degree in business administration are expected to have a basic competence in all the major functional areas of business administration—accounting, economics,

finance, management/management information systems/management science and marketing. In addition, basic competence is expected in finite mathematics, calculus and statistics. Students who possess a recent master's degree in business from a program accredited by the Accreditation Council of the American Assembly of Collegiate Schools of Business will generally have satisfied most of the basic competence requirements in these areas.

Administration. The program is administered by the dean of the Graduate College and the department in which the student enrolls with the assistance of a faculty advisory committee.

Major and Minor Areas. The candidate's advisory committee is responsible for assisting in the development of a plan of study that assures competence in the major and minor areas and in economics and quantitative analysis. All Ph.D. students in residence are required to do teaching or research on a quarter-time basis, for at least one semester, while earning the degree.

Economics and Legal Studies in Business

Professor and Head Joseph M. Jadlow, Ph.D.

Economics is a science of choice. The study of economics centers around individuals' attempts to improve their living standards. It provides a comprehensive view of how a society is organized to transform the limited resources available into want-satisfying goods and services. It investigates the principles underlying the operation of the economic system, and seeks to determine its weaknesses and to prescribe policy measures that will improve its operation. In the process it ranges over a host of the most important problems confronting contemporary society—the causes of and remedies for depression and inflation, the determinants of and methods for improving income distribution, poverty problems and welfare measures, the role of the government in economic activity, the requisites for economic growth and development, pollution and congestion and their control.

The primary objectives sought in the undergraduate curriculum are to develop a broad understanding and perspective of the economic aspects of people's activities, coupled with thorough training in the fundamental tools of economic

analyses. Toward these ends, the development of elementary mathematical and statistical skills is highly desirable, as is complementary study in the social and behavioral sciences, accounting and business administration.

A major in economics prepares students for positions with business firms, nonprofit private organizations and government agencies—both national and international. It provides an excellent background for the study of law and international relations. It qualifies competent students to undertake the graduate work necessary for professional positions in economic research and college or university teaching. A degree option in business economics and quantitative studies is offered to provide additional training in analytical methods and communication skill for both public and private sector occupations. An option in pre-law is offered.

General Business

The general business program gives students a broad, comprehensive type of business education preparing them to enter employment in a wide range of administrative positions in private business, government, or non-profit organizations. The scope of their educational experience enables these graduates to assume management positions in organizations of varying sizes and ranges of operations.

Students majoring in general business will take general education or foundation course work in behavioral and social sciences, communications, humanities and fine arts, natural science, mathematics, and statistics, as well as business foundation courses in accounting, business communications, business law, economics, finance, management information systems, management, and marketing.

This major, which provides for a high degree of individual student choice, includes required upper-division course work beyond the business core in each of the business disciplines as well as substantial work in business or business-related courses, selected by the student in consultation with his or her major adviser. A pre-law option is offered.

Agribusiness

The major in agribusiness is offered in cooperation with the Department of Agricultural Economics. Students pursuing this major may obtain a Bachelor of Science in Agriculture or Business Administration. Typically, a graduate of this

program would be prepared for employment in the food industry by organizations involved in the production, processing, distribution, marketing, transportation, research, or supplying of food, food products, or input for the production or processing of food products for human or animal consumption.

The student will take regular general education course work as well as foundation courses in agriculture and business administration. Additional upper-division course work in agricultural economics and business will be selected by the student in consultation with his or her major adviser.

Graduate Programs

The department offers work leading to the Master of Science degree and the Doctor of Philosophy degree. The graduate program in economics prepares economists for academic careers as well as research and administrative positions in business and government agencies.

Graduate fields of specialization include monetary economics, public finance, international economics, economic development, econometrics, labor and human resource economics, industrial organization, and urban and regional economics. In addition, graduate courses are offered in the history of economic thought and in mathematical economics.

The initial admission to a graduate program is determined by an elected graduate studies committee on the basis of the applicant's previous academic record; verbal, quantitative and analytical scores of the Graduate Record Examination; and letters of recommendation.

The Master of Science Degree. Admission to the master's program in economics is granted to college graduates with superior academic records whose preparation has been broad and thorough. They need not have majored in economics as undergraduates but must be well grounded in economic fundamentals. A good background in one or more such fields as history, philosophy, mathematics, statistics, political science, English, sociology, accounting, finance, psychology, or management is particularly helpful to the graduate student in economics. An applicant whose prior preparation is deficient in some respect, may, if otherwise qualified, be admitted to the program but will be required to remove the deficiency, increasing somewhat the time needed to complete work for the degree.

Each graduate student is guided in the preparation of a program of study by a graduate studies committee. At the master's level there are two options. One

option provides the student with a well-rounded program that avoids premature specialization in some particular area of economics. The candidate for the master's degree is required to show competence in basic economic theory and statistical methods, together with an understanding of the fundamental institutional operations of the United States economy. The second option is in applied economics which stresses communication skills, quantitative analysis and course work from other disciplines related to their career objectives.

Each program contains enough electives to permit considerable choice among areas of emphasis. A research report or thesis is required of all students who take only the M.S. degree. Those accepted for the Ph.D. program have the option of applying for and receiving the M.S. degree without the research report upon successful completion of the Ph.D. qualifying examination and the filing of an approved Ph.D. thesis topic with the Graduate College. A foreign language is not required.

The Doctor of Philosophy Degree. Admission to the doctoral program in economics is granted to college graduates who have satisfactorily completed at least one year of graduate work in economics and who have superior academic records.

This program stresses balanced preparation in economic theory and in mathematics and statistics, as well as competence in subject-area fields of specialization. The student is required to pass qualifying examinations in the theory core and in one field of specialization. (The theory core is not considered a field of specialization.) Competence must be demonstrated in second and third fields of specialization, either through course work or by passing a qualifying examination in each field. An advisory committee helps the student plan a program of study to achieve these objectives. A foreign language is not required.

A dissertation based upon original research is required of the candidate for a Ph.D. degree in economics. A final oral examination deals principally with the dissertation and fields to which it is most closely related.

Finance

Associate Professor and Head
Janice W. Jadlow, Ph.D.

There are financial implications in virtually all organizational decisions, whether the organization is a business

firm, a nonprofit organization, or a government. Thus, financial executives are of central importance to overall planning and control, and nonfinancial executives must know enough finance to work the financial implications into their areas of expertise. The increasing importance of finance for any organization has accompanied the evolution of the field of finance itself.

Finance has evolved since the early 1900s from a descriptive to an analytical discipline recognized as a genuine science. Finance builds on economic theory to focus on both sides of the organization's balance sheet, asset analysis and the optimal mix of liabilities and equity, including the implications of investor portfolio theory for the firm. Finance consists of three interrelated core areas: financial markets and institutions, investments and portfolio theory, and managerial (business) finance. Other topics interwoven within these core areas include international finance, futures and options, bank management, insurance, real estate, and personal finance. Recent issues of emphasis include deregulation of financial institutions, the implications of telecommunications on financial information and decisions, innovative methods of financing long-term investments, and the influence of inflation on interest rates.

The primary objective of the undergraduate finance curriculum is to develop a broad understanding of the financial aspects of the activities and decisions and to provide thorough training in the fundamental tools of financial analysis. Toward these ends, the study of finance is complemented with the development of elementary mathematical and statistical skills and with study in economics, accounting, and business administration. The major in finance is intended to prepare students for positions with a wide variety of organizations that require special understanding of financial analysis, financial management and financial systems.

Finance majors entering the corporate world may begin in one of several positions. A career in financial management can lead to a major executive position, including chief executive officer. The positions within managerial finance include capital budgeting analyst, daily cash manager, credit analyst, financial analyst (who works closely with accountants), and property manager.

Alternatively, finance majors may choose to enter the financial services industries. Career possibilities include: the banking industry as a loan officer, retail bank manager, or a member of the trust department; the securities industry as a stockbroker or account executive,

a securities analyst, investment banker, or financial planner; and the insurance industry as an agent or underwriter.

Graduate Programs

Concentrations in finance are offered through the Master of Business Administration and Doctor of Philosophy degrees.

The Master of Business Administration Degree. (See "Business Administration.")

The Doctor of Philosophy Degree. A Ph.D. in business administration with concentration in finance prepares the student for careers in academia, business or government.

The program is designed to meet the needs and objectives of individual students, but all students will seek an in-depth understanding of the theoretical foundations of financial economics and develop research competency, and will develop teaching skills. The small class size provides a supportive environment conducive to the exchange of ideas and the development of new insights by both faculty and students.

Students will select finance as their major area of study. Two areas of concentration are also to be selected. As support for the major field of study, each student is required to attain graduate level competence in economic theory and quantitative methods.

Prerequisites for admission to the program are appropriate basic courses in calculus, statistics and computer science.

Competence in planning and executing research is demonstrated by a dissertation. In addition, each candidate must pass comprehensive qualifying examinations and a final oral examination on the dissertation itself.

Outstanding students with degrees in any field of study may apply. Applications for admission are evaluated on the basis of (1) undergraduate and graduate grade-point averages, (2) score on the Graduate Management Admissions Test, (3) a two- or three-page statement describing goals and academic interests, (4) three letters of recommendation, (5) evidence of research potential, and (6) a personal interview when feasible. It is the applicant's responsibility to see that all materials related to these criteria are received by the Department of Finance.

Management

Professor and Head
Wayne A. Meinhart, Ph.D.

The majority of accomplishments in contemporary society are created through organization and group effort. Whether the goals are to realize success in business or solve the pressing problems of society, organizational systems must be effectively managed to maximize the probability of success.

As an area of study, the field of management offers dynamic, exciting possibilities to students. The field of management is concerned with the analytical process and the application of relevant theory and research to creative problem solving. Examples of such challenges include designing organizational systems; leadership; motivating people; planning courses of action; and efficiently allocating and utilizing resources. Since people in the field of management deal with real-world problems, the student should have a deep interest in applying knowledge in problem-solving situations. Examples of the kinds of knowledge applied include, but are not limited to, behavioral science, economics, mathematics and statistics, management information systems, communications skills, accounting, and necessary knowledge of theory and methods in management and management science. It is not necessary for students to have interests in each of these areas since the field offers substantial opportunities for specialization.

The curriculum for the bachelor's degree requires of all students a common foundation of work in the disciplines listed above. Students are then guided into advanced work in these areas and in their applications of courses in management, management science, and management information systems. Four degree programs are available for choice based upon the student's interest in specialized work. Each program emphasizes the knowledge bases and applications that will be useful in a rapidly changing world.

Management

The major in management prepares students for leadership careers as managers with business or nonprofit organizations. It emphasizes the study of management systems and problems. Majors are typically employed by organizations of all types and sizes as managers, management trainees or staff specialists. The field of management has much to offer

those interested in leadership roles in business and public sector organizations.

Human Resource Management

The option in human resource management is designed to prepare students for careers in personnel and human resource management. Anything that concerns the work force of an organization is the concern of the personnel manager. This includes working with labor relations and collective bargaining, forecasting the demand for personnel, attracting potential employees, orienting them and then developing the careers of those employed. For those who enjoy working with both data and people, a career in personnel management offers many opportunities and the chance for personal growth and development.

Management Information Systems

The major in management information systems (MIS) prepares students for work in information systems development and operation. Both applications of computer systems technology and understanding of data and information flows among the functional areas of business are emphasized. The continuing integration of the computer in all aspects of business and the critical need for responsive management information systems has created a strong demand for graduates who are knowledgeable about both information systems and business. The first two years of study involve the study of mathematics, statistics, and computer science as well as English, accounting, economics, psychology and other courses designed to develop a broad educational background. The junior and senior years focus on aspects of information systems and computer technology including programming languages, data base management, artificial intelligence, systems analysis, data communication systems, and management science methods. Coverage of functional areas prepares MIS graduates to understand the information needs of complex business organizations for which information systems are developed.

Management Science and Computer Systems

The major in management science and computer systems is designed to prepare students for careers as staff

managers in complex businesses or nonprofit organizations. There is a high demand for persons with advanced quantitative and computer competency with a knowledge of business systems. Many students have a special interest in building concentrations in management systems and computer science. The management science and computer systems program is ideal for this purpose. Examples of topics covered include managerial decision theory, operations research, systems analysis, management information systems and operations management. The study of management science and computer topics may be combined with advanced work in related disciplines for those with appropriate interests. Management science and computer systems majors typically enter business or public organizations as management systems analysts, computer systems analysts, or management trainees. Many also undertake graduate study to further their professional education.

Graduate Programs

The Department of Management offers work leading to the Master of Business Administration and the Doctor of Philosophy in business administration degrees.

The Master of Business Administration Degree. (See "Business Administration.")

The Master of Science in Telecommunications Management Degree. The interdisciplinary M.S. in telecommunications management degree is also currently housed in the Department of Management. This program prepares graduates for managing the telecommunications technologies as well as managing in a competitive environment with telecommunications systems. The graduates of this program are likely to be employed by providers or users of telecommunications technologies.

Information about the program is available on the World Wide Web (<http://www.mstm.okstate.edu>).

The Master of Science in MIS/AIS. (See "Business Administration.")

The Doctor of Philosophy Degree. The Ph.D. in business administration program through the Department of Management provides intensive study in management, management science and management information systems. It prepares the student for significant professional contributions in university teaching and research, or staff positions in business or government.

The program is quite flexible and individually structured to meet the needs and objectives of each candidate. Emphasis is placed on an astute understanding of analytical and theoretical foundations of

the business environment and development of research capabilities in the area.

The student will select as his or her major area management/management science. Two minor areas are also to be selected. One of the minor areas must be taken in the College of Business Administration from the fields of accounting, economics, finance, or marketing. The second minor area may or may not be taken outside the College of Business Administration. As support for the major and minor fields of study, each student is required to attain graduate level competence in economic theory and quantitative methods.

As prerequisites to the program, all candidates are to have completed appropriate basic courses in calculus and statistics. Likewise, candidates are expected to have a basic competence in the major functional areas of business—accounting, finance, management, and marketing. Competence in the functional areas is usually assumed for candidates having recently completed an appropriate graduate course in each area through a program accredited by the American Assembly of Collegiate Schools of Business.

Competence in planning and executing research must be demonstrated in a dissertation. In addition, each candidate must pass a series of comprehensive qualifying examinations, both written and oral, and a separate, final oral examination on the dissertation itself. To enhance teaching skills, all Ph.D. students in residence are required to teach on a quarter- or half-time basis for at least one semester while earning the degree.

Outstanding students with master's degrees in any field of study may apply. The application for admission to the program is evaluated on the basis of (1) undergraduate and graduate grade-point averages, (2) the score on the Graduate Management Admissions Test, (3) a two- or three-page statement describing goals and academic interests, (4) three letters of recommendation, (5) evidence of research potential, and (6) a personal interview when feasible. It is the responsibility of each applicant to ensure that all material related to the above criteria is received by the department.

Marketing

Professor and Head
Joshua L. Wiener, Ph.D.

The Department of Marketing provides two quite significant majors within the CBA. One of these is marketing. This is

an exciting field of study leading to a variety of job opportunities both in the private sector and in not-for-profit organizations. Also, it provides an excellent career path to top management within an organization.

The second major provided by the department is international business. Almost every business has international operations or is affected by events, competitors and conditions in the global economy. This opens career opportunities in the field and prepares one for successful management within the domestic economy.

Marketing

Marketing is concerned with the identification of wants and needs by buyers and the development of products, distribution channels, price and communication methods to best satisfy those wants and needs. The buyers may be individuals or organizations and their buying may include products or services. Since the economic system is dependent on the ability of organizations to match resources with marketplace needs, marketing is gaining in prominence every year.

A marketing graduate will likely be involved in performance and management of many traditional areas of decision-making—sales, advertising, logistics and marketing research. In addition, one frequently assists in product planning, developing marketing information systems, and general management. Since these tasks are necessary for all types of organizations, employers of marketing graduates include manufacturers, banks, hospitals, retailers and not-for-profit organizations.

The effective marketing manager must possess a perspective and capabilities that reflect a three-dimensional program of study: (1) a liberal education in the sciences, humanities, behavioral and social sciences, mathematics and communications; (2) an adequate knowledge of the major functional areas of business; and (3) a high-level competency in marketing.

One's liberal education is emphasized during the freshman and sophomore years. The study of the functional areas of business begins in the sophomore year and continues into the junior year. During the junior and senior years, the focus is on marketing. In addition to the introductory course that provides an overview of the field of marketing, the student takes courses in areas such as consumer behavior, promotion, sales management, services marketing, electronic commerce,

marketing research, channels and international marketing. While studying marketing, one typically selects courses in other fields such as international business, management, information systems, finance, advertising and public relations, and other fields to support a particular career choice within the marketing field.

International Business

The major in international business provides a fundamental understanding of the global business environment and develops decision making capabilities in the international setting. It spans cultures, economic conditions, political and legal systems, and competitive climates.

This major has the same General Education and Common Body requirements as all other CBA majors. In addition, it includes specific international business courses, international environment courses, modest foreign language competency, and a minor field in any business field. Students are encouraged to seek study abroad opportunities and other avenues for expanding their cross-cultural understanding. The international business major requires 39 credit hours.

Graduate Programs

The Department of Marketing offers work leading to the Master of Business Administration and the Doctor of Philosophy in business administration degrees.

The Master of Business Administration Degree. (See "Business Administration.")

The Doctor of Philosophy Degree. The Ph.D. in business administration program through the Department of Marketing provides intensive study in marketing. It prepares the student for significant professional contributions in university teaching and research, or staff positions in business or government.

The program is quite flexible and individually structured to meet the needs and objectives of each candidate. The program is designed to create scholars and researchers in the field of marketing. Highly student oriented, the program focuses on training individuals in current marketing theory and research techniques. Collaboration between students and faculty is strongly encouraged.

Program Content. The student will take 15 hours of Ph.D. seminars in marketing. The student must also complete a nine-hour minor in another discipline, such as

economics, management, sociology or psychology. As support for the major and minor fields of study, extensive course work (normally 18 credit hours) in the area of quantitative/research methodology is required. In addition, each student must attain graduate level competence in economic theory.

Each candidate must pass a series of written comprehensive qualifying examinations that address knowledge in the major and minor fields. An oral examination will be held on the dissertation itself. To enhance teaching skills, all Ph.D. students who plan to teach in the United States are required to teach on a quarter- or half-time basis for at least one semester while earning the degree.

As prerequisites to the program, all candidates are to have completed appropriate basic courses in calculus and statistics. Likewise, candidates are expected to have a basic competence in the major functional areas of business—accounting, finance, operations management, organizational theory, economics, and marketing. Competence in the functional areas is usually assumed for candidates having recently completed an appropriate graduate course in each area in an M.B.A. program accredited by the American Assembly of Collegiate Schools of Business.

Application Procedure. Outstanding undergraduate or graduate students from any field of study may apply. For those with an M.B.A., the program will normally consist of two years of course work and two years of dissertation work. For those without a master's degree, the plan of study for the Ph.D. degree will typically allow for the granting of an M.B.A. prior to completion of the Ph.D. degree. Applications for admission to the program are evaluated on the basis of (1) undergraduate and graduate grade-point averages, (2) the score on the Graduate Management Admissions Test or Graduate Record Examination, (3) a two- or three-page statement describing goals and academic interests, (4) three letters of recommendations, (5) evidence of research potential, and (6) a personal interview when feasible. It is the responsibility of each applicant to ensure that all material related to the above criteria is received by the Department of Marketing. Application forms and detailed explanation of the Ph.D. degree in business administration with an emphasis in marketing are available through the department.

College of Education

Ann C. Candler Lotven, Ed.D., *Dean and Director of Professional Education*

Ed Harris, Ph.D., *Associate Dean for Administrative Affairs and Director of Research and Extension*

Lowell Caneday, Ph.D., *Associate Dean for Undergraduate Studies*

Nan Restine, Ph.D., *Interim Associate Dean for Graduate Studies*

The College of Education (COE) includes the schools of Applied Health and Educational Psychology, Curriculum and Educational Leadership, and Educational Studies. The College offers a wide range of undergraduate and graduate programs to prepare individuals for careers in teaching, administration or research in the professional field of education either in the common schools or in institutions of higher education. Additionally, programs in adult education and technical education prepare individuals for careers as human resource development specialists in business, industry and agency settings. There are a variety of degrees within the College at the bachelor's, master's, specialist and doctor's levels that prepare individuals for productive lives in the global community (see the "Degrees Offered" section of the *Catalog*). The Office of Extension within the College of Education concentrates its efforts on fulfilling the College's commitment of the land grant university to inform and educate the citizens of Oklahoma. In order to better serve the citizens, the office offers diverse programs through video conferences, weekend and evening courses for staff development, credit and noncredit courses, and conferences. These formats allow undergraduate, graduate, and other constituents to come together to discuss pertinent issues related to such topics as public schooling, higher education, parental involvement, health, human performance, and leisure behavior, aeronautics, aviation education and space sciences. The office offers ACT preparation workshops for high school students and the Summer Reading Fun Club for area school children. The School of Curriculum and Educational Leadership offers a master's degree through education extension by compressed video.

Accreditation

In the College of Education, the aviation programs are accredited by the Federal Aviation Administration, the only nationally-recognized accrediting body for programs in aviation. OSU was the first university in Oklahoma with a program receiving this designation. The counseling psychology program is accredited by the American Psychological Association. The leisure studies program is accredited by the National Recreation and Park Association, and the American Association for Leisure and Recreation with options in leisure service management and therapeutic recreation. All professional education programs are accredited by the Oklahoma State Board of Education and the North Central Association of Colleges and Secondary Schools. Business education, as well as technical and industrial education professional education programs, are also accredited by the Oklahoma State Department of Vocational-Technical Education.

Statement on Diversity. The College of Education is committed to the promotion and affirmation of diversity in the broadest sense. This commitment is consistent with the ethical principles of the various professions represented in the College. These principles place a high value on the dignity and worth of individuals regardless of their gender, race, ethnicity, sexual/affectional orientation, age, physical abilities, religious beliefs, and socioeconomic class. Appreciation of the value of diversity also extends to diversity of thought and perspective. Faculty make every effort to promote an atmosphere of respect and trust in which individuals feel free to explore, discuss and express their beliefs with one another.

High School Preparation

Students are expected to satisfy the high school curriculum requirements as determined by the Oklahoma State Regents for Higher Education. It is recommended that the student be involved in clubs and organizations as well as have had some experiences working with children and youth, depending on the chosen field.



Admission Requirements

Freshman students are admitted to the College of Education consistent with criteria published for admission to the University. For continuing enrollment in good standing, the College of Education requires a minimum of a 2.50 GPA for admission to Professional Education, student teaching, and graduation. This requirement is consistent with state standards for students in the state of Oklahoma who complete professional education programs and seek licensure.

Criteria for students wishing to transfer into the College of Education include a required minimum grade-point average based on the University graduation and retention grade-point average policy.

<i>Total hours attempted</i>	<i>Minimum GPA required</i>
fewer than 31	1.75
31 through 45	2.00
over 45	2.50

Requests from students seeking readmission after having been placed under probation/suspension should be submitted to the Office of Student Academic Services in the College of Education and will be reviewed by the director of Student Academic Services prior to readmission.

All student grades are reviewed at the end of each semester to determine whether appropriate academic progress is being made.

For graduation with recommendation for Licensure/Certification, the following minimum GPAs are required: (1) a 2.50 overall GPA; (2) a 2.50 GPA in the Major Requirements; (3) a 2.50 GPA in Professional Core Requirements; and (4) where noted, a 2.50 GPA in the College/Departmental Requirements. The student must earn minimum grades of "C" or "P" in each course in the Major Requirements, the Professional Core Requirements, and where noted, the College/Departmental Requirements. The student must earn grades of "P" in all sections of observation (lab and clinical experience) courses and student teaching for recommendation for Licensure/Certification.

Scholarships

The College of Education offers a variety of scholarships for undergraduate and graduate students. The following are scholarships offered by the College of Education:

Ray E. Brown Memorial Scholarship
 Vera Jones Chauncey Memorial Scholarship
 Christiansen Aviation Scholarship
 College of Education Alumni Association Centennial Scholarship
 College of Education Alumni Association Freshman Scholarship
 College of Education Alumni Association Minority Scholarship
 College of Education Alumni Association 21st Century Scholarship
 College of Education Special Leadership Award
 Valerie Colvin Scholarship
 Gretchen Lynnette Cumberledge Air Traffic Control Association Scholarship
 Rachel Dotson Scholarship
 Lacrishia Diane Stephens Earls Memorial Scholarship
 Education Student Council Scholarship
 Charles A. "Adam" Esslinger Outdoor Recreation Scholarship
 Future Teachers Scholarship
 Aix B. Harrison Scholarship
 Ora A. Henderson Memorial Scholarship
 Daniel and Mary L. Herd Memorial Scholarship
 J. Andrew Holley Memorial Scholarship
 Arlene Starwalt Jeskey Scholarship Fund in Math Education
 Helen M. Jones Scholarship
 Henry S. Jordan Humanitarian Scholarship
 Richard and Edna Jungers Scholarship
 Robert B. and Maxine Kamm Distinguished Graduate Fellowship Fund

Kappa Delta Pi Scholarship
 Knaub Family Scholarship
 Locke, Wright, Foster, and Cross Graduate Scholarship
 Leon L. Munson Memorial Scholarship
 Mable Marietta Macey-Oaks Memorial Art Scholarship
 Percy W. Oaks, Sr. Memorial Art Scholarship
 Outstanding Freshman Aviation Education Student
 James Leonard Prince Memorial Scholarship
 Wendell Sharpton Family Scholarship
 Helmer and Frances Sorenson Scholarship
 J. Kenneth St. Clair Scholarship
 Amy Louise Wagner Memorial Scholarship
 Hoyt E. Walkup Scholarship
 Kim R. Watson Scholarship
 Loyd L. Wiggins Scholarship
 Xerox Corporation Scholarship

In addition to these scholarships, Oklahoma State University is allocated, on an annual basis, a large number of Oklahoma State Regents for Higher Education scholarships. These scholarships are available in teaching fields identified by the Oklahoma State Board of Education as critical shortage areas and are only available to Oklahoma residents attending or desiring to attend OSU.

Privately funded scholarships are also available. Information concerning these scholarships may be obtained through the office of the appropriate department head.

Academic Advising

Academic advisement for undergraduate students is coordinated through the Office of Student Academic Services, located in 106 Willard, in the College of Education. Students are assigned to a particular academic adviser in the Office of Student Services or to the faculty in the academic departments, depending on the student's declared major. Faculty academic advisers are nominated by their department heads and appointed by the dean of the College. Academic advisers may confer with their advisees on such matters as vocational counseling, course selection, academic problems, long-range professional goals, and semester by semester enrollment.

Special Academic Programs

Bachelor of University Studies. The College of Education utilizes the Bachelor

of University Studies degree program along with the other colleges in the University. Unique career objectives of non-traditional students may be met by working with academic advisers in selecting a specially-tailored program that ultimately leads to a degree.

Applied Educational Studies. The applied educational studies, Ed.D., is an interdisciplinary, cross-departmental degree program, coordinated by the Office of the Dean of the College of Education, to combine the traditional priority of preparing leaders in education with the nontraditional degree needs related to education.

The research core may include a combination of two or more course work areas offered by the schools of Applied Health and Educational Psychology, Curriculum and Educational Leadership, and Educational Studies.

Students interested in such an interdisciplinary degree should contact the associate dean for graduate studies for information on degree requirements and the application process.

Tutoring Program. The Reading and Math Learning Center within the School of Curriculum and Educational Leadership offers elementary education undergraduate and graduate students a faculty-supervised opportunity to tutor school-age children interested in improving their reading and math skills.

OSU-Frontier Alliance. OSU-Frontier Alliance, initiated in 1990, provides OSU professional education students the opportunity to be involved in a joint institutional effort designed as a proactive approach for meeting the needs of students and teachers in a culturally diverse environment. This alliance allows OSU to have a continuing collaboration with the Native American tribal community and the Frontier School District.

Professional Development Conferences. Professional education students and alumni are encouraged to attend the annual Celebration of Teaching Conference on the OSU campus held the first Monday in April. Additional outreach conferences include the Oklahoma Association of Elementary School Principals, the Oklahoma Association of Environmental Educators; the Oklahoma Education Association Annual Leadership Academy; the Oklahoma Technology Administrator's Conference and the Adult Basic Education Conference. Most conferences have graduate credit and CEU's available for attendance and completion of projects through the College of Education Extension office.

Graduation Check. The College of Education Office of Student Academic Services prepares a graduation check that

indicates the undergraduate's status for completion of degree requirements. For those students in Professional Education, licensure as a teacher is included in the graduation check. Undergraduates may request through their academic advisers that the graduation check be completed.

Job Placement. An employment service is provided for College of Education students and coordinated through the Office of Career Services in cooperation with the COE office of Student Academic Services. It assists students in signing up for interviews with in-state and out-of-state employers. Opportunities with school districts and other employers not recruiting on campus are maintained at all times. Resources that are available to assist the student seeking employment include resume information, interviewing tips and placement annuals. Registration with Career Services affords students the opportunity to participate in several placement days held on campus and to access the office's referral service to employers.

Alumni Association. The College of Education Alumni Association distributes a quarterly newsletter to its 3,000 members. The organization provides professional support and an immediate network of professional contacts. The Alumni Association provides scholarships for students in the College of Education. Graduates attending convocation receive an invitation for a one-year complimentary membership to the Alumni Association. The organization sponsors Education Appreciation, annually recognizing the Oklahoma Teachers of the Year.

General Education Requirements

All undergraduate degrees in the College of Education require a minimum of 40 semester hours in general education that include the following: communication skills, mathematics, United States history and government, science, behavioral studies, arts and humanities, and electives. All degrees are consistent with the current University General Education requirements and the Oklahoma State Board of Education standards.

Departmental Clubs and Honor Societies

American Association of Airport Executives
 Education Student Council
 Elementary Educators of Tomorrow
 Flying Aggies
 Health Promotion Club
 Kappa Delta Pi (education honor society)
 Leisure Club

Multicultural Educators of Tomorrow
 Phi Epsilon Kappa (health, physical education, leisure honor society)
 Physical Education Club
 Student Art Education Association
 Student Council for Exceptional Children
 Student Education Association

School of Applied Health and Educational Psychology

Associate Professor and Head Jerry Jordan, Ph.D.

The School of Applied Health and Educational Psychology is a multi-faceted organizational unit encompassing undergraduate and graduate academic programs in health promotion, physical education, leisure studies, counseling, counseling psychology, educational psychology, school psychology, school psychometry and gifted and talented education. The School seeks to fulfill the traditional functions of teaching, research, extension, and public service that are consistent with Oklahoma State University. The mission is to foster the development, integration, and application of empirical knowledge, theory, skills and experiences to promote social, physical, psychological, educational, and environmental health. Consistent with the goals of the University's Professional Education Council's Core Concepts and Goals Statement, faculty strive to demonstrate and perpetuate teaching based on theory and research-driven educational practices.

Course Prefixes. Courses that support educational and school psychology, and gifted education are listed in the catalog under the EPSY prefix. Courses that support counseling and counseling psychology are listed in the *Catalog* under the CPSY prefix. Courses in health and human performance are listed in the *Catalog* under the HHP prefix. Undergraduate and graduate leisure courses continue to use the LEIS prefix. Undergraduate courses in physical education continue to carry a PE prefix. Undergraduate health courses continue to carry the HLTH prefix.

Degree Opportunities. A student may earn a degree of Bachelor of Science (B.S.), Master of Science (M.S.), Specialist in Education (Ed.S.), Doctor of Education (Ed.D.) or Doctor of Philosophy (Ph.D.) with emphasis in one of the following:

Programs/Areas of Emphasis	Degrees
<i>Counseling/Counseling Psychology</i>	
Community Counseling Elementary School	M.S.
Counseling	M.S.
Secondary School Counseling	M.S.
Counseling Psychology	Ph.D.
<i>Educational Psychology and School Psychology</i>	
Educational Psychology	M.S., Ph.D.
Gifted Education	M.S.
School Psychology	Ph.D., Ed.S.
School Psychometry	M.S.
<i>Health and Human Performance</i>	
Health Promotion	B.S., M.S., Ed.D.
Exercise and Fitness Science	B.S., M.S., Ed.D.
Physical Education Pedagogy	B.S., M.S., Ed.D.
Physical Education Administration	M.S., Ed. D.
Athletic Training	B.S.
<i>Leisure Studies</i>	
Leisure Service Management	B.S., M.S., Ed.D.
Therapeutic Recreation	B.S., M.S., Ed.D.

Counseling and Counseling Psychology

Associate Professor and Coordinator Alfred F. Carozzi, Ed.D.

The *counseling and counseling psychology* program areas offer graduate programs in community counseling and school counseling leading to the M.S. degree in counseling and student personnel, and counseling psychology leading to the Ph.D. degree in applied behavioral studies.

The *M.S. program in community counseling* is intended for individuals who wish to serve as professional counselors in a variety of human service and community mental health agencies. Students may choose elective courses in selected areas of specification such as youth counseling, substance abuse counseling and mental health counseling.

The *M.S. programs in elementary and secondary school counseling* are intended for individuals who wish to provide counseling services to children, youth, and consulting services to the children's teachers and parents in the school setting. Each program meets academic requirements for state certification as a school counselor.

Both M.S. programs are designed to meet academics and practica requirements for licensure as licensed professional counselors in Oklahoma. Applications for M.S. programs are reviewed in April and October.

The *Ph.D. program in counseling psychology* is accredited by the American Psychological Association and based on the scientist-practitioner model of training. The program is designed to prepare students for counseling, consulting, teaching and research roles in various settings such as university counseling centers, academic departments, child guidance centers, youth and family centers, hospitals, business settings, and mental health clinics. Students are required to follow a specified sequence of study in which academic course work and practicum experiences are integrated. Students must also complete one year full-time internship. Application materials for the counseling psychology program are due by January 15 for the following fall enrollment.

Educational and School Psychology

Professor and Coordinator Kay Bull, Ph.D.

Educational Psychology Programs.

M.S. Program. A master's degree in educational psychology is available as an area of specification within the M.S. in applied behavioral studies. Educational psychology emphasizes the application of psychological theory and research in the field of education. Every educational psychology master's student takes basic courses in educational psychology and research. Each student also takes additional courses in a concentration area of either education/ instructional psychology or human development.

Ph.D. Program. The Ph.D. in applied behavioral studies with specialization in educational psychology includes specialization in instructional psychology, human development, and education of the gifted. The programs prepare students for the role of teacher and researcher in educational and non-educational settings such as higher education, business, government, and communities. The educational psychology Ph.D. is designed to provide students with maximum opportunity to individualize their programs according to their own interests, needs and professional goals. Applications for the Ph.D. program in educational psychology are due by February 1 for the following fall enrollment.

M.S. Program in Gifted Education. The master's degree program, with emphasis in gifted and talented education, is de-

signed to provide experiences, skills and knowledge that facilitate the development of program options for and the education of individuals who are gifted and talented in the areas of general intellectual ability, specific academic ability, and creativity. The program is characterized by its applied nature and includes a broad general preparation in gifted education including identification and behavioral characteristics, teaching models and strategies, program and curricular development, creativity; counseling the gifted, social, emotional and cultural needs of students who are gifted; working with parents; and identification and recruitment of community resources. An endorsement in gifted education is available through the State Department of Education.

School Psychology Programs. M.S.

Program. The master's in school psychometry prepares individuals to provide psychometric services to schools, youth agencies and other organizations working with children and youth. The master's level school psychometrist/educational diagnostician functions primarily as a psychoeducational examiner and teacher consultant. The psychometrist spends the bulk of time with assessment and individual educational programming. Psychometrists are employed by Oklahoma's twenty Regional Education Service Centers and by public school districts. The school psychometry program meets the Oklahoma State Department of Education certification requirements.

The *Ed.S. program in school psychology* is available through the School of Applied Health and Educational Psychology. The Ed.S. is the appropriate level of training for those who are interested in applying psychology to a variety of child-related learning and adjustment problems, and for the improvement of children's mental health. Specialist-level school psychologists typically work in school systems and function in diverse roles including consultation, psychological and psychoeducational assessment, and intervention to facilitate success for all children. The Ed.S. program at OSU is approximately 70 hours, consistent with the National Association of School Psychologists (NASP) standards for training, and meets the Oklahoma State Department of Education certification requirements. Successful completion of this program leads to eligibility for certification by the Oklahoma State Department of Education as a school psychologist and also the NASP National Certification in School Psychology (NCSP). Applications for the Ed.S. program are due March 1 for consideration for admission the following semester.

The *Ph.D. program in school psychology* is based on the scientist-practitioner model that emphasizes the application of the scientific knowledge base and methodological rigor in the delivery of school psychological services and in conducting research. Training in the scientist/practitioner model is for the purpose of developing a Science-Based Learner Success orientation in students. Doctoral level school psychologists function in diverse and important roles including consultation, assessment, counseling/therapy, supervision, program evaluation, and research to facilitate success for all learners. They add to the understanding of children and their families by contributing to the scientific knowledge base related to all aspects of child development. They are employed in many different settings including elementary and secondary schools, private practice, university, hospitals and mental health centers. School psychologists work with diverse populations and provide psychological services to children, youth, families, caregivers, school personnel, adult learners, and individuals with special needs, as well as to the systems in which these individuals need to be successful. Applications for the Ph.D. program in school psychology are due February 1 for the following fall semester.

Health and Human Performance

Associate Professor and Coordinator Frank Kulling, Ed.D.

The programs in health and human performance prepare students at the undergraduate level for careers in athletic training, exercise and fitness science, health promotion, and physical education.

The *exercise and fitness* (pending approval) *science* track prepares students for careers in rehabilitation exercise settings and post baccalaureate study in exercise science and allied health. This degree track prepares students for American College of Sports Medicine certifications.

The *health promotion* track prepares students for careers in a variety of settings including corporate, hospital-based, community, government and entrepreneur enterprises. Students culminate their degree requirements with an on-site internship during their last semester. This degree track prepares students for American College of Sports Medicine certificates and National Commission for Health Education Credentialing for the Health Education Specialist.

The *physical education* program includes a curriculum designed for professional preparation as a certified teacher of physical education. Specifically, students obtain certification that qualifies them to teach physical education and health in grade kindergarten through grade 12. Core courses for all physical education students include the following courses: an introduction to the discipline, eight hours of methodology in sport activities, applied anatomy and kinesiology, biomechanics, motor learning, exercise physiology, motor development, and physical education pedagogy. Students engage in two formal field-based experiences designed to better prepare them to become certified teachers: (1) a 45-hour practicum consisting of on-site observational experiences in one or more public school settings; and (2) a student teaching experience that includes on-site experiences as both an elementary and a secondary physical educator.

The athletic training program includes a curriculum designed for professional preparation as a certified athletic trainer by the National Athletic Trainers Association. In addition to core course requirements, students are required to complete 1500 hours of clinical experience in accordance with the National Athletic Trainers Association. The track in athletic training prepares students to work in a variety of allied health settings including secondary or post-secondary academic institutions, hospitals, rehabilitation or sports medicine centers, and professional sports teams.

Beyond the baccalaureate level the health and human performance program provides preparation at the master's and doctoral levels in health promotion and physical education.

Leisure Studies

Professor and Coordinator Chris Cashel, Ed.D.

The program in leisure studies at Oklahoma State University prepares students at the undergraduate and graduate levels for careers in leisure service management and therapeutic recreation. Both undergraduate options are accredited by the National Recreation and Park Association (NRPA) and the American Association for Leisure and Recreation (AALR). Students completing the programs are eligible to sit for respective national certification examinations. *Leisure service management* prepares students for employment in a variety of settings such as municipal, commercial, and industrial recreation; state and national park services; YMCAs and YWCAs; and armed services recreation. *Therapeutic recreation* prepares students to

work with persons with disabilities in a variety of settings including hospitals, rehabilitation centers, day programs, institutions and within the community.

Beyond the baccalaureate level, the program in leisure studies provides preparation at the master's and doctoral level in leisure service management and therapeutic recreation.

School of Curriculum and Educational Leadership

Professor and Head David England, Ph.D.

Associate Professor and Assistant Head Nan Restine, Ph.D.

The broad mission of the School of Curriculum and Educational Leadership is the study of schooling and the education of professionals for meaningful lifelong work with diverse individuals in schools, industry, higher education, and clinical settings at the state, national and international levels. This mission is focused on the integrated study of curriculum, instructional process, professional development, and educational leadership. Consistent with the goals of OSU's Professional Education Council's Core Concepts and Goals Statement, faculty strive to demonstrate and perpetuate teaching based on theory and research-driven educational practices.

Undergraduate Programs

Associate Professor and Elementary Education Coordinator, Margaret Scott, Ph.D.

Professor and Secondary Education Coordinator, John Steinbrink, Ed.D.

The School offers undergraduate degrees in elementary, secondary and K-12 education, and technical and industrial education.

Completion of the Bachelor of Science in Elementary Education degree qualifies the student for an Oklahoma elementary teaching license (1-8). This program of study includes course work in general education, in a field of specialization, and in professional education accompanied by substantial field-based practicum experiences.

The Bachelor of Science in Secondary Education degree is available in the following discipline areas: English, foreign language, mathematics, science

and social studies. Completion of this program emphasizing English, math, science, or social studies qualifies the student for a secondary (7-12) Oklahoma license. Students emphasizing foreign language, also receive a degree in secondary education and qualify for an elementary/secondary (K-12) Oklahoma license. Professional Education course work in art education for College of Arts and Sciences majors is also offered. Each of these secondary degree programs includes general education courses, extensive specialization course work in the discipline area, and professional education courses accompanied by substantial field-based practicum experiences.

The Bachelor of Science in Technical and Industrial Education (TIED) is designed with two distinct options: the noncertification option, for students interested in adult technical education, and the certification option for students interested in secondary vocational education.

TIED Noncertification Option. Students choosing the noncertification option are prepared to become instructional personnel for technical programs in community junior colleges, technical institutes and industry. Graduates with this option also accept technical employment of various types in business, industry and government.

The noncertification option is designed primarily for graduates of technical programs in technical institutes and community junior colleges. Qualified students from preprofessional programs can be accepted with advanced standing. In addition, students desiring to prepare for careers in technical education may enter the program directly from high school and complete their technical major requirements at OSU.

TIED Certification Option. Students selecting this option are prepared to serve as teachers, supervisors and coordinators for vocational trade and industrial education programs. Plans of study leading to the bachelor's degree are offered for those wishing to qualify for teaching under the approved state plan for vocational education. Students completing this option are qualified to teach in vocational departments of high schools and area vocational-technical centers.

The certification option includes area specializations selected from but not limited to the industrial fields of air conditioning heating and refrigeration, automotive technology, aviation technology, building and grounds maintenance, carpentry, commercial art, commercial photography, computer repair technology, cosmetology, diesel engine technology, drafting, electronics, individualized cooperative education, laboratory

technology, machining, masonry, printing, plumbing, television production, and welding technology. The specific field is determined by the specialization proficiency and teaching aspirations of the student. Since specialization competency normally is required for admission, students are accepted into this option by consent of the program faculty. The required specialization competency may be acquired by completing a vocational trade program in an approved high school, area vocational school, technical college, community junior college, and by apprenticeship training, by actual experience in the field of specialization, or a combination of these. See the section "Professional Education Unit" for details regarding state certification requirements and procedures.

Graduate Programs

Professor and Coordinator Kathryn Castle, Ed.D.

The School offers graduate degree programs at the master's, specialist and doctoral levels. While specialization is required, maximum program flexibility enables students to meet their individual goals. These degree programs are designed to prepare individuals to serve in educational and industrial settings as teachers, curriculum leaders, administrators, reading coordinators, professional development specialists, special educators, and research specialists. In addition, graduate programs prepare persons to assume faculty positions in colleges and universities.

Programs in the School offer the Master of Science (M.S.), Specialist in Education (Ed.S.), Doctor of Education (Ed.D.), or Doctor of Philosophy (Ph.D.) as follows:

Curriculum and Instruction M.S., Ed.D.
(Curriculum Studies/Supervision (curriculum, supervision, instruction, and curriculum administration))

Elementary Education (including early childhood education)

K-12 Education (art, foreign language)

Reading Education (including reading specialist certification)

Secondary Education (English/language arts, mathematics, science, and social studies)

Educational Leadership Ed.S.
(principalship, superintendency, and related roles)

Occupational Education Studies M.S., Ed.S.
Ed.D.

(vocational education, vocational education administration, technical education, trade and industrial education)

Special Education M.S., Ph.D.
(mild-moderate, severe-profound, and behavior specialist)

Curriculum and Instruction

The curriculum and instruction (CIED) program area offers graduate degree programs at the master's and doctoral levels. While specialization is required, maximum program flexibility enables students to meet individual goals. Programs are designed to prepare persons to enter public or private elementary and secondary schools as curriculum directors, department heads, reading specialists and instructional team leaders. Doctoral programs provide preparation for university teaching and research, as well as for K-12 roles, such as curriculum administrators.

A student may earn the degree of Master of Science (M.S.) in curriculum and instruction with emphasis in one of the following: curriculum studies/supervision, elementary education, reading, K-12 education, and secondary education. Students specialize in such areas as art, curriculum/instruction, early childhood education, elementary education, English/language arts, foreign language, mathematics, reading, science, secondary education or social studies. Students planning an emphasis in K-12 and secondary education may incorporate graduate course work from an academic discipline. The master's degree program is also frequently designed to qualify persons for certification in a specific area. Certification in school building administration may be incorporated into a master's degree emphasis.

A student may earn the degree of Doctor of Education (Ed.D.) in curriculum and instruction with emphasis in one of the following: curriculum/supervision, elementary education, K-12 education, reading, or secondary education.

Educational Leadership

Professor and Coordinator Ken Stern, Ed.D.

The Specialist in Education (Ed.S.) degree, with an emphasis in educational leadership, is a program of study beyond the master's degree, that is designed for students who seek to earn certification in administration at the building or district level. The program's primary purpose is to provide a well-articulated plan of study leading to a graduate degree in educa-

tional leadership while fulfilling requirements for certification in school administration.

The Ed.S. program includes a sequence of 33 credit hours—21 hours in an administrative leadership core, six hours in a planned internship during a fall and spring semester, three hours of practicum (a field-based study integrating course work and experiential learning activities), and a three hour elective.

Students must be admitted to either the Ed.S. program or another graduate program of study at OSU to enroll in most Ed.S. courses. (Upon completion of the required courses for certification, students may seek certification.) If students choose to complete the degree program, OSU will recommend certification.

To be considered for admission to the Ed.S. program, students must meet the following prerequisites: hold a standard teaching certificate; hold a master's degree in education or a related field; have at least two years of teaching experience at an appropriate level in an accredited elementary, secondary, or post-secondary school; have completed a course in student exceptionalities; have taken either the MAT or GRE and earned an acceptable score; have written a statement of goals; and have submitted a writing sample.

The majority of the course required for this program are currently listed under the EDLE prefix.

Occupational Education Studies

Professor and Coordinator Reynaldo Martinez, Ph.D.

Occupational education studies consists of areas in technical and industrial education, and graduate studies related to vocational-technical and industrial education. In addition occupational education studies provides programs to prepare vocational administrators, workplace education leaders and occupational professional development personnel who may work in secondary, post-secondary or international education arenas.

The degrees offered include the Master of Science degree in occupational and adult education, vocational education, trade and industrial education and technical education. Most master's programs have the option of a thesis, creative component or internship and report. Admission requires an undergraduate degree in an appropriate field, together with academic qualification indicative of potential success at the graduate level. Experience related to the degree sought

is desirable. Work experience is necessary in the vocational-technical education emphasis.

The master's degree in occupational and adult education is intended for individuals who wish to prepare for broader education roles relating to all vocational education disciplines, adult and continuing education and human resource development. The emphasis in vocational education prepares teachers, curriculum development specialists, professional development specialists and administrators in secondary or post-secondary vocational-technical institutions and government agencies. The emphasis in adult and continuing education prepares teachers and administrators in public and vocational-technical schools, community and junior colleges, universities, medical, correctional, and religious organizations as well as volunteers to facilitate effective learning for continuing education and returning adult students. The emphasis in human resource development prepares trainers, training managers, human resource executives, and related personnel in business, industry, government, military, health care service agencies and other environments to improve organizational performance by improving human performance.

The master's degree in trade and industrial education is designed to develop leadership and expertise in a wide variety of trade areas and industrial program design, implementation and assessment. The program builds and increases the competency of teachers, supervisors, and coordinators in instructional, occupational, and supervisory settings for advanced leadership opportunities in trade and industrial education programs. Plans of study can be designed for those who wish to qualify for state trade and industrial teacher certification credentials.

The master's degree in technical education is offered for persons who are preparing for employment in junior and community college or technical institute technician education programs, and teachers or administrators of technical education programs in domestic and international education settings. An adequate background in a major technical field and undergraduate program with technical course work are required for admission.

The Doctor of Education degree in occupational and adult education is offered with specializations in teacher education and personnel development, vocational education administration, curriculum and instruction, and research. This degree is for individuals who serve in occupational education roles such as university teacher educators, state and

national vocational-technical education agency leaders, and vocational-technical agency leaders, and vocational technical education school administrators. Other potential roles include leadership positions adult and continuing education and private sector human resource development organizations. A doctoral application folder and interview must be successfully completed to gain full admission.

The majority of courses required for this program are listed under the OCED prefix.

Special Education

Professor and Coordinator C. Robert Davis, Ph.D.

M.S. Programs. The academic preparation program in the special education area includes special techniques and arrangements to facilitate the education of individuals with disabilities. At the master's level, students may pursue sub-area emphases in mild-moderate disabilities, severe-profound disabilities, and behavior specialist.

Ph.D. Programs. Graduates pursue careers in university teaching and in the administration of special education programs in public and private settings.

The majority of courses required for this program are listed under the SPED prefix.

General Program Requirements, Application Procedures and Financial Aid

Master's Programs. Students elect one of three plans for completion of the master's degree: Plan I (minimum of 30 hours including a required thesis), Plan II (minimum of 32 hours including a required formal report), or Plan III (minimum of 32 hours including a required creative component). Application to the Graduate College precedes program admission decisions. Neither letter of recommendations nor standardized tests are required for admission.

Specialist and Doctoral Programs. The Ed.S. requires a minimum of 39 hours beyond the master's degree. The Doctor of Education (Ed.D.) and Doctor of Philosophy (Ph.D.) degrees require a minimum of 60 semester hours beyond the master's degree or 40 hours beyond the Ed.S. Application to the Graduate College precedes program admission decisions. For program admission, candidates prepare a folder to be evaluated by faculty. This folder is to include a score from the Graduate Record Exam or the

Miller Analogies Test, a Statement of Goals and Objectives, references, and examples of written expression. An interview may be required.

Financial Aid. Support is available each year for research assistantships and for qualified graduate students to assume teaching responsibilities in the undergraduate curriculum. Selections are usually made in the spring semester for the following academic year. Interested persons are encouraged to apply at any time. Applications can be obtained from the School of Curriculum and Educational Leadership. A limited number of graduate fee waivers and College of Education scholarships are available to eligible graduate students.

School of Educational Studies

Professor and Head Martin Burlingame, Ph.D.

Associate Professor and Associate Head Katy Perry, Ph.D.

The School of Educational Studies offers programs or majors in nine areas: adult education, aviation and space education, higher education, human resource development, organization and leadership, research and evaluation, social foundations, student personnel, and technology. These programs conduct scholarly inquiry into and educate professionals about topics that are foundational to educational thought and practice in a wide variety of occupational roles associated with business, educational and industrial settings. Consistent with the goals of OSU's Professional Education Council's Core Concepts and Goals Statement, faculty strive to demonstrate and perpetuate teaching that is based on theory and research-driven educational practices.

These programs or majors provide specialized training at the undergraduate and graduate levels yet permit flexibility to enable students to meet individualized goals. Additional general information about undergraduate degrees may be found under the "University Academic Regulations" section of the *Catalog*. Additional general information about graduate degrees may be found in the "Master's Degree," "Doctor of Education," or "Doctor of Philosophy" section of the "Graduate College" section of the *Catalog*.

Financial support is available for research assistantships and for qualified

graduate students to assume teaching responsibilities under faculty supervision in the undergraduate curriculum. Selections for assistantships are usually made in the spring semester for the following academic year. However, interested individuals are encouraged to apply at any time. Applications can be obtained from the School. A limited number of graduate fee waivers and College of Education scholarships are available to eligible students. This information can be obtained from the School.

Adult Education

Within the occupational and adult education program, adult education offers the M.S. and Ed.D. degrees for professionals working with adult learners in a wide variety of formal and informal educational settings.

Master's Degree Program. Each student's program of study is individually designed according to the needs of that student, of the academic program, and of the field. Plans of study may include either a thesis or a nonthesis option. The following courses are required as a core to provide a foundation in the nature of the learner, in the art of teaching, in program development and in the background of the field: HRAE 5203—Foundations of Adult and Continuing Education, HRAE 5213—Characteristics of Adult Learners, HRAE 5233—Needs Analysis, and HRAE 5253—Instructional Strategies for Adults.

Each student is expected to identify courses to support the core courses that provide a complete program for satisfying the student's educational goals in the program. These courses may include additional courses in adult education or human resource development, additional foundation courses as needed, a block of courses in another area that represents a cognate area of study, and courses from any department in the University.

Research requirements include three credits in basic research design or quantitative analysis. These may be satisfied by AGED 5980—Research Design in Occupational Education or REMS 5013—Research Design and Methodology. Basic statistics can be satisfied with a course such as REMS 5953—Elementary Statistical Methods in Education. In addition, the research component must include either (1) six credits of thesis, (2) an internship with a formal report, or (3) an identified creative component.

Doctoral Program. Each student's program of study is individually designed according to the needs of that student, of the academic program, and of the field. Plans of study for the Ed.D. degree are

required to include a minimum of 60 hours beyond the master's degree. In this plan, adult education students are expected to have strong foundations in multiple areas including philosophy and psychology. The following courses are required as a core to provide a foundation in the nature of the learner, in the art of teaching, in program development, and in the background of the field: HRAE 5203—Foundations of Adult and Continuing Education, HRAE 5213—Characteristics of Adult Learners, HRAE 5233—Needs Analysis, HRAE 5253—Instructional Strategies for Adults, HRAE 6871—Doctoral Seminar I, HRAE 6881—Doctoral Seminar II.

Each student is expected to identify courses to support the core courses that will provide a complete program for satisfying the student's educational goals in the program. These courses may include additional courses in adult education or human resource development, additional foundation courses as needed, a block of courses in another area that represents a cognate area of study, and courses from any department in the University.

Research requirements include the three areas of (1) a basic knowledge of research design, (2) quantitative research methods, and (3) qualitative research methods. In addition, one other course in either quantitative or qualitative methods is required.

In order to tailor the doctoral program to meet the specific needs of each student, students may include self-directed activities in their plans of study. These include directed independent study of special topics under HRAE 5340 and internships under HRAE 5880 or HRAE 6880. Students should work with their committee chair and program committee members in designing these self-directed activities. Since conducting independent research is a requirement of the Ed.D. degree and an expectation of all doctoral students, the plan of study must contain 10 dissertation hours.

Application Procedures and Admission Requirements. Information is available from the School.

Aviation and Space Education

Aviation Education. The aviation education program prepares students for careers in the aerospace industry. A bachelor's degree on aviation sciences offers three options: professional pilot, aviation management, and technical services management. Each option is tailored to meet specific needs for skilled individuals in the air carrier, air manufacturing and sales, and general aviation

segments of the industry.

Students in the *professional pilot* option complete all flight requirements for private pilot. Commercial pilot with instrument, multi-engine, and certified flight instructor ratings. Flight instructor-instrument and multi-engine instructor ratings are available as electives. Students are prepared for careers as general aviation, corporate, commuter, and airline pilots. Flight labs are conducted at the OSU Aviation Center located at the Stillwater Municipal Airport and all other aviation courses are on the main campus. Both flight and ground school courses are conducted under Federal Air Regulation Part 141. Advanced standing credit may be awarded for flight ratings earned prior to enrollment. OSU is one of the two universities in the nation to operate a high-altitude chamber that is used to supplement aviation safety education. Aviation research using the high altitude chamber is conducted in conjunction with the College of Osteopathic Medicine. The *aviation management* option prepares students for management positions in some component of the aerospace industry. Employment opportunities include positions with fixed-base operators, air carriers, corporate flight departments, commuter and air taxi operations and a variety of career areas associated with airport operations. The *technical services management* option builds on an individual's technical experience in aircraft maintenance or avionics to prepare the student for management positions in all segments of the industry. Twenty-five hours of technical training may be credited toward this option if received from an accredited institution.

Aviation education has an extensive industry-based management internship program established with major and regional air carriers and a variety of other companies within the aerospace industry. In addition to receiving academic credit, those students who qualify gain practical experience, and learn networking and other valuable interpersonal skills.

Space Science Education. The space science education program presents and supports courses primarily designed for pre- and in-service teachers. The program serves as regional teacher resource center for reference and printed materials, and audiovisual aids relating to national projects in aviation and space research.

A major responsibility of the program is the coordination of the Aerospace Education Services Program. Oklahoma State University, under contract to the National Aeronautics and Space Administration, provides aerospace education specialists and support staff for the delivery of educational visits to public schools

and the delivery of space-related information via satellite. In addition to school programs, the specialists support teacher workshops, and work with professional organizations and civic groups.

Graduate Degree Requirements. The program offers M. S. and Ed. D. degree programs.

M.S. Degree Program. Aviation and space sciences within the natural and applied science M. S. degree is a unique program designed to address the needs of the student who desires an emphasis in aviation and space education. The goal of the program is to provide the student with breadth and depth in aviation and space education. The plan of study developed by the student and the advisory committee is determined, in part, by the student's educational experiences.

All M.S. students select core courses from research, organizational theory, and administration and management. The remaining courses, to total a minimum of 32 semester hours, are selected from a suggested list of courses.

Ed. D. Degree Program. The interdisciplinary nature of the applied educational studies program meets the needs of the university aviation education professional. The cross-departmental research core of a student's program might include a combination of two or more course work areas appropriate for the student's needs.

As an interdisciplinary plan of study, course work and dissertation research is developed by the student and the advisory committee, based on the student's educational background and goals.

Application Procedures. Applications to the program are received upon arrival from the Graduate College. These applications are reviewed by the program graduate review committee.

Higher Education

The higher education program has emphases in three areas: administration, academic leadership, and college teaching. In the administration emphasis, the master's and doctoral degree are offered; academic leadership and college teaching offer only the doctoral degree.

The *administration* emphasis prepares individuals for administrative positions in all levels of post-secondary education. Course work emphasizes a thorough foundation in administrative theory, a multidisciplinary approach to understanding the administrative process, and extensive consideration of administrative functions and problems unique to particular higher education contexts. In

academic leadership, course work focuses on developing leaders who work or practice in college and university units specializing in student learning and services. *College teaching* prepares two- and four-year college teachers in a cooperative arrangement between the student's disciplinary field and the higher education program. Students take a majority of their course work in their academic field and selected courses in higher education to prepare them to be skilled college and university instructors. College teaching majors are expected to have an undergraduate or master's degree in the discipline they plan to teach at the college level. Persons interested in college teaching should contact the School for further information about specific cooperative arrangements with selected disciplinary fields. Some course work for these degrees have an EDLE prefix.

Application Procedures. Student applications are reviewed after receipt of all materials including an application essay, resume/vita, samples of written work, a current score on the GRE or MAT, and three letters of recommendations. College teaching applicants also must be admitted to graduate study in their disciplinary areas. Completed folders are reviewed twice a year, after October 1 and February 15.

Human Resource Development

Within the occupational and adult education program, human resource development (HRD) offers undergraduate, M.S., and Ed.D. degrees. These programs emphasize the professional training and development of prospective and practicing trainers, human resource development professionals, and performance improvement technologists.

These degrees are offered in collaboration with adult education and with occupational studies programs in the School of Curriculum and Educational Leadership.

Undergraduate Degree Program. Students choosing this degree, titled B.S. in Technical and Industrial Education, obtain the knowledge and skills needed to analyze, design, develop, implement, and evaluate HDR efforts in workplace education. Qualified students from pre-professional programs can be accepted with advanced standing. In addition, students desiring to prepare for careers in this area may enter the program directly from high school and complete the technical major requirements at OSU. Specific information about degree requirements are available at the School.

Master's Degree Program. Each student's program of study is individually designed according to the needs of that student, of the academic program, and of the field. Plans of study may include either a thesis or nonthesis option. The following courses are required as a core to provide a foundation in the nature of the learner, in the art of teaching, in program development and in the background of the field: OAED 5213–Characteristics of Adult Learners, OAED 5233–Needs Analysis, OAED 5253–Instructional Strategies for Adults, and OAED 5533–Human Resource Development.

Each student is expected to identify courses to support the core courses that provide a complete program for satisfying the student's educational goals in the program. These courses may include additional courses in human resource development or adult education, additional foundation courses as needed, a block of courses in another area that represents a cognate area of study, and courses from any department in the University.

Research requirements include three credits in basic research design or quantitative analysis. These may be satisfied by AGED 5980–Research Design in Occupational Education or REMS 5013–Research Design and Methodology. Basic statistics can be satisfied with a course such as REMS 5953–Elementary Statistical Methods in Education. In addition, the research component must include either (1) six credits of thesis, (2) an internship with a formal report, or (3) an identified creative component.

Doctoral Program. Each student's program of study is individually designed according to the needs of that student, of the academic program, and of the field. Plans of study for the Ed. D. degree are required to include a minimum of 60 hours beyond the master's degree. In this plan, HDR students are expected to have strong foundations in multiple areas including philosophy, psychology, economics, organization theory, and technology. The following courses are required as a core to provide a foundation in the nature of the learner, in the art of teaching, in program development and in the background of the field: HRAE 5213–Characteristics of Adult Learners, HRAE 5233–Needs Analysis, HRAE 5253–Instructional Strategies for Adults, HRAE 5533–Human Resources Development, HRAE 6553–Critical Issues in Human Resource Development, HRAE 6871–Doctoral Seminar I, HRAE 6881–Doctoral Seminar II.

Each student is expected to identify courses to support the core courses that provide a complete program for satisfying the student's educational goals in the program. These courses may include

additional courses in human resource development, or adult education, additional foundation courses as needed, a block of courses in another area that represents a cognate area of study, and courses from any department in the University.

Research requirements include the three areas of (1) basic knowledge of research design, (2) quantitative research methods, and (3) qualitative research methods. In addition, one other course in either quantitative or qualitative methods is required.

In order to tailor the doctoral program to meet the specific needs of each student, students may include self-directed activities in their plan of study. These include directed independent study of special topics under HRAE 5340 and internships under HRAE 5880 or HRAE 6880. Students work with their committee chair and program committee members in designing these self-directed activities. Since conducting independent research is a requirement of the Doctor of Education degree and an expectation of all doctoral students, the plan of study must contain 10 hours of dissertation.

Application Procedures and Admission Requirements. Information is available from the School.

Organization and Leadership

Graduate work is offered at the master's and doctoral level. The program prepares individuals for positions as faculty and administrators in public and private schools, and for positions in state and federal education agencies. The programs emphasize a thorough foundation in administrative theory, a multidisciplinary approach to understanding the administrative process, and extensive consideration of administrative functions and problems unique to particular organizational and educational contexts.

Degree Requirements. The Ed. D. program requires a minimum of 64 hours of course work in core, administration, minor, and research courses, as well as dissertation hours. In conjunction with the School of Curriculum and Educational Leadership, the program supports the Specialist in Education (Ed.S.) with an emphasis in educational administration. Applicants entering the doctoral program after completing the Ed.S. must earn a minimum of 40 hours, including dissertation hours, from Oklahoma State University. Some course work for these degree programs has an EDLE prefix.

Application Procedures. Student applications are reviewed following receipt of all materials including an application essay, resume/vita, samples of written work, a current score on the MAT or GRE, and three letters of recommendation. Complete folders are reviewed twice a year, after October 1 and February 15.

Research and Evaluation

The research and evaluation program offers the M.S. and Ph.D. degrees. The M.S. program prepares students to function as staff members in research and evaluation units in school districts, governmental agencies, and private corporations and foundations. Graduates of the doctoral program are prepared to serve as college or university professors, directors of research and evaluation for public schools and universities, researchers for funded projects, state department of education consultants, and professional employees for test publishers and local, state and federal government agencies.

Degree Requirements. The M.S. requires a minimum of either (Plan I) 41 hours of course work including a written thesis for which six hours will be received or (Plan II) 43 hours of course work including a written report. Course work includes core courses (e.g., educational foundations), specialization courses (e.g., research in education, statistical methods, program evaluation) and elective courses that define a collateral area of study consistent with or complementary to the undergraduate degree emphasis. Students must take two qualifying examinations that cover the program core and the area of professional specialization. The Ph.D. degree requires a university determined minimum of 60 semester hours beyond the master's degree or a minimum of 90 semester hours beyond the bachelor's degree. The typical doctoral student in the program completes nine hours of common core course work in educational foundations (educational psychology, human development, special populations), 33 professional course hours (e.g., statistical methods, psychometric theory, applied multivariate research, program evaluation), 18 hours in one or two collateral areas (e.g., mathematical statistics, computer science) and 15 dissertation hours. Students also select two applied experiences from a list of suggested experiences with the assistance and approval of their committee chair.

Many opportunities exist for graduate students to consult, teach, and collaborate with faculty on research projects. Research collaborations often lead to

conference presentations and scholarly publications.

Admission Requirements. Criteria for full admission to the master's program include an undergraduate GPA of at least 2.50, GRE score of at least 900, and three positive letters of reference. For the doctoral program, criteria include a graduate GPA of at least 3.50, a minimum GRE score of 1000, three positive letters of reference on SES forms, and a master's degree from an accredited institution.

Application Procedures. Applicants must submit a completed portfolio consisting of a Graduate Application for Admission form, three positive letters of recommendation, a signed Confidentiality of Reference form, minimum Graduate Record Exam scores, two official transcripts from each institution attended, Statement of Purpose, and the Graduate College application fee. International applicants must include TOEFL scores and a signed Confirmation of Resources form. Applications are reviewed as they are received.

Social Foundations

Within the curriculum and instruction program, social foundations offers specializations at the M.S. and Ed.D. levels. The roles for which this program prepares individuals are:

Field Based. The program assists practicing classroom teachers in understanding the social, historical, international and philosophical underpinnings of the institution called the school.

University Based. At the Ed.D. level, the program prepares individuals who wish to become teacher education professors in the fields of social foundations. Students traditionally have minors in content areas from the College of Arts and Sciences or the College of Business Administration.

Degree Requirements. The basic structure of the M.S. degree requires social foundations and research (12 hours), minor (12 hours) and thesis (six hours). The M.S. may also include additional course work in social foundations and the minor in lieu of the thesis. In this case, students are required to present a creative component or report (two hours). The basic structure of the Ed.D. degree require a core area in social foundations (12 hours), research (12 hours), supporting course work (nine hours), minor area (18 hours) and dissertation (10 hours). This program is multidisciplinary. Some course work for these degrees has a CIED prefix.

Admission Requirements and Application Procedures. Information concerning admission requirements and application procedures are available from the School.

Student Personnel

The program offers the M. S. and the Ph.D. degrees. The M.S. program in student personnel services prepares students for entry level positions in service delivery and administration in colleges and universities. This program offers practical experience in various student personnel areas to enhance the student's professional development. The program focuses on student development and counseling. The Ph.D. program in student personnel administration prepares students to administer student personnel programs at institutions of higher education. The curriculum is sufficiently flexible to permit individuals to develop an area of expertise, such as training and development, organizational behavior, or research. The program focuses on student development and administration.

Degree Requirements. The master's program is a 48-hour program that includes two internships. The doctoral program is a 105-hour post-baccalaureate program that includes a core of research courses, a specialized course component, and a 36-week internship.

Admission Requirements. Master's applicants must complete a file that includes: official transcripts, MAT or GRE scores, three letters of recommendation, and a statement of professionally-related experiences and goals. A doctoral applicant's file should include: official transcripts, a GRE score, four letters of recommendation, proof of written work, and a statement of professionally-related experiences and goals. Doctoral applicants must possess a master's degree from an accredited institution. Complete criteria for admission to the programs are available from the School.

Application Procedures. Application deadlines for the master's program are October 15 and April 15. Applications for the doctoral program are due February 1.

Technology

Within the curriculum and instruction program, information and communication technology offers both M.S. and the Ed.D. degrees. It is designed to be an interdisciplinary approach to assist in the integration of information and communication technologies in the teaching/learn-

ing process. Its focus is on the utilization of such technologies in elementary and secondary school settings by teachers and administrators as well as in such areas as business, industry, vocational education, and health sciences. Central to the program is the routine assessment of the efficacy of innovative technological systems in the form of research and the broad-based application of that research.

The program is conducted in an educational environment well-equipped to allow students to investigate and participate in applications of leading technologies. Both Oklahoma State University and the College of Education's facilities offer students access to well-equipped computer laboratories, linear and non-linear video production equipment, distance learning television studios, satellite capabilities, and multimedia systems. Close interaction with faculty and other talented graduate students create an atmosphere of collegiality and support for achieving individual goals.

Degree Requirements. The M.S. degree requires a core curriculum consisting of at least one graduate course in each of the following areas: educational foundations, curriculum studies, instructional theory, psychological foundations, and educational research. The M.S. program may also be closely allied with the Oklahoma State Department of Education's requirements for the graduate conversion certificate as a library media specialist.

The Ed.D. may be pursued with an emphasis in information/communication technology. The Ed.D. requires the completion of a minimum of 60 graduate hours beyond a master's degree, 10 hours of which must be dissertation hours.

Admission Requirements and Application Procedures. Entrance requirements for admission to the M.S. degree are based upon acceptable grade-point averages (3.00 for all courses taken for the bachelor's degree or 3.25 for all upper-division and graduate course work or 3.50 for OSU graduate course work included in the initial nine hours of study). All plans require a three-person faculty committee.

For admission to the Ed.D. program. Applicants must complete a folder that is reviewed by faculty. This folder must contain copies of undergraduate and graduate transcripts, written statement of goals and objectives, example(s) of applicant's written expression, letters of reference, and current results of the Miller Analogies Test or the Graduate Record Examination. An interview may be required.

Professional Education Unit

Officers of the Professional Education Council

Ann C. Candler Lotven, *Director of Professional Education*

David England, *Associate Director of Professional Education*

Anne Pautz, *Coordinator of Professional Education Services*

Robert E. Knaub, *Coordinator of Field Relations*

The College of Education coordinates all professional education programs offered at Oklahoma State University. All programs are operated in collaboration with the colleges of Agricultural Sciences and Natural Resources, Arts and Sciences, Human Environmental Sciences and the Graduate College. The dean of the College of Education serves as the director of the Professional Education unit. The Professional Education Council has been established as the governance and oversight structure for the Professional Education unit. The unit has a mission statement and goals that guide the operation of its programs.

Professional Education Council Core Concepts and Goals Statement. Oklahoma State University's Professional Education faculty seek to prepare individuals who believe everyone deserves the opportunity to learn and can learn; who act on the principle that diversity is to be valued; and who are committed to the belief that professional educators providing quality education are the backbone of society.

OSU's professional education programs are devoted to the concept of *integration*. Professional education students learn to integrate personal experience with fields of knowledge and with teaching based on sound theory and research-driven educational practice.

Students' attainment of unit and program goals is assisted and assessed in schools and communities in which continuous professional development for pre-service candidates, in-service school professionals, and university faculty is valued.

All Professional Education programs are administered by the dean of the College of Education and are coordinated through the Office of Professional Education. Upon completion of an approved program or degree, passing the appropriate Certification Examinations for

Oklahoma Educators, and upon the recommendation of the University, the candidate will be eligible for licensure/certification to serve in the schools of Oklahoma. All candidates completing an approved program or applying for a teaching license are subject to all rules and regulations specified by the OSU Professional Education unit, the Oklahoma State Board of Education, and the Oklahoma Commission on Teacher Preparation.

Programs are offered at various levels, but all require the earning of at least a bachelor's degree for recommendation for a standard certificate. Graduate programs leading to the master's degree, the education specialist degree, and both the Doctor of Education and the Doctor of Philosophy degrees are offered in several areas. In addition, there are programs at the graduate level that lead to certification but which may or may not lead to graduate degrees. Professional Education programs at Oklahoma State University have the approval of the Oklahoma State Department of Education.

Undergraduate Professional Education programs are offered in the College of Education as well as in the colleges of Agricultural Sciences and Natural Resources, Arts and Sciences, and Human Environmental Sciences. The student must meet the program requirements of the OSU Professional Education unit as well as the degree requirements of the particular college. Each student who desires to enter a Professional Education program must make formal application to do so and must meet the admission standards specified.

Students classified by the Graduate College as "special" or "provisionally admitted" who are pursuing teacher certification must be admitted to the Professional Education program. Information regarding admission requirements may be obtained from the Office of Professional Education.

The requirements for the degree being sought are made known to the student when he or she first enrolls at Oklahoma State University. While the curriculum may change before a student graduates, a student who makes normal progress toward graduation (no more than two years beyond the normal four-year bachelor's degree requirements) will be held responsible for the degree requirements at the time of matriculation, and any changes that are made, so long as these changes do not result in semester credit hours being added or delay graduation. State-mandated changes in teacher certification may result in additional course requirements for licensure/certification.

Inquiries concerning any aspect of

Professional Education programs at Oklahoma State University should be addressed to the head of the administrative unit offering the program or the Office of Professional Education, 325 Willard.

There are increasing opportunities in business, industry and state and federal agencies for persons with unique preparation in several education specialties. The College also provides academic preparation for a wide range of specialties:

I.

School Service Personnel— Certification Areas

- Administrator (elementary school principal)
- Administrator (school superintendent)
- Administrator (secondary school principal)
- School counselor (elementary and secondary)
- School psychologist
- School psychometrist

II.

Teaching Specialties—Certification Areas

- Elementary school certificate (grades 1-8)*
- Middle level English
- Middle level foreign language
- Middle level math
- Middle level science
- Middle level social studies
- Elementary-secondary school certificate (K-12)*
- Art
- English as a second language
- Foreign language
- Gifted and talented
- Health
- Library media specialist
- Physical education/health
- Reading specialist
- Special education (mild/moderate, severe/profound, and behavioral specialist)
- Secondary school certificate (grades 7-12)*
- English
- Mathematics
- Science
- Social studies
- Speech/Drama
- Technical and industrial education

Undergraduate Certification Programs

Undergraduate programs are offered in the following areas: agriculture; art; elementary education; English; foreign language (French, German, Spanish); mathematics; music-instrumental; music-vocal; occupational agriculture; physical education/health; science; social studies; speech and drama; and technical and industrial education. There are also other teaching endorsements available.

Graduate Programs

Initial certification programs offered at the graduate level are school psychologist, school psychometrist, special education (mild/moderate, severe/profound, and behavior specialist), and speech-language pathology. Advanced certification programs offered at the graduate level include reading specialist, school counselor, elementary school principal, secondary school principal, and school superintendent. Master's degrees are available in conjunction with all of the above programs and doctorates are available in many. Areas of concentration in several of these fields may be included as part of master's and doctoral degree programs if approved by the department head of the administrative unit offering the program and the dean of the Graduate College.

Admission to Professional Education

The criteria for admission to undergraduate Professional Education programs are based on University-wide policies recommended by the director of Professional Education through the Council on Professional Education. Requirements are applicable to all Professional Education administrative units of the colleges preparing teachers. The student is not considered a fully eligible participant in a Professional Education program until formally admitted to Professional Education.

A student will not be permitted to enroll in the courses in the professional sequence, teaching methods and the student teaching internship, unless full admission to the Professional Education program has been earned and maintained. Certain vocational programs may vary from this requirement due to state guidelines. Students should apply for admission to Professional Education as early as possible in their programs.

Criteria for Admission to Undergraduate Professional Education Programs

During the first semester of the academic program, the student must complete the Application for Admission to Professional Education. This form can be obtained in the Office of Student Academic Services, 106 Willard, for College of Education students. Students wishing to enter Professional Education programs within the College of Education must meet the required minimum grade-point average. (See "College of Education Admission Requirements.") If the student is enrolled in the Professional Education program in the College of Agricultural Sciences and Natural Resources, Arts and Sciences, or Human Environmental Sciences, the student should check with the office of the department head for further information. In addition to completing the Application for Admission to Professional Education form, the student should schedule the Professional Education interview and register for the Preprofessional Skills Test (PPST) or meet the current OSRHE alternative admission criteria. Professional Education interviews are generally scheduled during the first early laboratory and clinical experience. Registration booklets for the PPST are available from the University Testing and Evaluation Service and the Office of Professional Education.

After making application to a program in Professional Education, the student may elect to enroll in course work in the following preprofessional education areas (which must be completed before student teaching):

1. Foundations of education;
2. Exceptional child;
3. Early laboratory and clinical experiences (45-clock hours minimum).

Full admission to Professional Education must be achieved before the student may enroll in the remaining professional education sequence of learning theory, evaluation and methods. The student must meet all the following criteria:

1. *Basic Skills Competency.* Teacher candidates are expected to demonstrate competency in basic reading, writing and mathematics. The Preprofessional Skills Test is offered to all Professional Education students and is designed to assess mathematics, reading, English grammar and writing skills. A student may pass the PPST with the OSRHE established Standard Test scores (mathematics 171, reading 173, writing 172) or Computerized Test scores (mathematics 316, reading 320, writing 318); or meet

the alternative criteria by earning a 3.00 GPA in all hours of liberal arts and sciences courses (minimum of 20 hours). Contact the Office of Professional Education for specific information relative to alternative criteria. Information and registration for the Preprofessional Skills Test can be obtained from the University Testing and Evaluation Service and the Office of Professional Education. A study guide for the test is available in the Reserve Room in the Library.

2. *Interview for Admission to Professional Education.* All candidates for full admission to undergraduate Professional Education must satisfactorily complete a formal interview with designated OSU Professional Education faculty. The program interview policy form and guidelines may be obtained from the Office of Student Academic Services located in 106 Willard.
3. *Orientation to Professional Education Course and Laboratory and Clinical Experiences.* An appropriate orientation to Professional Education course must be completed with a grade of "C" or better. One semester credit hour of early laboratory and clinical experiences must be completed with a grade of "C" or better or grade of "P."
4. *Minimum Overall Cumulative GPA of 2.50.* A minimum overall cumulative GPA of 2.50 must be earned, based on no fewer than 40 credit hours of courses to include lower-division general education requirements as specified in the student's program.

Criteria for Admission to Graduate (Post-baccalaureate) Professional Education Programs

Graduate (post-baccalaureate) students must file the form Application for Admission to Professional Education Program—Post-baccalaureate and meet one of the following criteria for full admission to Professional Education.

1. The student must have completed an approved Professional Education program and hold a valid Oklahoma license or Provisional, Standard, or Professional Certificate; or
2. Students in a master's program must (a) satisfy the departmental requirements for unqualified admission to the master's degree program; (b) have a minimum overall GPA of at least 2.50; (c) complete the interview for Professional Education; and (d) complete one semester credit hour of early laboratory and clinical experiences with a

grade of "C" or better or a grade of "P," and (e) complete an orientation to Professional Education course with a grade of "C" or better or a grade of "P."

3. Students classified by the Graduate College as "special" or "provisionally admitted" must (a) have a minimum overall GPA of at least 2.50; (b) complete the interview for Professional Education; and (c) complete one semester credit hour of early laboratory and clinical experiences and an orientation to Professional Education course with a grade of "C" or better or a grade of "P."

Transfer Students

Transfer students must work toward meeting the criteria for full admission to Professional Education established by Oklahoma State University as soon as possible during the first semester at OSU.

Calculating Grade-point Average for Teacher Education

The 2.50 GPA for all Professional Education purposes is calculated based on the University graduation and retention GPA policy. Grades of "I," "NP," "P," "X," "W" or the mark of "AU" or "N" do not affect the overall GPA.

Retention in Professional Education

For participation in all courses requiring full admission to and for continued acceptability in the Professional Education unit, an undergraduate student must maintain a grade-point average required for graduation of at least 2.50. If this GPA falls below 2.50, the student is placed on probation. When the required graduation GPA is raised above 2.50, the student is removed from probation. If the student fails to meet the graduation GPA requirement in that probationary semester or fails to have at least a 2.50 GPA for that semester, the student will be suspended from the Professional Education unit. A student not satisfying the probation requirements at the end of the semester following the initial probationary semester will be administratively withdrawn from the Professional Education program and all courses having full admission as a prerequisite. Readmission to the Professional Education unit will require a new application. Advisers are available to assist the student in regularly reviewing continuing retention or reinstatement in Professional Education programs. A retention review prior to enrollment and

again prior to the beginning of classes each semester is encouraged when continuing retention is in question.

Graduate students, including those classified as graduate special students, admitted to the Professional Education unit must meet and maintain the requirements of the Graduate College to remain in good academic standing with the Professional Education unit. This will require that graduate students earn and maintain a 3.00 GPA at Oklahoma State University following admission to Professional Education.

Additional Professional Education Requirements

Students in Professional Education programs may be required to document competency in a foreign language at the novice high level and to complete a professional portfolio.

These requirements are dependent upon college matriculation, graduation dates, continuous enrollment, and admission to the Professional Education program. Students must contact their advisers for details.

Student Teaching Requirements

In order to participate in student teaching, all teacher candidates must complete the Student Teaching Profile Application form during the semester prior to the student teaching semester. Student teaching information is distributed at a meeting called by the coordinator of field relations and through the Office of Professional Education. Students are notified of this meeting through consultation with advisers, the "Official Bulletins" section of *The Daily O'Collegian* student newspaper, signs on bulletin boards across campus and in residence halls, and by announcements made in Professional Education classes. Students must submit their Student Teaching Profiles to the Office of Professional Education prior to specified dates in September and February. These dates will be announced to students in the same manner as mentioned above. Students will be notified in writing of their placements as soon as the coordinator of field relations has received confirmation from the cooperating schools.

Criteria for student teaching placement for all Professional Education students are:

1. Full admission to a Professional Education program;
2. A current overall grade-point average of at least 2.50;

3. A grade-point average of at least 2.50 in courses listed on the current approved program for licensure/certification in the areas of professional core, major, and college/departmental requirements. No grade lower than a "C" or a "P" in either of these areas;
4. Completion of all preprofessional education course work that includes at least one course in sociological foundations, all early laboratory and clinical experiences (45 clock hours minimum), exceptional child, and human growth and development, with no grade lower than "C" or "P" in any of these courses. It is recommended that professional sequence course work be completed to include learning theory, evaluation, and methods.

Required Grades in Student Teaching. A student must receive grades of "P" in all sections of student teaching in order to be recommended for a teaching license. A student assigned a grade of "F" in any section of student teaching will *not* qualify for a recommendation for a license or any level of certification.

Out-of-Area/Out-of-State Placements

A student requesting an out-of-area/out-of-state placement due to extenuating circumstances must have the approval of the coordinator of field relations and the department program coordinator, and is required to pay the following fees:

1. All necessary and appropriate fees required in securing and finalizing the placement (e.g., reimbursement for cooperating teacher, supervisor, etc.). These fees are payable to the Office of Professional Education and/or out-of-state university at the beginning of the semester in which the placement is sought.
2. If a recommendation for licensure/certification is to be made by Oklahoma State University, the student is responsible for reimbursing visits performed by the cooperating institution. All other criteria pertaining to in-state student teaching placements apply as previously stated.

Appeals

By enrolling in Professional Education programs at Oklahoma State University, students accept the responsibility for complying with all applicable Professional Education Council policies and procedures that allow students to main-

tain good academic standing. If the student believes that the established policies of the Professional Education Council have not been fairly or consistently followed, the student has the right to pursue an appeal to the Admission, Retention and Diversity Committee. For more detailed information pertaining to the appeals process, students are encouraged to contact the Office of Undergraduate Studies.

Certification Examinations for Oklahoma Educators

All students who graduate or are seeking endorsements from a Professional Education program are required to complete the Certification Examinations for Oklahoma Educators before a license or endorsement can be issued. The examinations, which include a General Education Test, a Subject Areas Test, and a Professional Teaching Exam, are administered by the National Evaluation Systems for the Oklahoma Commission for Teacher Preparation five times each year. Registration booklets are available in the Office of Professional Education. To qualify to take the Oklahoma Subject Area Test (OSAT) the student must:

1. be fully admitted to Professional Education;
2. have 90 hours of college credit completed on his or her transcript; and
3. meet minimum requirements for the standard teaching certificate or endorsement teaching credentials required by the Oklahoma State Department of Education.

Copies of the *Objectives and Study Guides for the Oklahoma Teacher Certification Testing Program* have been placed in the Reserve Room of the Library and are listed as "Objectives for Oklahoma Certification Testing Program."

Policies and requirements are being developed for the Oklahoma General Education Test (OGET) and the Oklahoma Professional Teaching Examination (OPTE). Candidates for these tests are individuals who enroll in Oklahoma teacher preparation programs on or after September 1, 1997.

Teacher candidates should plan to take the OGET during their sophomore/junior year and the OPTE and OSAT at or near completion of their program.

Registration deadlines are indicated on the registration booklet and are generally due about seven weeks prior to the testing date.

Personnel in the Office of Professional Education will process and deliver the registration form and required fees to the National Evaluation Systems.

Recommendations for License, Certificate, or Endorsement

Oklahoma State University will not make a recommendation for a license, certificate or endorsement until all criteria have been met for the Professional Education program and a passing score has been achieved on the Oklahoma Teacher Certification Test(s). Applicants recommended by Oklahoma State University for a license, certificate or endorsement must have achieved grades of "P" in all sections of student teaching. A successful recommendation for certification by the Residency Committee will result in a recommendation for the standard certificate. A student assigned the grade of "F" in any section of student teaching will *not* qualify for a recommendation for a license or any level of certification. Applications for an Oklahoma license or certificate can be obtained in the Office of Professional Education. Students seeking advisement concerning teacher licenses or certificates can be assisted by the coordinator of teacher certification in the Office of Professional Education.

Residency Program

A candidate with a license will serve at least one, and in some cases two years, as a resident teacher under the guidance of a Residency Committee consisting of a mentor teacher and an administrator within the local district where the beginning teacher is employed, and a higher education representative. Upon completion of the residency experience (120-180 days) the candidate may be recommended either for certification by the Residency Committee or for an additional year of teaching under the guidance of either the same or a new Residency Committee. If the candidate does not satisfactorily complete the second year as a resident teacher, the Residency Committee will recommend noncertification for the candidate.

College of Engineering, Architecture and Technology

Karl N. Reid, Sc.D., P.E., Dean

**David R. Thompson, Ph.D.,
Associate Dean for Instruction and
Extension**

**Timothy J. Greene, Ph.D., Associate
Dean for Research**

**Virgil Nichols, Ph.D., Director of
Student Academic Services**

Engineers, engineering technologists, and architects, working side by side, constitute one of the most powerful agents for change in our society. New ways are found to control the environment, to utilize the resources and forces of nature and to increase productivity of needed goods and services, in short, to improve the quality of life for all.

Most of the work of engineers, technologists and architects is concerned with the conception, design, fabrication, maintenance and testing of devices, processes, installations, and systems that serve human needs. This work provides ample opportunity to express creativity. It requires an ability to make decisions.

The professionals and semi-professionals who will be largely responsible for the shape of the world in the next few decades include those now in higher education. The power they will exercise makes an exciting prospect and presents a sobering responsibility. The easy problems are usually solved first and are now a part of history. Many difficult problems remain. The need for talented and highly trained people is obvious; one will be embarking on a lifetime of challenge if he or she decides to prepare for a career in engineering, engineering technology or architecture at Oklahoma State University.

The College of Engineering, Architecture and Technology (CEAT) offers a complete spectrum of educational opportunities designed to give graduates the capability and the flexibility to meet the ever-changing requirements of society—a society heavily committed to technological innovation. To be prepared to make continuing contributions, engineers, architects and technologists must have at their command not only the modern tools and processes of industry, but a firm and rigorous education in mathematics, the physical sciences, analysis and design. In order that those

contributions be sensitive to genuine human needs, the engineer, architect or technologist must also be schooled in the social sciences and humanities that provide the understanding of non-technical factors that must shape technological innovation. With this firm foundation and a commitment to lifelong learning, graduates make contributions to society throughout their professional careers.

The curricula in each of the programs seek to provide the optimum combination of breadth in the enduring fundamentals that undergird technologically based society, and specialization in the branch or discipline in order to equip the student to contribute to solutions at the cutting edge of the science or technology involved. Curricula are continuously evolving to include current applications of the principles. With such a bridge between theory and practice, the educational experience should support one's following diverse interests and opportunities throughout the productive years of his or her life span.

Academic Programs

Academic programs offered in the College of Engineering, Architecture and Technology culminate in the following degrees:

Schools of Engineering:

Bachelor of Science in aerospace engineering (an option in Mechanical Engineering), Biosystems Engineering with options in agricultural, biomechanical, environmental and natural resources, and food and bioprocessing; Chemical Engineering with options in environmental and premedical; Civil Engineering with an environmental option; Electrical Engineering with a computer engineering emphasis area; Industrial Engineering and Management; and Mechanical Engineering with an option in premedical.

Master of Biosystems Engineering, Chemical Engineering, Civil Engineering, Electrical Engineering, Environmental Engineering, General Engineering, Industrial Engineering and Management, Manufacturing Systems Engineering, and Mechanical Engineering.

Master of Science in biosystems engineering, chemical engineering, civil engineering, control systems engineering, electrical engineering, engineering and technology management, environ-



mental engineering, industrial engineering and management, and mechanical engineering.

Doctor of Philosophy in biosystems engineering, chemical engineering, civil engineering, electrical engineering, industrial engineering and management, and mechanical engineering.

School of Architecture:

Bachelor of Architecture, Bachelor of Architectural Engineering, Master of Architecture and Master of Architectural Engineering.

Division of Engineering Technology:

Bachelor of Science in Engineering Technology with programs in construction management technology (options in building and heavy), electrical engineering technology (option in computer), fire protection and safety technology, and mechanical engineering technology.

Accreditation

Undergraduate engineering programs are separately accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (EAC of ABET). More information on this accreditation is available from the Accreditation Director for Engineering, Accreditation Board for Engineering and Technology, 111 Market Place, Suite 1050, Baltimore, MD 21202. Specifics of accreditation are found in the sections devoted to specific programs on the following pages.

The Bachelor of Architecture program is accredited by the National Architectural Accrediting Board. More information on this accreditation is available from the Accreditation Director, National Architectural Accrediting Board, 1735 New York Ave. NW., Washington D.C. 20006.

The undergraduate engineering technology programs are separately accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC of ABET). For information on this accreditation, contact the Accreditation Director for Engineering Technology, Accreditation Board for Engineering and Technology, 111 Market Place, Suite 1050, Baltimore, MD 21202. Specifics of accreditation are found in the program descriptions in the section "Division of Engineering Technology."

Special College Programs

Cooperative Education. The Cooperative Education program provides students work opportunities in a supervised environment that assures professional development. Work periods alternate with academic studies. Students enter the program at the end of their sophomore year and complete at least one calendar year of supervised work experience in two or more work periods prior to graduation.

Scholars Enrichment Program. This program provides developmental experiences for a select group of gifted students that will develop their technical competence, world view, professional and public responsibility, and leadership skills. About 25 students are selected by application each year and interview to enter this four year program, based on demonstrated academic and leadership potential. Students participate in special lectures, tours, residence hall programs, seminars, personal development activities, faculty mentoring, and summer tours in the U.S. and abroad.

CEAT Research Scholars Program. This program provides opportunities for accelerated intellectual development of a select group of students. Approximately 12 new freshmen students are identified from applications and interviews annually to participate in this four year program. Each student is assigned to a research faculty mentor, participates in a research program, travels to one or more major research facilities and participates in a national professional society meeting.

Phillips Engineering Scholars Program. The Phillips Petroleum Company sponsors this program to increase the number of outstanding graduates in engineering from Oklahoma State Uni-

versity. Freshman students are identified for this program from applications and interviews with both Oklahoma State University faculty and Phillips employees. The program includes a number of experiences to help students develop professionally, build leadership and teamwork skills, assess personal capabilities, achieve academic excellence, enhance interpersonal relationships, and increase the student's awareness of career opportunities. Special features include the assignment of a Phillips engineer to mentor each student, focused national and international trips and financial support.

Women in Engineering, Architecture, and Technology (WEAT). Programs and resources are in place to develop and support female enrollment in the CEAT. Special counseling and advisement, an active Society of Women Engineers, summer programs in engineering for high school students, a conference for high school and OSU students, and a vigorous recruiting effort are all directed at recruitment and retention of women in engineering, architecture and technology. Female faculty and a coordinator of WEAT programs provide support to this program.

Multicultural Engineering Program. These programs are directed at increasing the number of minority graduates from the CEAT, and increasing the understanding of diverse cultures on the part of all students. Included are programs for recruitment and retention of qualified minority students. Industrial support provides scholarships, summer employment, and supplemental funds for recruitment and retention of minority students. Cultural awareness programming is designed to increase understanding of and sensitivity to the diverse cultures with which students will have to interact in today's world.

Employment Service. A placement office supports the University Career Services and assists students with on-campus interviews and job referrals for summer and permanent employment. Job vacancy listings, reference files, and resource materials on resume preparation, interviewing, and job search techniques, are available for student reference. Orientation meetings and various workshops are provided to prepare students for the process of seeking employment.

CEAT Residence Hall Program. CEAT floors have been established in the Kerr-Drummond residence hall for both men and women CEAT students. Students on these floors have access to computers, reference materials and test files. CEAT student staff live on the floors to provide programming and monitoring. Supple-

mental instruction is provided for selected math, science and engineering courses. Special activities are planned for the floors including events with faculty and other resource persons. This arrangement provides a community where students can study together, have access to tutoring, and serve as role models for other students. The atmosphere on these floors is very conducive to study.

Departmental Clubs and Honor Societies

Alpha Epsilon (agricultural engineering honor society)

Alpha Pi Mu (industrial engineering and management honor society)

Alpha Rho Chi (architecture honor society)

Amateur Radio Club

American Indian Science and Engineering Society

American Institute of Architecture Students

American Institute of Aeronautics & Astronautics

American Institute of Chemical Engineers

American Society of Agricultural Engineers

American Society of Civil Engineers

American Society of Heating, Refrigeration and Air Conditioning Engineers

American Society of Mechanical Engineers

American Society of Safety Engineers

CEAT Student Council

Chi Epsilon (civil, architectural or general engineering honor society)

Construction Management Society

Construction Specifications Institute

CEAT Student Council

Eta Kappa Nu (electrical engineering honor society)

Fire Protection Society

Institute for Operations Research and the Management Sciences

Institute of Electrical & Electronics Engineers (two student branches)

Institute of Industrial Engineers

National Society of Architectural Engineers

Omega Chi Epsilon (chemical engineering honor society)

Pi Tau Sigma (honorary mechanical engineering society)

Sigma Gamma Tau (honorary aerospace engineering society)

Society of Automotive Engineers

Society of Black Engineers, Technologists & Architects

Society of Fire Protection Engineers

Society of Hispanic Engineers

Society of Manufacturing Engineers

Society of Women Engineers

Student Association of Fire Investigators

Tau Alpha Pi (technology students honor society)

Tau Beta Pi (engineering students honor society)

CEAT Honors Program

The Honors Program provides opportunities for challenges for undergraduate students of unusually high ability, motivation and initiative. Honors classes, seminars and independent study courses are structured to put interested students and teachers together in ways which encourage discussion and a mature approach to learning.

Each honors course completed with an "A" or "B" grade is identified on the student's transcript as such. A special bachelor's degree honors diploma is conferred upon graduation for successful completion of all Honors Program requirements.

Qualified high school scholars are eligible for the Honors Program beginning with their first enrollment at OSU as freshmen. Eligibility is based on a composite ACT score of 27-29 and a high school grade-point average of 3.75 or higher, or an ACT score of 30 or higher with a 3.50 high school grade-point average. Students other than new freshmen may enter the Honors Program if they have a cumulative grade-point average of at least 3.25. Students should contact the OSU Honors Program, 509 Edmon Low Library, for eligibility forms.

Honors Recognition. The General Honors Award is earned by completing a minimum of 21 honors credit hours with grades of "A" or "B." At least three honors credit hours must be completed in each of four of the following areas: (1) English, speech communication and foreign languages (2000 level or higher), (2) humanities, (3) mathematics, statistics and computer science, (4) natural science, (5) social science, and (6) other courses with honors credit. Three of the 21 credit hours must be in a special honors seminar or an interdisciplinary honors course. A 3.50 or higher cumulative grade-point average is required at the time of the award. Completion of the General Honors Award is noted on the student's official transcript.

The College Honors Award is earned by completing a minimum of 12 honors credit hours in upper-division courses

with grades of "A" or "B." The 12 credit hours must include a senior honors thesis or senior honors project with a public presentation of the results. A 3.50 or higher cumulative grade-point average is required at the time of the award. Completion of the College Honors Award is noted on the student's official transcript.

Students who complete a minimum of 39 honors credit hours with grades of "A" or "B" and have received both the General Honors Award and the College Honors Award will be granted the bachelor's degree with honors. This recognition is reflected on the student's official transcript and on a special honors diploma.

Scholarships

Several scholarships are funded through private donations, alumni gifts, and industries, and vary in amounts from \$400 to over \$2,000 per year.

These scholarships are available for freshman through senior students, and are awarded primarily on the basis of academic achievement and leadership potential. However, during the selection process consideration may be given to financial need and other factors. Freshman students should normally have an ACT composite score of 29 or higher and be in the top 10 percent of their high school graduating class to be competitive for CEAT scholarships.

Each school or department within the College normally has scholarship funds available. These are administered through that school or department rather than through the College's scholarship committee. However, a separate application form is not required.

Scholarship application forms for transfer students may be obtained by contacting the Office of Student Academic Services, CEAT, 101 Engineering North, OSU, Stillwater, OK 74078.

Freshman scholarship applications should be completed and on file by February 1 preceding the academic year for which the student expects to receive the scholarship in order to assure full consideration. The OSU Freshman Fee Waiver and Scholarship form should be submitted to the Office of University Scholarships. Since copies of these applications are forwarded to CEAT, a separate application is not required.

Continuing students should submit scholarship applications to the head of the school in which they are majoring prior to May 1. In this manner they will also be considered for any departmental scholarships for which they may be eligible as well as for any CEAT scholarship. Students who have not selected a

major should submit their applications to the Office of Student Academic Services.

Concurrent Enrollment

If a student expects to apply credits toward a degree at OSU that are to be earned at another institution or through correspondence or extension, while enrolled in one of the programs of the College of Engineering, Architecture and Technology, permission must be obtained in advance. It is the belief of the faculty of the College that such enrollment detracts from the educational process at this institution, and can be justified only in the most unusual circumstances. Normally, if the material for which such permission is sought is available at OSU, permission will not be granted, nor will retroactive permission be granted in any circumstances.

High School Preparation

Beginning engineering students who have completed two units of algebra and one each in plane geometry and trigonometry/analysis in high school should be prepared to enter at the expected level in mathematics. In addition, students who can should obtain high school credit in one unit of general chemistry, one unit of general physics, and a course in calculus, if available.

Oklahoma State University offers course work in algebra, trigonometry and preparatory chemistry for students who were unable to obtain this work during high school. However, such credit does not count toward the minimum number of semester hours specified for the B.S. degree in engineering.

General chemistry, college algebra and trigonometry credits may count toward B.S. degrees in engineering technology, and general chemistry may be used as an elective in architecture.

General Education Requirements

For students in Engineering, Architecture and Technology, courses in the humanities and social sciences provide both a broadening of the education and essential background for addressing the critical issues in society. Students should contact an adviser in the CEAT Office of Student Academic Services to select sequences of courses that meet both of these objectives and satisfy the OSU general education requirements.

Schools of Engineering

Each of the schools of engineering offer bachelor's, master of (designated) engineering, master of science, and doctor of philosophy degree programs. The common curricular objectives for the engineering programs are to develop each student's: (1) capability to delineate and solve in a practical way the engineering problems of society, (2) sensitivity to the socially-related technical problems which confront the profession, (3) understanding of the ethical characteristics of the engineering profession and practice, (4) understanding of the engineering responsibility to protect both occupational and public health and safety, and (5) ability to maintain professional competence through life-long learning.

The Professional School Concept

In accord with the professional nature of a career in engineering, a student entering OSU is admitted into the pre-engineering program, consisting of the course work normally taken the first two years of an engineering curriculum. Near the completion of the pre-engineering course work, the student is considered for admission to one of the professional schools of the College to continue in the upper-division program. Upon meeting admission standards the student then pursues a curriculum leading to the B.S. degree with an optional additional year leading to a master's degree in his or her discipline.

Preprofessional School. The content of the pre-engineering program is similar for most engineering specialities, and includes course work devoted to mathematics through calculus and differential equations, communication skills, general chemistry, general physics, engineering sciences, social sciences, and humanities.

Professional School. Upon formal admission to the professional school of his or her choice, the student proceeds through the junior and senior years of the degree program, fulfilling "Major Requirements" as listed on the degree requirements sheets in the publication *Undergraduate Programs and Requirements* that is considered a companion document to this *Catalog*. Upon completion of all degree requirements, the student is awarded the Bachelor of Science degree.

Master of Engineering. The Master of (specific school) Engineering degree programs are designed to prepare the graduate for the practice of the engineering profession in industry and govern-

ment. They are distinguished by particular emphasis on developing in students the ability to perform effectively in design and development work; the programs normally include internship experiences as a part of the academic process.

Admission to one of these programs also depends upon being accepted by one of the professional schools. The total program consists of all undergraduate degree requirements, and a 32-semester-credit-hour study program in graduate-professional status meeting Graduate College requirements for a Plan III master's degree. At least 24 semester hours must be at the 5000 level, including six to eight hours of professional practice.

The professional school plan of study when filed with the Graduate College becomes the preliminary plan of study for the graduate portion of the program. A separate final plan of study must be filed with the Graduate College by the end of the second week of the term during which all requirements for graduation are to be completed.

Master of Science and Doctor of Philosophy. These degree programs are available in each engineering school to prepare engineers for careers in advanced engineering, research and development. The programs are described under each school's headings, and in the "Graduate College" section of the *Catalog*.

Admission Requirements

All new engineering students at Oklahoma State University are first admitted to the preprofessional school program. Regardless of previous background all new engineering students must enroll in ENGR 1111. Students transferring to preprofessional school from another major at OSU or University Academic Services must meet the same requirements for admission as a student transferring from another college or university.

Resident transfer students will be admitted directly to preprofessional school if they satisfy all OSU resident transfer student requirements and have a GPA of at least 2.00 not to include activity, performance or remedial courses in the most recent semester completed.

Nonresident transfer students admitted to OSU may enter directly to preprofessional school if they appear to have the ability to make satisfactory progress toward an engineering degree as indicated by the following:

1. An overall GPA of at least 2.70, and
2. A GPA of at least 2.50 over all mathematics, physical science, engineering science and engineering courses, and

3. A GPA of at least 2.00 (in at least 12 hours if a full-time student) in the most recent semester completed.

For these purposes, all GPAs are calculated using only the last grade in any repeated course.

Students not directly admissible to preprofessional school but those who meet OSU requirements for admission may be admitted to University Academic Services for one or two semesters in order to fully evaluate their qualifications for admission to pre-engineering. After grades are received each semester, such students may be evaluated and, if qualified, will be admitted to pre-engineering.

Transfer students who have completed all lower-division course requirements may, with the school head's permission, be allowed to take selected 3000-level engineering courses while in pre-engineering status.

International student applications must be received by June 15, November 1 and April 1 for the fall, spring and summer terms, respectively, to be considered for admission to pre-engineering.

Admission to the Professional Schools. In each school of engineering the lower-division course work is devoted to preparing the student for professional school.

To be admitted to one of the professional schools of engineering, the student must have:

1. Completed a minimum of 60 semester credit hours in an accredited institution of higher learning.
2. Demonstrated an acceptable level of competence in subject material comparable to that covered in Pre-engineering, i.e., General Education and Common Pre-engineering. Such demonstration may be by completion of course work or by examination with not more than half the requirements satisfied by examination.
3. Been formally accepted by a professional school.

An acceptable level of competence for admission to a professional school may be demonstrated by:

- a. Completion of the preprofessional school requirements as designated on the flow chart corresponding to the student's matriculation date and major, with an overall grade-point average of 2.30 or higher in these courses. Students may be deficient in no more than nine of these hours, and must have completed the required sequences in calculus, general physics, general chemistry, English composition, and at least two engineering science courses.

- b. Final grades of "C" or better in all required English composition courses.
- c. Completion at OSU of at least 12 semester credit hours of courses required for the degree, with a grade-point average of 2.30 or higher in these courses. This must include at least nine hours of technical subjects with a GPA of 2.50 or higher.
- d. Achievement of an overall grade-point average of 2.50 or higher in the required mathematics, physics, chemistry, engineering science and engineering courses completed prior to admission to a professional school and final grades of "C" or better in each of these courses.

For these purposes, all GPAs are calculated using only the last grade in repeated courses. Individual schools may impose higher standards for admission. Currently, the School of Electrical and Computer Engineering requires a 2.60 and 2.70 respectively where 2.30 and 2.50 are indicated in a., c., and d. above.

In addition, if the number of qualified professional school applicants to a given professional school exceeds the number that can be provided a quality program with the resources available, the number admitted each semester to that professional school will be limited. In that event, priority for admission will be given first to Oklahoma resident pre-engineering students on a best qualified basis as determined by the grade-point average in courses taken and completed at OSU. This practice will preserve the high standards demanded of a quality educational experience sought by students and is necessary so that OSU graduates will continue to be highly regarded.

Admission to Graduate-Professional Status. To be admitted to graduate-professional status in a professional school in the CEAT, a student must have satisfied requirements for a B.S. degree in engineering, meeting the criteria of the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology. Students with B.S. degrees in physics, chemistry, etc., must complete work to meet ABET undergraduate requirements before gaining graduate-professional status. Scholastic performance as an undergraduate at a level that indicates a high probability of success in a graduate program requiring a 3.00 minimum GPA on a 4.00 scale is also a requirement.

Class Placement

The selection of the initial chemistry and mathematics courses for an entering

student in the College of Engineering, Architecture and Technology is determined by the amount of and grades in mathematics or chemistry completed in his or her high school program, and ACT test scores. When appropriate, students with a strong background can obtain academic credit by advanced standing examination or by College Level Examination Program (CLEP) tests.

Academic Advising

The College's Office of Student Academic Services provides advisement for all pre-engineering students. When a student has gained admission to a professional school of engineering, he or she will be assigned a faculty adviser in the school.

Each student is personally advised in the planning and scheduling of his or her course work and is counseled and advised individually on matters of career choice, his or her activities at OSU, and on other academic matters. An academic file is created for each student at the time of initial enrollment.

Each student and his or her adviser must carefully select elective courses to meet the curriculum objectives and accreditation criteria. Specific criteria include appropriate computer-based experiences, knowledge of probability and statistics, competence in written and oral communications, an understanding of ethical, social, economic and safety considerations, and engineering design experiences that are integrated throughout the curriculum. The engineering design experiences begin with ENGR 1322 and culminate with a major engineering design experience specified on the degree requirement sheet. The adviser assists the student in this effort and tries to assure accuracy and compliance; however, the ultimate responsibility for meeting degree requirements rests with the student.

General Education Requirements

Opportunities to satisfy General Education requirements with required courses in the schools of engineering include:

English. Students are required to complete a course in technical report writing. Thus, students making an "A" or "B" in the first English composition course (ENGL 1113), need not take ENGL 1213, and may take ENGL 3323, to meet both the General Education requirement for English and the College requirement for technical writing.

Humanities and Social Science. Engineering students must complete a total of

18 semester credit hours to meet this requirement. By taking American history and political science, six additional hours of social and behavioral sciences, and six hours of humanities, the 18 hours will meet the University's requirements in these areas. Humanities and Social Science courses must be selected with the assistance of a CEAT adviser in order to assure compliance with accreditation requirements for both breadth and depth and the University's requirement for an International Dimension.

Biosystems and Agricultural Engineering

Professor and Head Billy J. Barfield, Ph.D., P.E.

The School of Biosystems and Agricultural Engineering is administered jointly by the College of Agricultural Sciences and Natural Resources and the College of Engineering, Architecture, and Technology.

Biosystems engineers are professionals who create and adapt engineering knowledge and technologies for the efficient and effective production, processing, storage, handling and distribution of food, feed, fiber and other biological products, while at the same time providing for a quality environment and preserving natural resources. Specialization is provided in emphasis areas or options of food and bioprocessing, environment and natural resources, biomechanical, and general agricultural engineering.

Biosystems engineering courses integrate the engineering sciences with biological sciences and teach students to design solutions to real problems of society. Students work both as individuals and in teams to solve real world design problems provided by industrial firms who hire biosystems engineers.

The goal of the biosystems degree programs is to produce graduates who possess broad-based knowledge, skills and judgment that prepare them to succeed in the profession of engineering or in further studies at the graduate level. To achieve this goal, the specific objectives listed below are integrated throughout the program.

In the preprofessional portion of the biosystems engineering program (usually equivalent to two years of study) the focus is on the underlying biological, physical, chemical and mathematical

principles of engineering, supplemented by appropriate general education courses in English, social sciences and humanities. Students who demonstrate proficiency in this portion of the program are eligible for admission to the professional school in biosystems engineering.

The professional school of biosystems engineering curriculum (typically two years) builds systematically upon the scientific knowledge acquired in the preprofessional curriculum. In professional school, students have the opportunity to focus on the option areas given above. Regardless of the option area, the degree is accredited at the basic level by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology under agricultural engineering and similarly named programs.

Each professional school course builds upon preceding engineering courses to develop in the student the ability to identify and solve meaningful engineering problems. The course work is specifically sequenced and interrelated to provide design experience at each level, leading to progressively more complex, open-ended problems. The course work includes sensitizing students to socially-related technical problems and their responsibilities as engineering professionals to behave ethically and protect occupational and public safety. The program culminates in senior year design courses in which students integrate the analysis, synthesis and other abilities they have developed throughout the earlier portions of their study into a capstone experience. At this point, they are able to design components, systems and processes that meet specific requirements, including such pertinent societal considerations as ethics, safety, environmental impact and aesthetics. The students have also developed and displayed the ability to conduct experiments essential to specific studies and to analyze the experimental results and draw meaningful conclusions.

An integral part of this education continuum from basic science through comprehensive engineering design are learning experiences that facilitate the students' abilities to function effectively in both individual and team environments. Moreover, the program provides every graduate with adequate learning experiences to develop effective written and oral communication skills. State-of-the-art computational tools are introduced and used as a part of their problem-solving experiences. Finally, the students' experiences in solving ever-more-challenging problems enables them to continue to learn independently throughout their professional careers.

A wide variety of employment opportunities are available for biosystems engineers in industry, public service and education. Some of these opportunities include positions in governmental agencies, consulting, machinery industry, manufacturing and installation, and electric power management industries. Biosystems engineers have careers in foreign countries as well.

Students interested in a degree in biosystems engineering may initially enroll in either the College of Engineering, Architecture and Technology or the College of Agricultural Sciences and Natural Resources. Students who enroll in the College of Agricultural Sciences and Natural Resources should request a biosystems engineering adviser and transfer to the College of Engineering, Architecture and Technology by the end of their first semester.

Graduate Programs

The School of Biosystems and Agricultural Engineering offers three programs leading to post-baccalaureate degrees: Master of Biosystems Engineering, Master of Science and Doctor of Philosophy. The Master of Biosystems Engineering program places emphasis on design and internship in engineering experience. The Master of Science and Doctor of Philosophy degrees emphasize research and development.

Excellent facilities are available for students to explore research and design in bioprocessing and food engineering, environmental physics, non-point-source pollution control, hydrology, water resources, water quality, air quality, wind erosion, machine development for biological systems, microelectronics, intelligent machines for biological production, irrigation design, and hydraulics.

Research projects are supported by the Agricultural Experiment Station and by state and federal grants. A well-trained faculty, many of whom are registered professional engineers with research, consulting and design experience, guide the graduate students' activities and plan programs to meet students' needs. Graduate students design experiments and special equipment to conduct their work. They are expected to demonstrate, by supporting research or by designs, the ability to identify a problem, define alternatives, propose a solution, organize a design or an experimental investigation, carry it to completion and report the results.

Admission Requirements. Admission to either the Master of Science or Doctor of Philosophy degree program requires graduation from an engineering curriculum accredited by the Accreditation

Board for Engineering and Technology. Students without accredited degrees may be admitted provisionally and may be required to take additional courses.

Admission to the Master of Biosystems Engineering degree program is permitted for students who meet the prerequisites as stated in the "Master of Engineering" section in the *Catalog*. The departmental graduate committee evaluates the applicant's credentials to determine equivalency and specify requirements to overcome deficiencies. A student must be accepted by an adviser in the School prior to official admission to the graduate program.

Degree Requirements. A candidate for any of the graduate degrees listed above follows an approved plan of study which must satisfy at least the minimum University requirements for that particular degree.

Chemical Engineering

Professor and Head R. Russell Rhinehart, Ph.D.

Chemical engineers use the language of mathematics to describe the chemical and physical behavior of molecules (solid, liquid, gas, or plasma). This ability is used to design and operate processes that produce useful products to benefit human welfare. Chemical engineers work in a wide range of industries that make pharmaceuticals, fuels, biochemicals, semiconductor materials, foods, plastics, paper, petroleum refining and chemicals. Key to providing a benefit to society, chemical engineers are responsible for resource conservation, minimizing pollution, minimizing costs, and maximizing quality and safety of processes that make the products.

The emphasis on the chemical nature of everything people use is what makes chemical engineers different from other engineers. The emphasis on the processes that make the products is what makes chemical engineers different from chemists.

Chemical engineers often find themselves defining a problem or product, developing a process to do what is needed, and then designing the plant to carry out the process. After the plant is started, chemical engineers commonly manage operations, oversee equipment maintenance, and supervise control of product quality. They trouble-shoot the problems which hinder smooth operations, and they plan for future expansions

or improvements. Their training and knowledge make them well qualified to market the products from a plant, the processing equipment for plants, or even the complete plant itself. The varied background and experience of chemical engineers make them ideally suited for advancement into top-level managerial and executive positions.

The goal of the B.S. degree program is to produce graduates who possess broad-based knowledge, skills and judgment that prepares them to succeed in the profession of engineering or in further studies at the graduate level including medical school. To achieve this goal, the objectives described below are integrated throughout the program.

In the preprofessional portion of the chemical engineering program (usually equivalent to two years of study), the focus is on the underlying scientific and mathematical principles of engineering, supplemented by appropriate general education courses in English, social sciences and humanities. Students who demonstrate proficiency in this portion of the program are eligible for admission to the professional school.

The curriculum in the professional school (typically two years) builds systematically upon the scientific knowledge acquired in the preprofessional curriculum. In professional school, students have the opportunity to focus in one of three emphasis areas: (1) the regular course prepares a graduate for a wide range of employment opportunities; (2) the premedical emphasis is for those who wish preparation for medical school or seek employment in medically-related professions; and (3) the environmental emphasis is for those who wish to emphasize environmentally-related studies. Each emphasis area is accredited under the basic level ABET criteria for chemical engineering programs and each prepares a student for success in M.S. or Ph.D. study at OSU or other universities. A more complete description of exact degree requirements for the bachelor's-level curricula is given in the publication *Undergraduate Programs and Requirements at OSU*.

Admission requirements for the professional school are:

Completion of at least 60 college level semester credit hours (SCH).

Completion of at least 12 SCH from OSU.

Completion of at least 51 SCH from the preprofessional school courses.

Completion of MATH 2145, 2155, and 2233; PHYS 2014 and 2114; CHEM 1515, 3053, and 3153; ENSC 2213 and 3233; CHE 2033, ENGL 1013 (or 1113 or 1313), and, if required, ENGL 1033 (or 1213 or 1413).

An overall GPA of 2.30 or better at OSU.

A GPA of 2.50 or better, in all of the college-level science and engineering courses taken at OSU and required for the B.S. These courses depend on degree option, but include MATH, STAT, PHYS, CHEM, BIOL, GEOL, ENGR, ENSC, CHE, etc.

A final grade of "C" or better in each of these technical and English courses.

Each professional school course builds upon the preceding chemical engineering courses to develop in the student the ability to identify and solve meaningful engineering problems. The course work is specifically sequenced and interrelated to provide design experience at each level, leading to progressively more complex, open-ended problems. The course work includes sensitizing students to socially-related technical problems and their responsibilities as engineering professionals to behave ethically and protect occupational and public safety. The program culminates in the senior-year design courses in which the students integrate the analysis, synthesis and other abilities they have developed throughout the earlier portions of their study into a capstone experience. At this point, they will be able to design components, systems and processes that meet specific requirements, including such pertinent societal considerations as ethics, safety, environmental impact and aesthetics. The students will have also developed and displayed the ability to design and conduct experiments essential to specific studies and to analyze the experimental results and draw meaningful conclusions.

An integral part of this educational continuum from basic science through comprehensive engineering design are learning experiences that facilitate the students' abilities to function effectively in both individual and team environments. Moreover, the program provides every graduate with adequate learning experiences to develop effective written and oral communication skills. State-of-the-art computational tools are introduced and used as a part of their problem-solving experiences. Finally, the students' experiences in solving ever-more-challenging problems give's them the ability to continue to learn independently throughout their professional careers.

Upon completing the B.S. studies the qualified student is encouraged to continue in the master's program.

Graduate Programs

The School of Chemical Engineering offers programs leading to the post-baccalaureate degrees of Master of Science and Doctor of Philosophy. A

program of independent study and research on a project under the direction of a member of the Graduate Faculty will be satisfactorily completed by all graduate students. For the Master of Science candidate, the project may result in a thesis. For the Doctor of Philosophy candidate, the project will result in his or her dissertation.

Admission Requirements. Admission to either the Master of Science or Doctor of Philosophy degree program requires graduation from a chemical engineering curriculum approved by the Accreditation Board for Engineering and Technology (ABET). Graduates from other curricula should submit transcripts to the head of the School of Chemical Engineering for evaluation.

The Master of Science Degree. General requirements for the Master of Science degree in chemical engineering are 30 semester credit hours of course work beyond the B.S. degree and an acceptable thesis. At least 18 hours must be in class work and a minimum of six hours of credit is required for thesis research. The courses taken must include CHE 5123, 5213, 5743, and 5843.

The Doctor of Philosophy Degree. The general credit requirement is a minimum of 90 semester credit hours beyond the B.S. degree including at least 36 hours of credit for research and at least 27 hours of course work. The courses must include CHE 5123, 5213, 5743, 5843, and three hours of "Research Methods." Each student is responsible for consultation with his or her advisory committee in preparing the study plan.

Civil and Environmental Engineering

Professor and Head Robert K. Hughes, Ph.D., P.E.

The exceptional diversity of professional practice in civil engineering presents many career opportunities for students well-founded in the physical sciences, mathematics, geology and biology.

The concern of civil engineers is a person's environment—its control, alteration and utilization. Civil engineers engage in planning, designing and constructing highways, waterway and railway systems, harbors and shipping facilities, systems for the treatment and distribution of water and for the collection and treatment of sewage and industrial

waste, dams and hydroelectric works, airports and terminals, structures of every kind including buildings, bridges, towers, industrial plants, tunnels and subway systems, schemes for the control of water and air pollution, and many other works of general benefit to society.

The professional curriculum in civil engineering is based on the pre-engineering courses in mathematics, physical sciences and engineering sciences. On this foundation, required courses train the student in the basic skills needed for the professional practice of civil engineering and provide the tools for more advanced study. Engineering theory and principles are developed in a way that will encourage their application to the solution of practical problems. Elective courses give experience in the solution of typical problems and develop the judgment and confidence of the student engineer.

The goals of the School are to provide a curriculum that is well balanced among the six major areas of civil engineering practice; to provide access and exposure to laboratory, computational and design experiences that will enhance performance in the practice of civil engineering; to enhance communicative skills and an understanding of management principles; to encourage the development of social relationships and experience in team participation; and to ensure student understanding of the ethical and societal responsibilities of professional practice. Program curricula requirements are outlined in the publication *Undergraduate Program and Requirements* that is considered a companion document to the *Catalog*. The civil and environmental program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology under the criteria for civil and similarly named engineering programs.

Design talents are developed through a series of courses in which the design component is integrated into course instruction. The first design experience occurs in the freshman year with a computer-aided design course. Concrete, steel, geotechnical and environmental design experiences occur in junior and senior level courses. The design component is culminated by a senior design experience using previous design exposure. The design requirements are provided in the publication *Undergraduate Programs and Requirements*.

Engineering ethics, occupational and public health and safety issues; teamwork; contemporary issues involving state, federal and local government issues; and professional practice are integrated into the course curriculum.

Some degree of specialization is provided through the choice of elective courses in structures, engineering mechanics, transportation engineering, soil mechanics and foundations, construction engineering and management, environmental engineering and water resources. There is a designated emphasis for those students wishing to concentrate more heavily in the environmental area of practice. The environmental emphasis is accredited as a civil engineering program. Strong support for various parts of the program are given by the departments of Industrial Engineering and Management, Mechanical and Aerospace Engineering, Agronomy, Chemistry, Geology, and Microbiology.

Graduate Programs

The School of Civil and Environmental Engineering offers five programs leading to post-baccalaureate degrees—the Master of Civil Engineering degree, the Master of Environmental Engineering degree, the Master of Science degree in civil engineering, the Master of Science degree in environmental engineering, and the Doctor of Philosophy degree. The Master of Civil Engineering and the Master of Environmental Engineering degrees are graduate professional degrees with increased emphasis on professional practice through a broad spectrum of management, economic and technical studies and the incorporation of actual engineering design experience before graduation. The Master of Science degree, on the other hand, is characterized by a higher degree of technical specialization in a particular area of study. The Doctor of Philosophy degree is designed to prepare a student for research and for the teaching profession in engineering.

Major areas of study in the School are applied mechanics, structural analysis and design, transportation, construction engineering and management, geotechnical engineering, water resources, and environmental engineering. Research in all major fields is continuously pursued. Master of Civil Engineering candidates may choose either to specialize or to engage in a broadly based program of study, in accordance with an approved and purposeful plan of study.

Admission Requirements. Candidates for the Master of Science or Doctor of Philosophy degree must have graduated from a civil engineering curriculum accredited by the Accreditation Board for Engineering and Technology. Graduates from other curricula and schools should submit transcripts to the head of the School of Civil and Environmental Engineering for evaluation. Admission to the

Master of Science in environmental engineering degree program is permitted for students who meet the minimum prerequisites as established by the School of Civil and Environmental Engineering.

Degree Requirements. All degree programs follow an approved plan of study that must be submitted at a designated time. All programs are characterized by the flexibility available in a study plan that is designed to satisfy the particular needs of the student, while conforming to the general requirements implied by the title of the degree and specified by the University.

The Master of Science degree in either civil or environmental engineering requires the completion of at least 30 semester credit hours beyond the bachelor's degree, including a research thesis for which not more than six semester credit hours may be granted. The non-thesis option (32 semester credit hours) described in the "Graduate College" section may be permitted at the discretion of the student's adviser.

The Doctor of Philosophy degree requires the completion of at least 90 semester credit hours of course work beyond the bachelor's degree, including not more than 30 semester credit hours for the research thesis. In addition, the candidate must complete six semester credit hours of course work in an area such as languages, mathematics, statistics, experimental techniques, research methodology, or similitude, (as specified by the advisory committee) that will facilitate his or her research effort. Generally, official admission as a candidate for the Doctor of Philosophy degree in any program offered by the School will not be granted until a member of the Graduate Faculty in the School agrees to serve as major (or thesis) adviser for the prospective candidate.

Electrical and Computer Engineering

Professor and Head
Michael A. Soderstrand, Ph.D.

Electrical Engineering

The electrical engineering program provides the fundamentals for a career in many related areas. All around is seen the astounding impact of microelectronics on consumer products such as

calculators, electronic watches, TV games, home computers and microwave ovens, but the future impact will be even more astounding on worldwide satellite communications, energy conservation, automation of industrial plants, oil and gas exploration, electrical power generation and distribution, to mention a few.

The curriculum is planned to provide skills in the analysis of engineering problems and the design of solutions to those programs. It provides experience in working as a team member on design projects. Emphasis is placed on the development of both written and oral communications skills and the concept of professionalism including the importance of life-long learning.

The School of Electrical and Computer Engineering offers a full range of undergraduate and graduate program choices. A degree in electrical or computer engineering is also an excellent foundation for graduate work in other professional fields such as medicine and law. Many graduates also pursue advanced programs in business and management after earning a degree in engineering.

The undergraduate electrical and computer engineering program at Oklahoma State University prepares each graduate for a life-long professional career. During the first two years, students complete a carefully designed pre-engineering program consisting of mathematics, physical sciences, engineering sciences and selected courses in the humanities and social sciences. During the final two years of the program, each student concentrates his or her study on electrical and computer engineering subjects and can elect from the following areas: computer engineering, electronics, energy systems, communications, control systems, electromagnetics, solid state devices, optics, and network theory/signal processing. Specific elective courses must be selected to assure that the design experience is integrated throughout the curriculum, culminating in the two major design courses at the senior level.

Computer Engineering

A special emphasis area in computer engineering is offered by the School of Electrical and Computer Engineering. This area is designed for students who have a strong interest in computers and desire to gain a full understanding of both the electronic hardware and the programming software aspects of modern computer systems. A student in computer engineering will also gain a detailed knowledge of one or more applications where computers are being used as integral components of advanced engi-

neering systems; examples are instrumentation and test facilities, communication systems, power systems and process control systems. Students in computer engineering will work directly with microprocessors, microcomputers, and minicomputers and develop special electronic circuits for interfacing these computers to various peripheral devices.

In addition to the laboratories devoted to research, separate instructional laboratories give students "hands-on" experience in microcomputers, minicomputers, digital logic design, electronics, electrical machinery, networks, instrumentation and electromagnetics. In most instances, the student is guided through laboratory exercises which are closely related to classroom lectures. Here the student has the opportunity to verify theoretical principles and design concepts presented in the lectures. In other courses, the laboratory formats are more open-ended, allowing the student to experiment freely and exercise individual discretion in discovering experimental results.

This program, including the computer engineering emphasis area described above, is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology under the criteria for electrical and similarly named engineering programs.

Graduate Programs

The School of Electrical and Computer Engineering offers two graduate degrees: Master of Science and Doctor of Philosophy. Students interested in a Master of Electrical Engineering degree program should contact the department head.

The Master of Science degree is designed for students interested in careers in industry and government service that emphasize advanced design, development, and research methods for high technology. This degree incorporates additional advanced course work and on-campus creative activities.

The Doctor of Philosophy degree is designed to prepare the student for high-level research and development positions in industry and government and for the teaching profession in engineering, and is distinguished by the emphasis on research and by the incorporation of a doctoral thesis.

Students may select course work and participate in research and design projects in the following areas: computer engineering, energy systems, control theory, communications, signal/speech/image processing, electromagnetics, electronics, network theory, solid-state devices, artificial intelligence, parallel processing, optoelectronics and lasers.

In addition, students may elect a multidisciplinary program that crosses departmental lines and emphasizes the application of electrical engineering and systems theory to complex problems involving the interaction of engineering systems and technology with social, economic and environmental processes.

Admission Requirements. Admission to the Graduate College, as described under "General Regulations" in the "Graduate College" section of the *Catalog* is the first step for those students proceeding toward advanced degrees. Graduation with high scholastic performance from an electrical engineering curriculum accredited by the Accreditation Board for Engineering and Technology qualifies the student for admission to the School of Electrical and Computer Engineering as a candidate for the advanced degrees offered.

Graduates from non-engineering fields such as mathematics, physics and computer science are also admitted to the School of Electrical and Computer Engineering M.S. and Ph.D. graduate programs, if an evaluation of their transcripts indicates they are prepared to take graduate-level course work in electrical engineering, or can be expected to do so after a reasonable amount of remedial course work. This condition also applies to graduates of unaccredited engineering programs and engineering technology programs.

Degree Requirements. The Master of Science degree is awarded to those students who successfully complete an approved plan of study under one of two possible options. If a thesis is written, 30 semester credit hours are required, including six hours credit for the thesis. If no thesis is written, 32 semester credit hours are required, including two hours credit for a creative activity. To be approved, a plan of study will include, as a minimum, 18 hours of 5000-level courses in electrical and computer engineering. Most plans of study include additional 5000-level courses, depending upon the background and particular educational goals of the student, and the minimum stated above is allowed only when a specific interdisciplinary plan of study is approved by the faculty. Each student is encouraged to include courses in supporting disciplines such as mathematics, computer science, statistics, business or other engineering fields. As mentioned above, some remedial work in undergraduate electrical and computer engineering may be required in addition to the 30-32 hours specified above.

The Doctor of Philosophy degree is granted in recognition of high achievement in scholarship in course work selected from the broad field of electrical

engineering, and an independent investigation of a research problem in a chosen field of specialization that leads to a contribution to knowledge, as presented in a dissertation. For this degree the Graduate College requires a minimum of 90 credit hours for acceptable academic work beyond the bachelor's degree, including credit for the dissertation.

The School of Electrical and Computer Engineering also participates in the Master of Manufacturing Systems Engineering program. (See "Graduate Programs" under "Industrial Engineering and Management," and "Telecommunications Management" in the "Graduate College" section.)

Industrial Engineering and Management

Professor and Head C. Patrick Koelling, Ph.D.

Industrial engineering and management (IE&M) is a broad field concerned with designing, analyzing, and operating a wide range of systems that include people, materials, money, and equipment. Industrial engineering and management is the only engineering discipline specifically concerned with the role of the human being in the processes by which goods and services are produced and as such is often called the "people-oriented engineering discipline." The industrial engineer's position in an organization is usually as a management adviser in contact with every phase of the organization. Because of the breadth of their backgrounds, industrial engineers are especially well qualified to rise to positions of leadership.

The goal of the industrial engineering and management program is to produce graduates who possess broad-based knowledge, skills and judgment that prepares them to succeed in the profession of engineering as desired, further studies at the graduate level. Specific educational objectives derived from this goal are available from the undergraduate adviser.

The curriculum explicitly provides course work useful in dealing not only with the physical elements of systems, but also with organizational, economic, environmental and human aspects. Such problems are found in traditional industries as well as in service organizations and governmental agencies, e.g., manufacturing facilities, hospitals, airlines, railroads, banks and management con-

sulting firms. In all of these capacities, the industrial engineer is concerned with improving productivity and quality, and providing safe and efficient working conditions.

The curriculum blends a basic group of common engineering science courses with specialized courses containing engineering topics in the major areas of industrial engineering—design of human/machine systems, design of management control systems and improvement of operations (both manufacturing and service). The course offerings stress mathematical and statistical techniques of industrial systems analysis, quantitative methodologies of operations research, computers as a tool for problem solving and simulation, economic considerations of alternatives, control of product or service quality and quantity, specifications of the manufacturing process including equipment and tooling, planning, scheduling and control of work flow, and behavioral sciences in the organization and management of human endeavor, ethics, and environmental and safety concerns.

Students gain valuable hands-on laboratory experience in manufacturing processes, work methods, computer simulation and human factors engineering. This experience, combined with the course work described above, provides a firm foundation for the capstone design course during the senior year. Specific courses containing these engineering topics and the major engineering design course are identified in the publication *Undergraduate Programs and Requirements*.

The course work is specifically sequenced and interrelated to provide design experience at each level, leading to progressively more complex, open-ended problems. The course work includes sensitizing students to socially-related technical problems and their responsibilities as engineering professionals to behave ethically and protect occupational and public safety. The program culminates in a senior year design course in which the students integrate the analysis, synthesis and other abilities they have developed throughout the earlier portions of their study into a capstone experience where they identify, delineate and solve engineering problems. Students are able to design components, systems and processes that meet specific requirements, including such pertinent societal considerations as ethics, safety, environmental impact and aesthetics. The students also develop and display the ability to design and conduct experiments essential to specific studies and to analyze the experimental results and draw meaningful conclusions.

An integral part of this educational continuum from basic science through comprehensive engineering design are learning experiences that facilitate the students' abilities to function effectively in diverse individual and team environments. Moreover, the program provides every graduate with learning experiences that develop effective written and oral communication skills. State-of-the-art computational tools are introduced and used as a part of these problem-solving experiences. Finally, the students' experiences in solving ever-more-challenging problems gives them the ability to continue to learn independently throughout their professional careers.

Professional School Admission Requirements

The College of Engineering, Architecture and Technology divides the engineering curriculum into two parts. The first portion of the curriculum includes most of the 1000- and 2000-level preparatory science, mathematics and engineering course work. This course work is referred to as Preprofessional School and includes all courses listed on the left hand side of the IE&M degree requirement sheet. The second portion of the curriculum is listed on the right hand side of the IE&M degree requirement sheet. These courses are collectively known as the Major Courses or Professional School Courses. They include 3000/4000 course work, as well as all IEM courses. A student may take no more than nine hours of IEM courses before being admitted to professional school.

To be admitted to the IEM professional school and thus continue with the IEM professional school curriculum, a student must meet the Professional School requirements:

- Completion of 60 hours of course work from an accredited university.
 - Completion of 51 out of 60 hours of preprofessional school course work (left hand side of the degree requirement sheet).
 - Completion of MATH 2155, PHYS 2114, CHEM 1314, ENGL 1113 and at least two ENSC courses with a final grade of "C" or better in each.
 - Achievement of an overall technical GPA of 2.50 and grades of "C" or better in each course. The technical GPA is calculated using grades earned at OSU in the required CHEM, ENGR, ENSC, IEM, MATH, PHYS and STAT course work.
 - An overall OSU GPA of 2.30 or better.
- Transfer students must complete at least 12 semester credit hours, at OSU, of course work required for the degree with

a GPA of 2.30 or higher. These credit hours must include at least nine hours of technical subjects with a technical GPA of 2.50 or higher.

Graduation.

1. Grades of "C" or better in all technical courses in the pre-engineering curriculum.
2. Grades of "C" or better in all courses that are prerequisites for IEM courses.
3. 2.00 major (right hand side of requirement sheet) GPA.

The program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology under the criteria for industrial and similarly named engineering programs.

Graduate Programs

The School of Industrial Engineering and Management offers graduate programs leading to the Master of Industrial Engineering and Management degree, the Master of Science degree, and the Doctor of Philosophy degree. The School is also one of the joint sponsors of the Master of Manufacturing Systems Engineering degree.

The Master of Industrial Engineering and Management degree is a graduate professional degree with increased emphasis on professional practice, incorporating an engineering design experience during the final year of study.

The Master of Science degree is characterized by a higher degree of technical specialization in a particular field of study. This degree program is designed to prepare men and women for technical positions such as research and consulting, as well as professional practice, in various kinds of organizations.

The Master of Science degree and the Master of Industrial Engineering and Management degree are intended to be especially attractive to both industrial engineering graduates, non-industrial engineering graduates, and many science majors. The two degree programs include a strong, technical component and an orientation to business and management which is complementary to other technical backgrounds.

The Doctor of Philosophy degree is designed to carry the student to the leading edge of knowledge in the profession of industrial engineering and management. It is intended to prepare men and women for highly specialized positions, such as research and consulting in industry, government and service organizations, and for teaching and research positions in colleges and universities.

The Master of Manufacturing Systems

Engineering degree emphasizes a broad exposure to manufacturing from the perspective of the industrial, electrical and mechanical engineering disciplines. Students select courses from all three engineering disciplines. The program is oriented toward engineering practice in integrated manufacturing systems and requires the student to execute an industrial internship. Structured as a terminal degree, it prepares individuals with knowledge of all aspects of manufacturing systems, including management as well as hardware aspects of manufacturing.

The basic consideration in graduate education in industrial engineering and management at this institution is the most effective and efficient utilization of human, physical, and economic resources. Instruction in management embraces both qualitative and quantitative concepts, including analytical methodologies and social considerations pertinent to organizations of many kinds.

Staff and facilities are available for the study and practice of several phases of industrial engineering. Advanced degree programs may be arranged with major emphasis in fields of interest such as industrial management, manufacturing systems analysis and design, operations research, simulation, ergonomics, production control, quality assurance, economic analysis, energy and hazardous waste management and other qualitative and quantitative facets. Students may complement industrial engineering and management courses with work in several other branches of engineering, as well as economics, business administration, computer science, statistics, mathematics, psychology, and sociology.

Admission Requirements. Graduation from an accredited engineering curriculum with scholastic performance distinctly above average qualifies the student for admission to the Master of Science or Doctor of Philosophy degree programs. Applicants not meeting these criteria should submit transcripts to the director of graduate programs for the School of Industrial Engineering and Management for evaluation.

Admission to the Master of Industrial Engineering and Management degree program is permitted for students who meet the minimum prerequisites as stated in "Master of Engineering."

Degree Requirements. The *Master of Industrial Engineering and Management* degree requires the completion of at least 33 semester credit hours beyond the bachelor's degree, including an internship or professional practice of six semester credit hours.

The *Master of Science* degree in industrial engineering and management

requires the completion of at least 30 semester credit hours beyond the bachelor's degree, including a research thesis of six semester credit hours. A 32 semester-credit-hour option is also permitted and must include a three credit hour creative component.

The *Doctor of Philosophy* degree requires the completion of at least 90 semester credit hours of course work beyond the bachelor's degree or 60 semester credit hours of course work beyond the master's degree, normally including a 20 semester credit hour research thesis. In addition, the candidate must complete six semester credit hours of course work in an area such as mathematics, statistics, experimental techniques, or research methodology (as specified by the advisory committee).

The *Master of Manufacturing Systems Engineering* degree requires the completion of 33 semester credit hours beyond the bachelor's degree and normally includes six credit hours based upon an internship in industry.

The School of Industrial Engineering and Management also participates in the health care administration specialization, offered through the natural and applied sciences masters degree program, and the Master of Science in Engineering and Technology Management. Current program information can be found on the World Wide Web (www.okstate.edu/ind-engr). (See the "Graduate College" section of the *Catalog*.)

Mechanical and Aerospace Engineering

Professor and Head
Lawrence L. Hoberock, Ph.D., P.E.

Mechanical engineering and aerospace engineering are professional disciplines that involve the invention, design, and manufacture of devices, machines and systems that serve the ever-changing needs of modern society.

Mechanical engineering is an exceedingly diverse field that covers an exceptionally wide range of systems, devices and vehicles. Mechanical engineers are vitally concerned with all forms of energy production, utilization and conservation. They deal with everything mechanical, whether it is small or large, simple or complex—from power lawn mowers to automobiles, fuel cells to nuclear power plants, gas turbine engines to interplanetary space vehicles, artificial limbs to life support systems,

robotic manipulators to complex automatic packaging machines, precision instruments to construction machinery, household appliances to mass transit systems, and heating and air-conditioning systems to off-shore drilling platforms. In virtually every organization where engineers are employed, mechanical engineers will be found.

The B.S. degree program in mechanical engineering, together with the premedical option in mechanical engineering, is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology under the criteria for mechanical and similarly named engineering programs.

Aerospace engineering, an option in mechanical engineering is concerned with the science and technology of flight, and the design of air, land and sea vehicles for transportation and exploration. This exciting field has already led people to the moon and continues to lead in the expansion of frontiers deeper into space and into the ocean's depths. Because of their unique backgrounds in aerodynamics and lightweight structures, aerospace engineers are becoming increasingly involved in solving some of society's most pressing and complex problems, such as high-speed ground transportation and pollution of the environment. Aerospace engineering, an option in mechanical engineering, is separately accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology under the criteria for aerospace and similarly named engineering programs.

The goals of the mechanical engineering B.S. degree programs, including the aerospace engineering and premedical options, are to educate engineers who are both well prepared to practice engineering upon graduation and who have sufficiently rigorous development to undertake graduate work. Because mechanical engineering is perhaps the broadest of all engineering disciplines, the program provides not only excellent grounding in all engineering fundamentals, but also allows some flexibility in selecting controlled technical electives to suit the student's interests. However no one area may be unduly emphasized at the expense of another. For the aerospace engineering and premedical options, prescribed course work has been selected to provide students with more focused development. Graduates of these programs are fully competent as mechanical engineers, including their abilities in design, but also competent in their areas of concentration.

As a fundamental component of all B.S. programs, engineering design is

strongly emphasized in the junior and senior years. A minimum of 16 credit hours of design, integrated throughout the curriculum, must be taken by each student. In fact, each MAE course at the 3000 and 4000 levels includes some design content, ranging from a minimum of one-half to a maximum of four credit hours of design content. Each professional school course builds upon the preceding mechanical and aerospace engineering courses to develop in the student the ability to identify and solve meaningful engineering problems. The course work is specifically sequenced and interrelated to provide design experience at each level, leading to progressively more complex, open-ended problems. The course work includes sensitizing students to socially-related technical problems and their responsibilities as engineering professionals to behave ethically and protect occupational and public safety. The program culminates in a senior-year design course in which students integrate analysis, synthesis, and other abilities they have developed throughout the earlier portions of their study into a capstone experience. The design experiences include the fundamental elements and features of design with realistic constraints such as economics, safety, reliability, social and environmental impact, and other factors. At this point, students are able to design components, systems and processes that meet specific requirements, including such pertinent societal considerations as ethics, safety, environmental impact and aesthetics. Students develop and display the ability to design and conduct experiments essential to specific studies and to analyze the experimental results and draw meaningful conclusions.

An integral part of this educational continuum from basic science through comprehensive engineering design are learning experiences that facilitate the students' abilities to function effectively in both individual and team environments. Moreover, the program provides every graduate with adequate learning experiences to develop effective written and oral communication skills. State-of-the-art computational tools are introduced and used as a part of their problem-solving experiences. Finally, the students' experiences in solving ever-more-challenging problems gives them the ability to continue to learn independently throughout their professional careers.

The broad background and problem-solving ability of mechanical and aerospace engineers make them suited to engage in one or more of the following activities: research, development, design, production, operation, management, technical sales and private con-

sulting. *Versatility* is their trademark. A bachelor's degree in mechanical engineering or the aerospace engineering option is also an excellent background for entering other professional schools such as medicine, dentistry, law or business (M.B.A.). The premedical option in mechanical engineering is available for students wishing to enroll in medical school.

In the professional school, (essentially the junior and senior years of the program) mechanical and aerospace engineering students extend their study of the engineering sciences and consider applications of fundamental principles and analysis tools to the solution of real technological problems of society. Students make extensive use of modern electronic digital computers in many courses in their programs. Some design courses involve students in the solution of authentic, current and significant engineering problems provided by industrial firms, such as 3M, Charles Machine Works, Halliburton, Hewlett Packard, Koch Industries, Mercury Marine, Murphy Manufacturing, National Standard, Purolator, and Seagate. Students may also help smaller firms that need assistance with the development of new products.

The student designs, with the guidance of an adviser, an individualized program of study consistent with his or her interests and career plans. Some students terminate their studies with a bachelor's degree, while others receive one of several graduate degrees.

Graduate Programs

The School of Mechanical and Aerospace Engineering offers programs leading to the Master of Science degree, and the Doctor of Philosophy degree. These degrees prepare the graduate for research and development positions in industry and government, or for the teaching profession in engineering. They are distinguished by the incorporation of a research component.

Students may select course work and participate in research or design projects in the following areas: advanced manufacturing processes, aerodynamics, design, computational mechanics, dynamic systems and controls, fluid mechanics, materials processes, solid mechanics, and thermal systems. Students are encouraged to take courses in mathematics and science and in other fields of engineering which fit into their programs.

Admission Requirements. Admission to the Graduate College is required of all students pursuing the M.S. or Ph.D. degree. Graduation from a mechanical or

aerospace engineering curriculum accredited by the Accreditation Board for Engineering and Technology, with scholastic performance distinctly above average, qualifies the student for admission to the School of Mechanical and Aerospace Engineering as a candidate for the M.S. and Ph.D. degrees. Graduates from disciplines other than mechanical or aerospace engineering may be admitted if an evaluation of their transcripts by the School of Mechanical and Aerospace Engineering indicates they are prepared to take graduate-level course work in mechanical engineering, or can be expected to do so after a reasonable amount of prerequisite work.

Degree Requirements. All degree programs follow an approved plan of study designed to satisfy the individual goals of the student, while conforming to the general requirements of the School of Mechanical and Aerospace Engineering and the Graduate College.

The Master of Science degree program with the thesis option requires 24 semester credit hours of approved graduate-level course work, and a suitable research thesis of six semester credit hours. The non-thesis option requires 35 semester credit hours of which two must be for an acceptable, directed research activity that results in a written and oral report to the faculty.

The Doctor of Philosophy degree requires a minimum of 90 semester credit hours beyond the bachelor's degree, including a dissertation for which no more than 30 semester credit hours may be awarded.

The School of Mechanical and Aerospace Engineering also participates in the Master of Manufacturing Systems Engineering degree program. (See "Graduate Programs" under "Industrial Engineering and Management.")

School of Architecture

Professor and Head
J. Randall Seitsinger, M.Arch., AIA

The School of Architecture, founded in 1909, offers professional degree programs in both architecture and architectural engineering. The integration of these programs through shared faculty, facilities and course work is a major strength of the School. It is one of the few such integrated programs in the United States, and as such produces graduates who are particularly prepared for the integrated team processes used in pro-

fessional practice. The School of Architecture is a primary unit in the College of Engineering, Architecture and Technology, and therefore benefits from excellent state-of-the-art resources which significantly enhance the School's professional programs.

The School of Architecture is dedicated to providing a high quality and focused professional education to students whose career goals are to enter the practice of architecture or architectural engineering. Professional and liberal study electives provide opportunities for educational breadth or depth and a possible double degree in both architecture and architectural engineering.

The employment demand for OSU graduates consistently exceeds the supply potential of the School. Oklahoma State University graduates are recruited by the leading architectural and architectural engineering firms both in Oklahoma and nationally. The Oklahoma State University School of Architecture is particularly proud of having among its alumni many of the leaders of the best firms in the country, an AIA Gold Medalist (the highest award given to an architect), and presidents of the American Institute of Architects (AIA) and the National Architectural Accreditation Board (NAAB).

Mission and Goals. Architecture is the difficult and complex art and science of designing and building a setting for human life. It is unique among today's professions in that its successful practice requires a blend, in roughly equal shares, of traits normally considered less than compatible: human empathy, artistic creativity, technological competence, and organizational and economic acumen. In contrast to other fine arts, architecture is rarely self-generated; it is rather a creative response to a stated or perceived human need. It must, therefore, be more user-oriented than fine art alone and more humane than pure science. Its design solutions must avoid the total subjectivity and detachment of other arts while striving to be functionally, technically and economically objective and sound. Yet, in a seemingly insoluble contradiction, the keenest technological and economic functionality will fall far short of becoming architecture unless it also strongly appeals to human spiritual and emotional values. When one thinks of the environment, one cannot help but see or recall architectural images: pyramids in Egypt, Greek and Roman temples, gothic cathedrals, medieval castles, industrial cities, modern skyscrapers and dwellings or entire cities which significantly express the culture and values of the people who live or lived there.

The fundamental mission of the School of Architecture is to focus its unique combination of accredited programs in architecture and architectural engineering to prepare and inspire students for the vital professional leadership roles and responsibilities required to shape the physical environment and to have a positive impact on the social, economic and cultural qualities of life in Oklahoma and the entire international context.

The School of Architecture endeavors to instill in each individual a sensitivity to human needs. A genuine concern for quality, integrity and high ideals, a positive attitude for life-long learning, and an appreciation for one's own self-esteem.

The School's primary goal is to provide excellence in professional education for students preparing to enter the private practice of architecture or architectural engineering. This professional focus is to educate not just qualified candidates for the degree, but graduates who, during their careers, will be licensed professionals and will assume positions of leadership within the profession and society.

Accreditation. The School of Architecture offers two separately accredited professional degree programs. The Bachelor of Architecture degree, B.Arch., is accredited by the NAAB. The Bachelor of Architectural Engineering degree, B.Arch.E., is accredited by the Accreditation Board for Engineering and Technology (ABET) as an engineering program. Both programs require a minimum of five years of study to complete.

Architecture

Architecture is the complex synthesis of creatively solving problems involving both art and science through the disciplined orchestration of image making, activity organization, technological applications, legal constraints, and budgetary parameters which together express culture, enhance quality of life and contribute to the environment.

Education in architecture consists of campus-oriented classroom and studio courses, as well as off-campus studies. It is conducted in an intellectual climate which stimulates inquiry, introduces principles and values, and teaches the disciplines necessary to work in collaboration with others. The goal of the program is the education of future leaders within the architecture profession.

The design studio is the center of the School's educational program. It is the setting where students and faculty work most closely together, and where all specialized study and knowledge comes

together and is synthesized in design. The record of OSU students' achievements in the design studios is evidenced by the success in national and international architectural design competitions. In the last 15 years, over 100 OSU students have won or placed in national and international competitions. In addition to a student's design studio education, he or she is required to complete sequential courses in architectural history/theory, technology, and management that work in correlation with the design studio sequence.

The program has long been known as one of the strongest professional programs in the United States. OSU graduates are consistently offered employment opportunities in many of the best architectural offices in Oklahoma and throughout the United States. The program is fully accredited by the National Architectural Accreditation Board.

In the United States, most state registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), the sole agency authorized to accredit U.S. professional degree programs in architecture, recognizes two types of degrees: the Bachelor of Architecture and the Master of Architecture. A program may be granted a five-year, three-year, or two-year term of accreditation, depending on its degree of conformance with established educational standards.

Master's degree programs may consist of a preprofessional undergraduate degree and a professional graduate degree, that, when earned sequentially, comprise an accredited professional education. However, the preprofessional degree is not, by itself, recognized as an accredited degree.

Architectural Engineering

Architectural engineering is a profession that combines the art and science known as architecture with a detailed background in fundamental and applied engineering principles. In its broadest sense, it involves the creative application of science and technology to the design of structures meant for human occupancy. Architectural engineering differs from architecture in its focus upon the design of elements, systems and procedures for buildings, rather than the design of buildings themselves. Architectural engineers practice in a wide variety of professional engineering settings such as consulting firms, architectural firms,

industrial or commercial organizations and governmental agencies.

The goal of the architectural engineering program is to produce graduates who possess broad-based knowledge, skills and judgment that prepares them to succeed in the profession of architectural engineering or in further studies at the graduate level.

The primary focus of the architectural engineering program at OSU is the safe and economical design of structural systems used in buildings. These structural systems must withstand the various forces of nature such as gravity, winds and earthquakes, as well as the forces of man. These systems require a working knowledge of the mechanics of those materials commonly used for building structures such as steel, timber and reinforced concrete.

The study of architectural engineering is an integrated mix of liberal studies, design and technical education. Architectural engineers need to be able to conceptualize aesthetic issues and design complex technical systems.

In the preprofessional portion of the architectural engineering program (approximately two years of study), the focus is on the underlying scientific and mathematical principles of engineering and the basic design principles of architecture supplemented by appropriate general education courses in English, social sciences and humanities. These courses allow students to assimilate a beginning knowledge base in architecture and engineering along with a broader liberal based component to their education. Students who demonstrate proficiency in this portion of the program by meeting a specific set of admission criteria are eligible for admission to the professional program in architectural engineering.

The professional program in architectural engineering (typically three years) builds systematically upon the scientific and architectural knowledge acquired in the preprofessional curriculum. Students acquire detailed structural and architectural knowledge and problem-solving abilities through a series of progressively more detailed and comprehensive courses and studios.

Each architectural engineering course builds upon the preceding architectural engineering courses to develop in the student the ability to identify and solve meaningful architectural engineering problems. The course work is specifically sequenced and interrelated to provide design experience at each level, leading to progressively more complex, open-ended problems. (See the publication *Undergraduate Programs and Requirements*.) This course work includes

sensitizing students to socially-related technical problems and their responsibilities as engineering professionals to behave ethically and protect public safety. The program culminates in a fifth year course (ARCH 5119) in which the students integrate analysis, synthesis and other abilities they have developed throughout the earlier portions of their study into a capstone experience.

An integral part of this educational continuum from basic knowledge through comprehensive architectural engineering design are learning experiences that facilitate the students' abilities to function effectively in both individual and team environments. Students are exposed to a wide variety of problems dealing with contemporary issues in an international context. Moreover, the program provides every graduate with adequate learning experiences to develop effective written and oral communication skills. State-of-the-art computational and CAD tools are introduced and used as a part of the students' problem-solving experiences. Finally, the students' experiences in solving ever-more-challenging problems gives them the ability to continue to learn independently throughout their professional careers.

Undergraduate Curriculum

The programs in architecture and architectural engineering are five years long and offer the professional degrees of Bachelor of Architecture and Bachelor of Architectural Engineering.

Undergraduate Admission. Students who satisfy the University admission requirements are eligible to enroll for the first two years of the program (pre-architecture). Upon completion of these two years, the best qualified students are selected, upon application, by the School for admission to the upper division. Admission is based upon academic achievement and professional potential. Admission criteria are subject to annual review by the School and may be obtained directly from the School.

Transfer students are required to furnish transcripts and course descriptions for previous classroom courses, as well as examples of previous studio work. Evaluation and enrollment by the School is on a course-by-course basis for all transfer students.

General Education. Opportunities to satisfy General Education requirements with required courses in the architecture curriculum include American Urban History (HIST 4503), used to meet requirements in Social and Behavioral Sciences. At least 12 semester hours of basic science and mathematics can be

counted toward General Education requirements, and required upper-division course work in History and Theory of Architecture can be used for General Education credit.

Electives. Electives should be selected to comply with the appropriate undergraduate degree requirements for the program. (See "Changes in Degree Requirements" in the "Academic Regulations" section of the *Catalog*.) These requirements assure compliance with institutional and accreditation criteria.

Foreign Study. The School of Architecture is committed to preparing its graduates for the professional opportunities presented by the expanding global economy. As part of this preparation, the School offers an eight-week Summer Foreign Study Program based in Versailles, France. This program has been designed to supplement the required curriculum. Students study, in an organized and disciplined fashion, major examples of modern and historic European architecture including urban issues. Both analytic and artistic sketching skills are the main tools developed in this course of study.

Experience has shown that the Summer Foreign Program significantly increases a student's level of maturity, independent thinking, and cultural and social awareness of others. Knowing the values and accomplishments of other cultures not only deepens and broadens knowledge and abilities, it also makes a student a better and more responsible citizen of his or her own country.

Four weeks of the eight-week program are spent in France under the direct supervision and instruction of faculty from OSU. The remainder of the eight weeks is spent in independent travel study in other countries in western and central Europe. Housing while in Versailles is provided in French family homes, enriching the cultural experience of each student.

Faculty and Facilities. In keeping with the professional orientation of the School, the faculty have extensive experience as successful practicing architects and architectural engineers, as well as outstanding scholastic records. Faculty experience includes the design of virtually all building types and systems in the many varied climates of Europe and Asia, as well as North and South America.

The School of Architecture is housed in the Architecture Building, the original University Gymnasium and Armory, built in 1918. This structure was extensively remodeled in 1976 and contains all studios, laboratories, galleries and offices of the School. Specialized facilities include the Cunningham Library, con-

taining all of the University's holdings on architecture and a fully-equipped Computer-assisted Design Laboratory. The faculty and students are especially proud of the Architecture Building, for it serves as an example of innovative architectural design and the adaptive reuse of an important building.

Student Work. Projects submitted for regular class assignments may be retained by the School. All projects not retained will be available to the student.

Student Body. With the curriculum based upon extensive and personalized student-faculty interaction, the student-faculty ratio in studio courses is set at approximately 15 to one. Annual student enrollment is approximately 300 students of whom approximately 22 percent are women, and approximately 18 percent are international students, thus providing a rich and diverse educational environment. A variety of student organizations and activities are available.

Academic Advising

The College's Office of Student Academic Services provides advisement for all pre-architecture students. When a student has gained admission to the upper-division of architecture, he or she will be assigned a faculty adviser.

Each student is personally advised in the planning and scheduling of his or her course work and is counseled and advised individually on matters of career choice, his or her activities at OSU, and on other academic matters. An academic file is created for each student at the time of initial enrollment.

Graduate Programs

The School offers the opportunity for specialized study at the graduate level in architecture and architectural engineering. These programs lead to the post-professional degrees, Master of Architecture and Master of Architectural Engineering.

These graduate programs are designed for students already possessing their first professional or five-year degree. Each graduate program is normally one-year long and consists of a minimum of 32 credit hours.

Candidates with nonprofessional four-year undergraduate degrees may apply for admission to the professional degree program and, if admitted, complete the requirements for a Bachelor of Architecture degree. Application may then be made to the School's graduate program.

Graduate Admission. Admission is limited and based upon undergraduate academic records and accomplishments, examples of work, practical

experience and recommendations from practicing architects, engineers and educators.

Admission depends upon being accepted by the Graduate College of the University and by the School's Graduate Admissions Committee. Complete applications for admission must be filed with both the Graduate College and the School by February 15. The School's Graduate Admissions Committee will review all applications by March 31. Late applications will be considered only if vacancies exist. Normally, applications to the graduate program are considered for admission beginning the following fall semester only.

Student Portfolios. For the Master of Architecture program, photographic examples of work performed in architectural design and other professional courses or actual practice are to be submitted with the admissions application for review by the School. Slides are not acceptable. Portfolios should be mailed directly to the School to arrive no later than February 15. Candidates for admission to the Master of Architectural Engineering program are not required to submit a portfolio.

Regulations and Procedures. Regulations and procedures as established by the Graduate College for a master's degree apply to the School's graduate programs, except as otherwise noted in the School's current program description. This description is reviewed by the School annually, and may be obtained directly from the School.

For further information, contact the School of Architecture, Oklahoma State University, Stillwater, OK 74078-1085.

Division of Engineering Technology

Professor and Director James E. Bose, Ph.D., P.E.

Engineering technology education is concerned with the practical application of engineering achievement with emphasis upon the end product rather than the conceptual process. Whereas the development of new methods is the mark of the engineer, effective use of established methods is the mark of the technologist. Often the technologist will be expected to achieve what the engineer conceives.

Curricula

Engineering technology curricula at OSU are four-year programs which lead to the Bachelor of Science in Engineering Technology. Graduates of the program are known as "technologists" and are trained either to assist engineers or to provide independent support for engineering activities. The technologist receives an intensive education in his or her technical specialty and great depth in mathematics and technical sciences. The program provides breadth in related technical, communication and socio-humanistic studies. A "master of detail," he or she is capable of independent action in performance of technical activities and is frequently involved as a coordinator, expeditor or supervisor of other technical personnel. His or her capability in technical sales and other public-contact positions is enhanced by his or her background in selected liberal studies.

Bachelor of Science in Engineering Technology Degree Programs

- Construction Management
- Electronics (computer option)
- Fire Protection and Safety
- Mechanical Engineering

The Bachelor of Science in Engineering Technology degree requires either 128 or 129 credit hours.

The engineering technology graduate is qualified to select from a broad array of engineering-related positions. Job titles of engineering technology graduates include field engineer, test engineer, associate engineer, product engineer, sales engineer, tool designer, production engineer, engineering technologist, estimator, scheduler, and project engineer.

Those less intrigued with theoretical concepts but who have the interest and aptitude toward applications are likely engineering technology majors. These students particularly appreciate the engagement of technical specialty courses beginning with the first semester and continuing throughout the course of study. The relevance of the technical science and related technical courses adds further satisfaction.

The Bachelor of Science in Engineering Technology program is composed of the following curricular subdivisions:

Mathematics and science—algebra, trigonometry, applied calculus, general physics, and chemistry or other science.

Technical specialty—technical science and related technical courses.

Communication—English composition, and written and oral technical communication.

Social sciences and humanities—history, government, religion, literature, art, music.

Electives—controlled and general.

Co-op Program. The College of Engineering, Architecture and Technology offers an experience-based program, Cooperative Education (Co-op). Co-op allows technology students to achieve a balanced education through the combination of theoretical and practical knowledge during their early years of professional development. The student's education is a cooperative effort between the University and industry. Students alternate semesters on campus with work semesters in industry during their junior and senior years. The periods of employment constitute an essential element in the educational process. Students gain practical knowledge which is carried back to the classroom, giving academic programs a sense of reality. By the time they receive their degrees, students have accumulated the equivalent of a year-and-a-half of progressively challenging work experience.

Participation in Co-op is voluntary; transfer students must successfully complete at least one semester at OSU prior to their first placement. Students may obtain further information about the program from the coordinator, 101A Engineering North.

Transfer Students

An important, contemporary educational development is the "two-plus-two" bachelor's program. Those completing an associate degree in technology-oriented curricula at other institutions are generally admissible to the junior year with a minimum loss of academic time. The "two-plus-two" concept provides the attractive feature of two occupational-entry levels—technician or technologist.

Required course work in mathematics and basic science is utilized to meet up to 18 semester hours of General Education requirements also. The Scientific Investigation requirement is met as a part of the course work meeting professional requirements for basic science.

Construction Management Technology

Associate Professor and Head
Charles A. Rich, M.S., P.E.

The construction industry is the largest industry in the world. Leadership in this field requires a broad knowledge of labor, materials, equipment, capital and

construction procedures. The interdisciplinary approach of the construction management program offers the student specialized course work in all phases of construction, designed to prepare him or her for responsible positions in industry.

One of the primary goals of the Department of Construction Management is to enhance the quality of the instructional program through effective management of the curriculum, teaching assignments and fiscal and physical resources. This goal includes providing instructional facilities, equipment and support services for faculty and students which maintain an excellent learning environment.

Faculty with excellent credentials, including a balance of formal education, teaching ability and appropriate industry experience, are recruited nationwide and are provided opportunities for individual professional development and regular contact with the industry. Faculty members are encouraged to become involved in extension and research programs relating to the department's areas of strength or growth and to serve the needs for continuing education within the industry, particularly in the southwestern construction community.

These needs and opportunities for service are assessed regularly through close cooperation with local and regional construction professionals and industry associations. An active Industry Advisory Committee, representing a broad cross-section of the industry, meets regularly to offer support and guidance necessary to preserve uncompromising excellence.

The modern constructor must have a great deal of technical knowledge to keep abreast of rapidly changing equipment, materials and methods of construction. Specialized courses in estimating, surveying, structures, construction planning and scheduling, construction law and insurance, field and office management and construction procedures provide students with the background necessary for today's construction industry. These specialized courses, in addition to a blend of the basic sciences, business, and general studies, produce a well-balanced curriculum for students in construction. Special attention is given to computer applications in construction estimating, and the development of graphic, written and oral communication skills is emphasized throughout the curriculum.

Students with an interest in building structures may select courses in the "building" option of construction management which provides them with a knowledge of working drawings, mechanical and electrical equipment of buildings,

and other course work for a career in building construction.

Students with an interest in civil engineering structures may select courses in the "heavy" option of construction management which provides them with a knowledge of highways, soils, foundations and other course work for a career in the heavy and industrial construction industry.

The department attempts to identify and recruit highly qualified students who will benefit from the instructional program, and faculty members promote retention and ultimate graduation of construction management students through effective instruction and advisement. An active program of outcome assessment among graduates and their employers assures that the program continues to provide the academic training required for success. As one method of program assessment, each student, in the final semester, is expected to sit for the Level I Constructor Qualification Examination given once each semester. The student is responsible for the application process, including the appropriate fees. The test fee is reimbursed to the student through the Office of University Assessment upon completion of the examination.

Graduates of construction management have shown the curriculum to be successful in their development as productive members of the construction industry, holding responsible positions as project managers, estimators, material and equipment salespersons, and construction managers at all levels.

The bachelor's program in construction management technology is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC/ABET).

Electrical Engineering Technology

Professor and Head

Thomas G. Bertenshaw, Ed.D.,
P.E.

The electrical engineering technology curriculum provides preparation for outstanding career opportunities not only in the electronics industry itself but also in many other areas in modern industry which depend upon electronics for control, communications or computation. Many opportunities exist for graduates to work in diverse areas of electronics and computers.

The work of the electrical engineering technology graduate may range from assisting in the design and development

of new equipment in the laboratory, applying modern microprocessors in the field, to the operation or supervision of production operations, technical writing, customer service and sales.

The program provides the Bachelor of Science in Engineering Technology degree with an electronics major. To meet these diverse needs the program is laboratory-oriented and provides a strong foundation of mathematics and science, specialized course work in electronics technology and related technical areas, and courses in the area of communications and the social studies.

The electrical engineering technology-computer option curriculum provides the preparation for graduates to enter the growing field of computer hardware and software. The demand for graduates having both computer hardware and software skills is quickly developing as the importance of automation, robotics, and artificial intelligence is recognized. Graduates of this program will be prepared for those opportunities in industry requiring considerable knowledge of both computer hardware and software.

The program provides the Bachelor of Science in Engineering Technology degree with an electronics major, and with a computer option. To meet the diverse needs that graduates will have, the program provides a strong foundation of mathematics, science, and specialized courses. Related courses in the humanities and social sciences are included to give the graduate an appreciation of the world in which the graduate will live and work.

The bachelor's program in the electronics major is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC/ABET).

Fire Protection and Safety Technology

Associate Professor and Head
Thomas Woodford, M.S.

The fire protection and safety curriculum provides preparation for assessing and reducing the loss potential in the industrial setting with respect to fire, safety, industrial hygiene, and hazardous material accidents. With respect to fire, reducing the loss potential might involve setting design criteria with a special emphasis on life safety or fire resistivity or specifying automatic detection or extinguishing systems. When considering safety, reducing accidents may require special protective equipment or clothing, or the redesign of machinery or

processes. Reducing losses caused by environmental problems may require sampling air for contaminants, such as asbestos or toxic chemicals, or monitoring noise levels, and the development of procedures to address practical approaches to compliance with state and federal regulations. Addressing the problems of handling and disposing of hazardous chemicals, such as spill control, is often required. Managing risk and compliance with federal laws and regulations relative to occupational safety and health and hazardous materials is an increasingly important job activity.

The fire protection and safety engineering technology program has existed at Oklahoma State University since 1937. The demand by business and industry for loss control specialists has resulted in the evolution of the program into one that now places emphasis upon industrial fire protection, safety, and occupational health. The program is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC/ABET) and concludes with the Bachelor of Science in Engineering Technology degree in fire protection and safety.

The curriculum is designed to immediately introduce the student to studies in fire protection and safety. Therefore, students are able to measure their interest in a fire protection and safety career early in their academic program. The curriculum is rigorous in the areas of mathematics and the physical sciences. Two semesters of calculus are required as well as two semesters of chemistry and one semester of physics. Computer usage is an essential component of most fire protection and safety courses. Interested high school students should design their high school programs to prepare themselves for college level mathematics and science classes.

The graduates of the fire protection and safety engineering technology program at Oklahoma State University are consistently recruited by the major businesses and industries of the United States. Graduate placement, salary offers, and advancement into managerial positions have been excellent due to the uniqueness and high technical quality of the OSU fire protection and safety technology program.

Mechanical Engineering Technology

Professor and Head

James E. Bose, Ph.D., P.E.

Mechanical engineering technology (MET) is that component of engineering that specializes in design and application. It includes the broad areas of mechanical design, mechanical power and manufacturing. Mechanical engineering technology is applied in robotics, automotive manufacturing, computer-aided drafting and design, computer-aided manufacturing, agricultural machinery and processing, mining, shipbuilding, spacecraft, electronics manufacturing, food processing, aircraft metals and plastics production—nearly the entire spectrum of the industry. In the power areas MET graduates are involved in vapor power cycles, gas power cycles, air conditioning, fluid power and power transmission. Manufacturing areas involving MET graduates include tool design, cost evaluation and control, plant operations, production planning and manufacturing methods.

An important element in MET is the use of laboratory experience as a teaching tool. The MET program has laboratories in fluid power, materials, fluid mechanics and applied thermal sciences, basic instrumentation, computer-aided design (CAD), and manufacturing. A senior capstone design course composed of student teams integrates the knowledge and skills learned during their course of study. These laboratories are supported with the latest computer software that supports the design function. Where appropriate, laboratories with modern computer data acquisition systems and on-screen displays are available.

In addition to the required mechanical engineering technology courses, students are provided a solid foundation in algebra, trigonometry and calculus, physics, chemistry, statics, dynamics, instrumentation, thermodynamics and computer science.

Preparation for a specific industrial function can be accomplished by selecting courses that emphasize a given design area, such as fluid power, mechanical design, computer-aided design (CAD) power generation, and air conditioning and heating. Because the program focuses on the application of engineering principles to the pragmatic solution of problems, graduates are immediately productive with minimal on-the-job training, thus increasing their value to industry. Graduates of the MET program

are prepared to function in the areas of product design, testing, and evaluation; product application and maintenance field engineering; and technical sales and liaison. Industries employing MET graduates include manufacturing companies of all types, (aircraft, automobile, compressor and turbine, fluid power manufacturers and others); energy companies (such as natural gas, electrical power generation, and the oil and gas industries); and service companies (transportation industry, architecture and professional engineering firms, and those supporting the oil and gas industry).

Companies utilizing the talents of MET graduates are diversified in their products, as well as geographical location, thus providing a variety of choices in respect to both type of work and place of residence and in diverse industrial, governmental and educational institutions.

College of Human Environmental Sciences

Patricia K. Knaub, Ph.D., *Dean*
Margaret J. Weber, Ph.D., *Associate Dean for Academic and Research Services*
Lynda Harriman, Ph.D., *Associate Dean for Cooperative Extension*
Debra C. Engle, M.S., *Director of University Extension and Development*

The College of Human Environmental Sciences (CHES) is composed of three departments—Design, Housing and Merchandising; Family Relations and Child Development; and Nutritional Sciences—and the School of Hotel and Restaurant Administration. Each science-based program focuses on the reciprocal relationship between people and their natural, constructed or social environments. Graduates pursue professional careers in business, health, communications, education, international service, research, social welfare and a variety of agencies, organizations and institutions. Preprofessional options and advisement are offered for students interested in pursuing graduate education in law, medicine, dentistry or in their major fields of study.

Interdisciplinary, multicultural and global in perspective, the College programs link knowledge of individual development and environmental quality. The College's graduates are prepared for people-centered professions that develop solutions to many of today's most pressing issues. These issues include promoting and contributing to human development and family functioning, improving nutrition and health, designing and managing environments that address human needs where people live, work and play, and effectively managing and delivering products and services critical to the betterment of the environment.

Further information may be found on the World Wide Web (www.okstate.edu/hes).

Accreditation

All programs culminating in a B.S. in Human Environmental Sciences are accredited by the Council for Accreditation of the American Association of Family and Consumer Sciences. In addition, specialized agencies have approved or

accredited specific programs in the College as follows: The Foundation for Interior Design Education Research (FIDER) has accredited the undergraduate interior design program. The American Dietetic Association (ADA) has approved the Dietetic Internship and the Didactic Program in Dietetics (DPD). The Child Development Laboratory is licensed by the state of Oklahoma, Department of Human Services. The School of Hotel and Restaurant Administration is accredited by the Accreditation Commission for Programs in Hospitality Administration (ACPHA). The master's level program in marriage and family therapy is accredited by the American Association of Marriage and Family Therapists (AAMFT).

Academic Advising

The CHES Office of Academic and Research Services provides advisement for all freshmen enrolling in the College and coordinates advising in the College. When a student has identified a major area of study, the student transfers to the department of his or her choice. The student is assigned a faculty adviser in that department.

Each student is advised in the planning and scheduling of his or her course work. Advising sessions include discussions on career choice and internship opportunities. The student is encouraged to maintain a close relationship with the adviser throughout the college career and to visit the adviser at times other than enrollment when only brief meetings may



be possible. Students are also encouraged to participate in the Career Empowerment Opportunities (CEO) program.

Honors

College Honors are earned at the upper division (3000- and 4000-level classes) in the student's major and are one of the requirements for receiving a bachelor's degree with honors. Students with 60-93 credit hours must have a 3.37 cumulative GPA. Students with 94 or more credit hours must have a 3.50 cumulative GPA. College honors requires HES 4003 Honors Seminar, six hours of upper-division honors credit in the department and three hours of honors thesis or creative component. For further information on University Honors, refer to the "Special Programs, Services and Facilities" section of this *Catalog*.

Career Services

Students in CHES have the benefit of a Career Services office designed specifically to serve them. CHES Career Services offers students opportunities to explore traditional and nontraditional careers. Students also have the opportunity to interview with companies within HES, participate in career empowerment workshops, learn of part-time job opportunities related to their areas of study, and identify internship possibilities. For students considering graduate or professional school, there are tools and contacts to aid them in finding programs. CHES Career Services provides a link to the University Career Services, and makes students aware of the resources available throughout campus, such as resumes on-line, on-campus interviews, career fairs, career and skill assessments, and many others.

Scholarships

Oklahoma State University has an extensive scholarship program for entering freshmen, and applications should be sent to the University Scholarships Office by February 1. College of Human Environmental Sciences scholarship applications are due for continuing students in January and scholarship awards are made in April. Freshmen and transfer student scholarships are awarded prior to the fall semester. Criteria for and the amount of the scholarship awards vary.

Academic Programs

Undergraduate Programs. The Bachelor of Science in Human Environmental Sciences degree is offered by three departments and one school of the College. The majors are:

Design, Housing and Merchandising, with options in apparel design and production, apparel merchandising and interior design.

Family Relations and Child Development, with options in early childhood education, individual, family and community services, and a preprofessional program with options in child development, youth and adult, or gerontology.

Hotel and Restaurant Administration, with options in hotel administration and restaurant management.

Nutritional Sciences, with options in dietetics, foods and nutrition, and human nutrition/premedical sciences.

A minor may be pursued in some of the College's programs.

Additional details about specific requirements in any of the departments or in the School may be obtained by contacting the specific offices.

Graduate Programs. The Master of Science degree is available in design, housing and merchandising; family relations and child development; hospitality administration; and nutritional sciences.

Students seeking admission to a master's degree program in any of the departments must have completed 30 semester credit hours in human environmental sciences or closely-related subject matter. A student with background deficiencies must compensate for such deficiencies before completing the master's degree. Evidence of academic ability (a 3.00 GPA or above) in undergraduate work and Graduate Record Examination (GRE) scores are required. The plan of study for a master's degree student is individually planned to develop academic excellence specific to the student's career goals. The master's degree requires a minimum of 30 semester credit hours including a six-hour thesis or 32 semester credit hours including a report or creative component. The selection and organization of courses are made in consultation with the adviser and the student's advisory committee. At least 21 semester credit hours must be completed in courses numbered 5000 or above.

The *Doctor of Philosophy* degree is an interdisciplinary degree program through the College in conjunction with the departments of Design, Housing and Merchandising, Family Relations and Child Development, Hotel and Restaurant Administration, and Nutritional Sciences

in the College of Human Environmental Sciences. Individualized programs lead to an area of specialization in any one of the departments. Admission to the program is based upon evidence that the applicant meets general requirements of the Graduate College, has demonstrated superior achievement, and can successfully complete a doctoral program, as evidenced by letters of recommendation, GRE scores, a 3.50 GPA, and a philosophy statement and goals. Applications are reviewed by a graduate faculty committee in the department. This program offers an interdisciplinary combination of courses and research experiences.

A minimum of 60 semester credit hours beyond the master's degree is required for the Ph.D. degree.

The Ph.D. degree prepares individuals to be researchers and educators for research positions in universities, business and industry, for university teaching and for administrative or management level positions.

The *Doctor of Philosophy* degree in food science is an interdisciplinary program available through the Department of Nutritional Sciences in cooperation with other University graduate programs.

Departmental Clubs and Honor Societies

American Society of Interior Design
Student Chapter

Apparel, Merchandising, and Design
Association

CHES Ambassadors

CHES Freshman Council

CHES Graduate Student Association

CHES Student Council

Club Managers Association of America

Eta Sigma Delta (hotel and restaurant
administration honor society)

Family Relations and Child Development
Club

High Society Catering

Hotel and Restaurant Society

International Facility Management Association
Student Chapter

Kappa Omicron Nu (scholarship and
leadership honor society)

Nutritional Sciences Club

Phi Upsilon Omicron (scholarship and
leadership honor society)

Sigma Phi Omega (gerontology honor
society)

Design, Housing and Merchandising

Professor and Head
Donna H. Branson, Ph.D.

The mission of the Department of Design, Housing and Merchandising is to continuously improve the development and delivery of future-oriented, integrated instruction, research and outreach programs in design, housing and merchandising that focus on the individual-environment interaction, that are globally oriented, scientifically based and that enhance quality of life in a socially responsible manner. Three undergraduate options are available: interior design, apparel merchandising and apparel design and production.

Students in *interior design* are preparing for careers as professionals who assist businesses and families in planning interior spaces and solving problems relative to the function and quality of interior living and work space. Course work includes fundamentals of design, design analysis, space planning and programming, design of interior space, CAD and related aspects of environmental design. Career opportunities include professional practice in interior and architectural firms, historic restoration and preservation, product design and sales, and facility management. The Foundation for Interior Design Education Research (FIDER) has accredited the undergraduate interior design program. An emphasis in facility management prepares students to work in the facility planning and management department of a large firm such as a corporation, hotel or health care facility.

Students in *apparel merchandising* are preparing for careers with major firms in the apparel and related retail fields. The focus is on developing competencies associated with merchandising and management in the apparel industry. Course work includes retailing, marketing, merchandise planning and analysis, buying practices, promotion, visual merchandising, fashion and market trend analysis, quality assurance and international sourcing. Career opportunities include merchandise manager for retailers and manufacturers, marketing manager for manufacturers, merchandise sourcing manager, visual merchandiser, fashion coordinator, mall manager, and manufacturer's representative.

Students in *apparel design and production* are preparing for careers in the apparel, textiles, and sewn products industry. The program emphasizes the

integration of design principles, fabrication, the needs and desires of the ultimate user, and mass production capabilities toward creation and production of apparel and other sewn products.

Course work includes principles of design, apparel production, quality assurance, functional apparel design, properties and performance evaluation of textiles, pattern making, CAD and entrepreneurship. American Apparel Manufacturers Association (AAMA) has approved the Pre-Production (design) and Production Management undergraduate curricula. Career opportunities include fashion and functional designer, apparel engineer, product development manager, accessory designer, pattern maker, pattern company or manufacturer's representative, textile designer, sourcing manager, quality assurance manager, and production manager.

Students in all three options will develop business management, communication, creative problem solving and administrative skills. An internship is required for all undergraduate students. Minors are available in apparel merchandising and apparel design and production.

Graduate Programs

The Department of Design, Housing and Merchandising offers graduate work leading to the Master of Science in design, housing and merchandising and the Doctor of Philosophy in human environmental sciences degrees. The programs are scientifically based and research oriented. Graduate degrees in the department are tailored to departmental areas of expertise, professional goals of the candidate and College of Human Environmental Sciences and Graduate College requirements. Graduate programs may focus on either *merchandising* or *environmental design*. Students may investigate environmental design and merchandising from the following perspectives: product development and evaluation, consumer and supplier behavior, business development and management, and constructed environmental and individual interrelationships.

The Master of Science Degree. The Master of Science degree is designed to prepare individuals for careers in business, industry, extension and post-secondary or college teaching. The program is built around the academic background, experience, needs, special interests and professional goals of the student. The selection of courses that meet departmental requirements is made in consultation with the advisory committee. If the undergraduate degree is not in the area of specialization, specific undergraduate courses in design, housing and

merchandising will be required as prerequisites. A minimum of 21 credit hours is required in the department. Additional courses may be selected from other areas of human environmental sciences or from supporting areas such as marketing, sociology, communications, and architecture. A thesis or creative component is required of all students.

The Doctor of Philosophy Degree. The Ph.D. prepares individuals for research positions in universities, business and industry, for university teaching and for administrative or management level positions. The student will be expected to have a master's degree or equivalent in design, housing and merchandising or in a closely-related area from a college or university of recognized standing. A student may be required to demonstrate competence in the area of specialization and in related areas, and further course work may be required before admission will be granted.

The plan of study is individually determined for the student in cooperation with an advisory committee. Each plan of study will be an integrated combination of courses and research providing for specialization within an area of design, housing and merchandising, including synthesis of knowledge drawn from departments within and outside of human environmental sciences. Emphasis is on attainment of competence rather than on the completion of specific numbers of credits; however, a minimum of 60 credit hours beyond the master's must be completed. Each student will develop competence in the area of specialization which includes courses in the major and the support area. A global or international dimension and a management dimension are included. The program includes a strong emphasis on research and application of statistical procedures.

More detailed information on graduate study in the Department of Design, Housing and Merchandising can be obtained by writing the head of the department.

Family Relations and Child Development

Professor and Head David Balk, Ph.D.

Courses in family relations and child development assist men and women in preparing for people-oriented and service-oriented professions, in preparing teachers, and in developing attitudes and skills that are fundamental to satisfying relationships between people and

their physical, constructed and social environments.

The department has three major goals:

1. To offer professional preparation for graduate and undergraduate students in fields related to human development, early childhood education, family sciences, and marriage and family therapy;
2. To contribute to the available knowledge of human and family development through basic and applied research;
3. To improve the opportunities for all University students to enjoy wholesome and satisfying personal and family lives through an improved understanding of concepts of human development and family sciences.

The department offers undergraduate students options in early childhood education; individual, family and community services; and preprofessional. All options emphasize integration of theory and research with practice.

The *early childhood education—teacher certification* option provides professional preparation for individuals to teach in public school programs for pre-kindergarten through third grade. The option prepares students to design developmentally appropriate curricula for young children. An early childhood education certificate is required to teach pre-kindergarten through kindergarten in Oklahoma public schools. It also provides preparation for working with infants through preschool and families in a variety of settings.

The *individual, family and community services* option prepares individuals for careers in providing services to children, youth and adults, and their families. The course content focuses on individual development and family dynamics in the context of the community. Career opportunities are in public and private social services agencies, and in business and industry.

The *preprofessional* program has three options: (1) child development, (2) youth and adult, and (3) gerontology. These options provide education for individuals planning to continue their education in graduate programs, medical school, law school, or other specialized graduate programs. The curriculum focuses on developing skills in critical thinking, scientific investigation, and written and oral communication. Students are prepared for advanced education in such areas as family counseling, medicine, physical therapy, gerontology, law and psychology. This option provides flexibility to accommodate the student's particular area of interest or to meet prerequisites for a professional school.

The B.S. degree requires a minimum of 124 semester credit hours. A minor is also available in the department; information on requirements may be obtained from the department head. Articulation agreements between Oklahoma State University and Tulsa Community College provide for a seamless transition toward a baccalaureate degree in family relations and child development undergraduate options.

Further information may be found on the World Wide Web (www.okstate.edu/hes/frcd).

Graduate Programs

Graduate study in the Department of Family Relations and Child Development (FRCD) is designed to prepare students in the creation, dissemination, and application of knowledge that enhances the quality of life for individuals and families. The Department of FRCD offers a marriage and family therapy specialization that is accredited by the Commission on Accreditation for Marriage and Family Therapy Education (COAMFTE) of the American Association for Marriage and Family Therapy (AAMFT). The Child Development Laboratory is licensed by the state of Oklahoma, Department of Human Services and is accredited by the National Association of Young Children. The department has a 50-year history of providing quality graduate education in family relations and child development.

The Department of Family Relations and Child Development offers graduate study leading to the Master of Science degree and the Doctor of Philosophy. Both the Master of Science degree and the Doctor of Philosophy degree programs develop the theoretical and research foundation for further graduate study or for the application of new knowledge. The graduate programs are tailored to the candidate's professional goals, expertise of faculty members, Department of Family Relations and Child Development, and College of Human Environmental Sciences and Graduate College requirements. Graduate programs are central to the department's research and generation of knowledge efforts. Faculty and students share an obligation to make significant contributions to the store of knowledge and share this knowledge with various audiences.

The Master of Science Degree. Admission to the graduate program is selective and based on a variety of criteria including grade-point average, Graduate Record Examination (GRE) scores, letters of recommendation, and student goals. Students need not have majored in family relations and child development but should have 12 upper-division semester

credit hours in child or human development, family sciences or closely-related areas. Students not meeting these criteria may be required to complete prerequisite undergraduate courses in order to be fully admitted to the graduate program.

A minimum of 18 credit hours of core departmental course work is required. Depending upon the program area, additional courses are required in each specialization area as described below. Students are admitted into one of the following specializations for the Master of Science degree: (1) child development, (2) family science, and (3) marriage and family therapy.

Beyond the departmental core courses, students within each specialization take course work determined in consultation with their advisers and advisory committees. The child development and family science specializations require a total of 30 semester hours for the thesis option and 36 semester hours, including a written creative component, for the non-thesis option. The marriage and family therapy curriculum is designed to meet the COAMFTE accreditation guidelines and requires 51-60 semester hours.

The *child development* specialization includes courses in child development to provide the background for working with young children and parents. This specialization emphasizes a balance of academic knowledge for current research and theory and opportunities for experience in the child development laboratory or classroom environment. This specialization is designed for individuals who desire further education in child development and is the natural extension of an early childhood education degree. It provides the background for working with young children in a variety of settings. Students in this specialization gain a core theoretical and research base and could choose to build a program which leads to partial fulfillment of requirements for state certification in early childhood programs, parent education, child development specialist, and curriculum specialist.

The *family science* specialization is designed for students who desire to work with families in family life education, or in family and community service settings, or to pursue doctoral studies in family science. The curriculum provides the research and theoretical foundations and opportunities to develop the professional skills necessary to work in a variety of family-oriented careers or to pursue further graduate studies. Career opportunities include administrator of family and community services agencies, family life educator, family consultant, and parent educator.

The *marriage and family therapy* specialization provides students with basic knowledge, skills and a professional identity essential for entry-level practice of marital and family therapy. This program is accredited by the Commission on Accreditation for Marriage and Family Therapy Education of the American Association for Marriage and Family Therapy. This program has restrictive admission requirements. The curriculum includes course work in individual development, marital and family systems, marital and family therapy, professionalism and ethics, research and statistics and supervised practicum. Graduates practice in controlled settings and under supervision, with methods for determining how couple and family problems develop and can be resolved.

Students completing an M.S. degree in family relations and child development may work toward the Graduate Certificate in gerontology. Students design plans of study that meet both the requirements for a degree in one of the FRCD specializations and the gerontology certificate. The certificate allows students to receive specialized instruction, experience and research opportunities working with older adults. Oklahoma State University is an institutional member of the Association for Gerontology in Higher Education.

The Doctor of Philosophy Degree. The Doctor of Philosophy degree is awarded in human environmental sciences with specialization in family relations and child development. The objective of the program is to offer an integrated interdisciplinary combination of courses and research with a specialized focus on family or child development sciences. The program is designed to prepare competent researchers and educators who will make contributions to the scientific literature in child development and family sciences. This program provides intensive mentoring with individual faculty so that the students can tailor their studies to meet specific interests and needs. Throughout the program, students work toward establishing competencies in: (1) an area of specialization within family relations and child development; (2) the design and implementation of research, including computer analysis and contributions to theory development; (3) the ability to function as a member of an interdisciplinary team and to synthesize knowledge from a variety of academic specialties, and, (4) the performance of professional leadership roles within a specific area of specialization.

Admission to the Ph.D. program is selective and requires the completion of an M.S. in family relations, child development or a related area. Admission decisions are based on a variety of criteria

including grade-point average (3.00 grade-point average in undergraduate work and 3.50 in previous graduate study preferred; 3.25 in previous graduate study is required), GRE scores (450 or higher in each of the Verbal, Quantitative and Analytical sections preferred), letters of recommendation, student goals, and TOEFL scores (required for students for whom English is a second language, 575 minimum).

Students work with their advisers and advisory committees to develop flexible, yet rigorous programs that meet both degree requirements and the professional needs of specialization within family relations and child development. The program requires 60 hours beyond the master's degree including 18-30 hours in FRCD and supporting areas, 18-30 hours in research methods and statistics, a three hour course in human environmental sciences, and 15 hours of dissertation. Students who did not complete a thesis for the master's degree are required to complete a thesis equivalent project in addition to the minimum 60 credit hours beyond the master's degree.

Nutritional Sciences

Professor and Head Barbara J. Stoecker, Ph.D.

The Department of Nutritional Sciences prepares graduates for positions in health professions including nutrition and dietetics. Requirements for admission for most medical schools can be met through the *human nutrition/pre-medical sciences* option. The *dietetics* option prepares students for a diverse and dynamic profession that integrates human nutrition, food service administration, food science, chemistry, physiology, management and interpersonal skills. The *foods and nutrition* option is for students who desire to work in the field of foods and nutrition but do not plan to become a registered dietitian or apply to a professional school.

Three degree options and a minor are offered through the department.

The *foods and nutrition* option provides emphasis areas for students interested in foods and health journalism, in food service management, in community nutrition and in food product development. Career opportunities include foods or nutrition editor for various media, food service design consultant, dietary products or equipment representative, cooperative extension specialist, nutrition educator, and food scientist for industry.

The *dietetics* option meets the Didactic Program in Dietetics (DPD) academic requirements and is approved by the American Dietetic Association. The department requires a minimum of a 2.50 GPA for enrollment in professional courses in dietetics. With appropriate electives, minors may be obtained in restaurant administration, business administration or health. The *human nutrition* option is ideal for students desiring greater depth in the physiological and biochemical sciences in preparation for medical and other professional schools, graduate study and research in human nutrition.

When students successfully complete the academic requirements (DPD) and experience component (dietetic internship) they are eligible to write the Registration Examination for Dietitians which is administered by the Commission on Dietetic Registration of the American Dietetic Association. Individuals who are successful on the examination become registered dietitians and are entitled to use the initials "R.D." to signify professional competence. Many states including Oklahoma also require a license to practice dietetics in the state.

Nutrition professionals work in a wide range of settings, in both the public and private sector and assume an array of challenging responsibilities. Career opportunities for a registered/licensed dietitian include: health care dietitian and administrator, nutrition or food science researcher, fitness/wellness consultant, public health nutritionist, entrepreneur in dietetic programs and services, and corporate dietitian/nutritionist.

Some of the specialized careers and college teaching require additional course work or advanced degrees.

The dietetic internship at Oklahoma State University requires prior completion of the DPD requirements and meets the American Dietetic Association's supervised practice requirements for registration eligibility. Its mission is to provide students with the knowledge and skills necessary to practice as an entry-level dietitian.

All students admitted to the internship must be enrolled concurrently in the graduate program of the Department of Nutritional Sciences. Students successfully completing the program may, if desired, continue to work toward a graduate degree and may apply graduate course work from the internship to their degree programs.

Further information may be found on the World Wide Web (www.okstate.edu/hes/nsci)

Graduate Programs

The Master of Science Degree. Admission to the graduate program is selective and is based on a variety of factors including grade-point average, Graduate Record Examination (GRE) scores, letters of recommendation and student goals. The master's degree requires a minimum of 30 semester credit hours with six semester credit hours for research and thesis. Students may emphasize human nutrition, food service management, nutrition education, or food science. Each student prepares a thesis which is defended in a final oral examination.

The plan of study is individually planned with an adviser who is designated after entry into the program. An advisory committee gives final approval of the plan.

Students may also apply to the master's internationalist program which combines international experience and language training through the Peace Corps with academic study for an M.S. in nutrition. These students begin their academic study in the summer session to prepare them for their Peace Corps assignments one year later.

The Doctor of Philosophy Degree. The Ph.D. degree is awarded in human environmental sciences with specialization in nutritional sciences. To be admitted, applicants will be expected to provide evidence of academic ability and preparation, and a statement of goals and letters of recommendation. An emphasis in human nutrition or in food systems administration and management is available depending on the student's interests and qualifications. The department also participates in OSU's interdisciplinary food science program at the M.S. and Ph.D. levels. To acquire the competencies required, the candidates will need to study in their areas of emphasis and in selected areas within and outside the department.

More detailed information on graduate study in the Department of Nutritional Sciences can be obtained by writing the head of the department.

School of Hotel and Restaurant Administration

Professor and Director
Patrick J. Moreo, Ed.D.

The School of Hotel and Restaurant Administration is accredited by the Accreditation Commission for Programs in Hospitality Administration (ACPHA), a specialized accrediting body. The mission of the OSU School of Hotel and Restaurant Administration (HRAD) is to provide education, research, and service in a globally sensitive, scientifically-based advanced level program for hospitality management careers and life-long learning based on ethical principles. This mission is accomplished by implementing instructional and operational components in the curriculum identified by industry leaders as requirements for success. The academic program is delivered with balanced emphasis on scientific principles and practical business applications. The school has a reputation for providing qualified and skillful managers in lodging, restaurants, clubs and institutional food service settings. An educational facility of more than 22,500 square feet houses laboratories, classrooms, exhibit areas and faculty offices. Specific accommodations include: quantity food preparation areas with state-of-the-art commercial equipment and diverse methods of meal preparation; dining room management and table service laboratory; two fast-food service laboratories for multi-unit fast-food operations; basic food preparation laboratory; classroom and demonstration area; and project room.

Career opportunities include restaurant operations, personnel administration, labor relations, sales and promotion, accounting, front office and general management positions. Positions as regional directors for lodging, restaurant, industrial, and fast food management chains are excellent possibilities. Airline catering, vending and individual restaurant entrepreneurship are additional career areas.

To meet the needs of the industry and provide sound academic preparation at the undergraduate level, the curriculum emphasizes professional and general education. The professional area includes courses in accounting, law, finance, communications and economics. Courses in service management, food and beverage purchasing and control, layout and design, sales and promotion, front office management, and advanced

hotel and restaurant management are also included in the specialized area. The B.S. degree with an option in hotel administration or restaurant management may be earned by completing a minimum of 124 semester hours and achieving a "C" grade in courses required in the major area. A minor is also available in the School.

Successful completion of a management internship is required. Internship placement in hotels, restaurants, and related establishments is arranged globally in cooperation with industry executives and the OSU faculty.

Further information may be found on the World Wide Web (www.okstate.edu/hes/hrad).

Graduate Programs

The Master of Science Degree. Admission to the graduate program in hospitality administration is selective and is based on a variety of factors including grade-point average, Graduate Record Examination (GRE) or Graduate Management Admission Test (GMAT) scores, letters of recommendation and goals of the applicant. Applicants are required to have a bachelor's in hospitality administration or allied field. Prerequisite courses may be required for students with undergraduate degrees in areas other than hospitality administration. The master's degree requires a minimum of 30 credit hours for the thesis option, 33 credit hours including a report, or 38 credit hours including a creative component.

The plan of study is individually developed with an adviser who is designated after entry into the program. An advisory committee gives final approval of the plan.

Competitive graduate teaching and research assistantships, graduate fellowships and tuition fee waivers are available to qualified applicants.

The Doctor of Philosophy Degree. The Ph.D. is awarded in human environmental sciences with specialization in hospitality administration. This program focuses on research and prepares researchers, educators and practitioners to make contributions to the literature in the hospitality field, and requires a minimum of 60 hours beyond the M.S. degree.

More detailed information on graduate study in the School of Hotel and Restaurant Administration can be obtained by writing the director of the School.

College of Osteopathic Medicine

Thomas Wesley Allen, D.O., *Dean and Vice-President for Health Affairs*

David T. John, M.S.P.H., Ph.D., *Associate Dean for Basic Sciences and Graduate Studies*

Larry D. Cherry, D.O., *Associate Dean for Clinical Education*

Wenette W. Pegues, Ed.D., *Assistant Dean for Students/Registrar and Financial Aid*

Gary H. Watson, Ph.D., *Director of Research*

As health care grows more complicated, primary care physicians will be needed more than ever. The College of Osteopathic Medicine is helping to fulfill a critical need by training physicians who are able to treat every member of the family and can simplify the health care process by applying his or her knowledge to treat the whole person.

Most graduates of OSU-College of Osteopathic Medicine practice in the primary care fields—family medicine, pediatrics, internal medicine and obstetrics/gynecology. Others continue their training in specialties and subspecialties—anesthesiology, neurology, psychiatry, radiology, surgery, emergency medicine, dermatology, and oncology, to name a few. Regardless of the field they pursue, students are trained to be excellent physicians, starting with a strong background in general medicine.

The College was founded in 1972 in response to a physician shortage in the small towns and rural areas in the state. The College opened its doors in 1974 and graduated its first class in 1977. In 1988, the College was merged with Oklahoma State University and continues to prepare students to be primary care physicians with emphasis in rural medicine. Nationwide, the greatest need is for doctors to care for people in small towns.

The main campus is located on 16 acres along the west bank of the Arkansas River with a full view of downtown Tulsa. The latest addition to the four-building complex is the Center for Advanced Medical Education. It houses extensive conference facilities, expanded classroom space and a medical bookstore. On the south campus, a half-mile away, is the OSU Health Care Center. First opened in 1981, this clinical teaching facility can accommodate up to



3,000 patient visits a month. It is both a teaching clinic for medical students, interns, and residents, and a health care resource for residents of the west Tulsa area. The Health Care Center provides comprehensive health care and is staffed by licensed physicians and other health care professionals who supervise students in the care of patients.

Osteopathic Medicine

Promoting a patient-centered approach to health care, osteopathic physicians are concerned with the entire patient and traditionally have excelled in general and family health care. The doctor of osteopathic medicine is a fully-trained physician who selectively utilizes all accepted scientific modalities to maintain and restore health. They are licensed to practice all phases of medicine, and offer their patients an added dimension of health care through osteopathic manipulation, a hands-on technique that uses palpation and manipulative procedures of the musculoskeletal system to diagnose illness and treat patients.

Minimum Admission Requirements

At the time of application, the applicant must have an overall grade-point average of at least 3.00 (on a 4.00 scale), a preprofessional science GPA of at least 2.75, and a minimum of 7 average score on the Medical College Admissions Test (MCAT). Applicants must take the MCAT. They are encouraged to take the examination in the spring prior to applying.

Under special circumstances, the College may use discretion to admit students who do not meet these minimum requirements.

At the time of entry, the applicant must have completed:

1. At least 90 semester hours and not less than 75 percent of the courses required for the baccalaureate degree at a regionally-accredited college or university;
2. Satisfactory completion of the following courses, including laboratory, with no grade below a "C" (2.00 on a 4.00 scale):
 - English (six to eight semester hours)
 - Biology (eight to 10 semester hours)
 - Physics (eight to 10 semester hours)
 - General chemistry (eight to 10 semester hours)
 - Organic chemistry (eight to 10 semester hours)
3. Applicants must have taken at least one of the following undergraduate courses: biochemistry, comparative anatomy or cellular biology, embryology, microbiology or molecular biology, histology, physiology, genetics.

An on-campus interview with the Applicant Interview Committee is by invitation only. Interviews are conducted by clinical and basic science faculty members, as well as alumni. Applicants must participate in the interview to qualify for further consideration. Interview results and other data submitted will be considered when determining which applicants have demonstrated appropriate levels of scholarship, aptitude, and motivation for admission to the program. Class size is limited to 88 students. Non-U.S. citizens must have a permanent resident visa ("green card") at the time of application in order to be considered for admission.

The annual application deadline is January 1.

College Curriculum

Divided into Basic Sciences and Clinical Sciences, the curriculum at the College emphasizes primary care. The four-year program uses a coordinated, spiraling systems approach in which subject matter is continuously re-introduced in greater depth and complexity.

During the first year students are introduced to core concepts in anatomy, physiology, biochemistry and microbiology. Students begin to develop competence in osteopathic clinical skills including physical examination, diagnosis and patient interviewing and recognition of normal and abnormal patterns of physical conditions and disease.

The second year emphasizes case-based learning, clinical problem-solving strategies and recognition and understanding of common diseases and conditions frequently seen in primary care settings. Small group learning and independent study are keys to students' development of the critical thinking for the clinical context. Students' clinical skills are honed through interactive lab sessions and simulated clinical experiences. Behavioral science courses provide students with an appreciation of the importance of preventative medicine, cultural sensitivity and mental health issues.

The final 24 months are clinically oriented and community based, consisting of clerkship experiences in hospitals and clinics where students observe patients on a daily basis under physician-faculty supervision.

The student has rotations through primary care services including surgery, obstetrics-gynecology, pediatrics, psychiatry, internal medicine, family medicine and emergency medicine. The balance of the clerkship program consists of supervised patient contact in small towns and rural areas throughout Oklahoma. The student spends four weeks at each of several locations including a community hospital, primary care clinic, family practice clerkship, and elective locations.

Students graduate from the four-year program with the Doctor of Osteopathic Medicine (D.O.) degree. Following graduation, students complete a one-year rotating internship and then enter a residency program.

Detailed information on the College of Osteopathic Medicine can be found in the College's academic catalog, available from the College:

Oklahoma State University College of
Osteopathic Medicine
1111 West 17th Street, Tulsa, Oklahoma
74107-1898
(918) 582-1972
Toll-free, 1-800-677-1972

Graduate Medical Education

The College administers internship and residency programs at Tulsa Regional Medical Center, Hillcrest Health Center

in Oklahoma City and Jefferson Regional Medical Center in Pine Bluff, Arkansas. In addition, the College administers a two-year family practice residency program in Tulsa.

The College maintains close contact with its graduates and can offer assistance in setting up a practice following the graduate's internship and residency training.

The College recently added a graduate program in biomedical sciences. The six-year program is an excellent option for students who wish to pursue careers in medical research or academic medicine.

The first two years are the basic science years of the program. The middle two years are graduate study, research and dissertation of the Ph.D. program. The final two years are the clinical sciences years of the D.O. program. At the end of six years, the student is expected to have completed the requirements for the D.O. degree and the Ph.D. program.

Selection Factors

The College considers applications for admission from all qualified candidates without regard to age, gender, creed, race, disability or national origin. Preference is given to Oklahoma residents. Those who have experienced unequal educational opportunities for social, cultural or racial reasons are particularly urged to apply. Applicants must be U.S. citizens or have obtained permanent resident status to be considered.

Accreditation

The College is accredited by the Bureau of Professional Education of the American Osteopathic Association, the recognized accrediting agency for institutions that educate osteopathic physicians. The Oklahoma State Regents for Higher Education are empowered by the Oklahoma Constitution to prescribe standards for higher education applicable to each institution in the Oklahoma State System of Higher Education.

Financial Aid

A financial aid officer works to ensure that students are not prevented from attending the College because of their financial situations. The primary purpose of the College's aid program is to provide financial assistance to students who would otherwise be unable to afford tuition. A computer search program allows students to systematically find available loans, grants and scholarships for which they may be eligible.

Tuition at the College of Osteopathic Medicine (for the 1999-2000 school

year) totals \$9,552.00 per year for Oklahoma residents and \$24,244.00 per year for out-of-state residents.

Although the principal responsibility for financing an education remains with the student and his or her family, the College will work to offer campus-based aid to supplement that contribution.

Because the number of applicants and their total requests each year exceed the resources available, a selection process is necessary to see that the most deserving and best qualified students have first claim on available resources. Financial aid options include loans, scholarships, and grants, as well as work-study programs and return service agreements.

A Family Financial Statement and other required applications are available from the College.

Honor and Service Organizations

The College emphasizes community service, and many students volunteer their time in giving school and athletic physicals, visiting nursing homes, working with school children, and working at College-sponsored health fairs or the annual Osteopathic Run. Listed below are official student organizations.

American College of Family
Practitioners—Undergraduate Chapter
American Medical Women's Association
Association of Military Osteopathic Physicians and Surgeons
Atlas Fraternity (social)
Christian Medical and Dental Society
Delta Omega (national osteopathic sorority)
Geriatric Medicine Club
Inter-Club Council
Osteopathic Sports Medicine Society
Pinnacle Yearbook
Sigma Sigma Phi (honor society)
Society for the Advancement of Osteopathic Medicine
Student Associate Auxiliary
Student National Medical Association
Student Osteopathic Internal Medicine Association
Student Osteopathic Medical Association
Student Osteopathic Surgical Association
Student Senate
Undergraduate American Academy of Osteopathy

College of Veterinary Medicine

Joseph W. Alexander, D.V.M., M.S.,
Dean

Michael D. Lorenz, D.V.M.,
*Associate Dean for Academic
Affairs*

Richard W. Eberle, Ph.D., *Associate
Dean for Research*

John G. Kirkpatrick, D.V.M., *Director
of Veterinary Extension*

Carolynn MacAllister, D.V.M.,
Director of Continuing Education

The primary objective of the College of Veterinary Medicine is to educate veterinarians for private practice. However, the professional curriculum provides an excellent basic medical education in addition to training in diagnosis, disease prevention, medical treatment, and surgery. Graduates are qualified to pursue careers in many facets of veterinary medicine and health-related professions.

Accreditation

The College has full academic accreditation status approved by the Council on Education of the American Veterinary Medical Association. Accreditation is based on an assessment of 11 essential factors, namely, the college's organization, its finances, physical facilities and equipment, clinical resources, library and learning resources, enrollment, admissions, faculty, curriculum, continuing and post-graduate education, and research.

Preparatory Requirements

Attainment of the degree of Doctor of Veterinary Medicine requires, at a minimum, six academic years of collegiate training. In preparation for the professional training the student must complete both prescribed and elective collegiate courses. The minimum prescribed preparatory studies, totaling 60 semester hours of course work, can be completed in two calendar years. Most of the entering veterinary medical students in recent years have had three to four years of preparatory training or a bachelor's degree. It is recommended that the student undertake an appropriate regular bachelor's degree program in the sciences, in the course of which he or she will complete the prerequisites for entry

into the College of Veterinary Medicine by the end of at least the third year of preparatory training.

Admission Requirements

Collegiate course requirements for entry into veterinary medical college may be completed at any accredited university or college. Special pre-veterinary curricula are available at Oklahoma State University through the College of Agricultural Sciences and Natural Resources and the College of Arts and Sciences. Both colleges offer programs of study in pre-veterinary medical sciences which provide for the award of a bachelor's degree after the first or second year of veterinary medical studies to those persons who gain early entry into a veterinary medical college.

Requests for information on pre-veterinary medical study programs and applications for admission to such programs should be addressed to the dean of either the College of Agricultural Sciences and Natural Resources or the College of Arts and Sciences.

Listed below are the *minimum* course prerequisites for consideration for admission to the College of Veterinary Medicine.

English composition and technical/professional report writing—eight semester credit hours. An English elective may be substituted for the technical writing.

Chemistry—17 semester credit hours including five semester credit hours of organic chemistry designed for pre-

veterinary, premedical and pre-dental students which must include both the aliphatic and aromatic series of organic compounds. Additionally three semester credit hours of biochemistry are required.

Physics—four semester credit hours of descriptive physics or two semesters of general physics.

Mathematics—three semester credit hours. Mathematics courses must include the fundamental operations of algebra, exponents and radicals, simple equations, graphs, simultaneous equations, quadratic equations and logarithms.

Biological science—15 semester credit hours. Courses in zoology, microbiology and genetics are required. These courses must include laboratory work. Comprehensive courses in biology will be considered but must be evaluated before credit is accepted.

Animal Nutrition—three semester credit hours of the basic principles of animal nutrition, including digestion, absorption and metabolism of the various food nutrients and ration formulation. Courses in human nutrition are not acceptable.

Humanities and social science—six semester credit hours.

This information was current at the time of publication but is subject to change. The admission requirements are under annual review and changes may be made at any time.

Scholarships

The College has several scholarships which are available to veterinary medicine students, based on academic achievement and financial need. Special scholarships and awards are available for disadvantaged and minority students enrolled in veterinary medicine or in the pre-veterinary medicine program.

Veterinary Medical Studies

Enrollment in veterinary medicine is restricted. Applications for admission must be submitted by October 1, and a new class enters the College each year at the beginning of the fall semester.

Applicants who are legal residents of Oklahoma will be given first priority. However, a limited number of the first-year



students may be selected from a pool of nonresident applicants. Questions about residency should be directed to the Office of Admissions, Oklahoma State University. Requests for application materials should be directed to the manager of veterinary medicine admissions, College of Veterinary Medicine.

Students are admitted as candidates for the Doctor of Veterinary Medicine degree on the basis of records of academic performance in preparatory studies, standard achievement tests, and references to determine personal characteristics and career motivation.

The College has an alternative admissions program. For further information, contact the Office of the Associate Dean.

The veterinary curriculum extends over four calendar years. The first two academic years conform to the normal semester system of the University. The last two academic years are continuous, with the fourth starting shortly after the third. The fourth year is clinical in nature and classes are primarily in the Boren Veterinary Teaching Hospital. The fourth year is organized into three-week rotations to provide for lower faculty-student ratio and more efficient use of clinical facilities and resources.

Veterinary Biomedical Sciences Graduate Programs

Diana Moffeit

The veterinary biomedical sciences (VBS) graduate program is a multidisciplinary program intended to provide a broad base to address individual student interests. The program is administered within the College of Veterinary Medicine but may involve some faculty outside of the college. Programs of research and study leading to the degrees of Master of Science and Doctor of Philosophy are available within the broad areas of focus: infectious diseases, pathobiology and physiological sciences. The Master of Science degree is also available in the clinical sciences. The program is designed to prepare individuals for careers in teaching and research, and specialization is possible within each area dependent upon faculty interests, student needs and available funding.

Current areas of research include tick-transmitted diseases, bovine infectious diseases, ehrlichiosis, hepatozoonosis, environmental toxicology, antimicrobial activity and disposition, soft tissue infections and phagocytosis, axial skeletal development, marine mammal morphology, snake/spider venom characterization, biology of tendon and ligament

repair, regulation of sperm function, laser applications, and equine gastric, orthopedic and infectious diseases. Additional areas include infectious and parasitic diseases of wild animals, vector transmitted protozoan and rickettsial diseases of wild and domestic animals, steroid hormone action, reproductive physiology, neosporosis, interferon, immunomodulators, and ruminant pestiviruses. Faculty and their specific areas of interest are available through the Graduate Coordinator or via the World Wide Web (www.cvm.okstate.edu/graduate).

Prerequisites. Candidates for admission must possess at least a bachelor's degree or equivalent, with a background in biological and physical sciences. While there are no absolute grade requirements, applicants with combined verbal, quantitative and analytical GRE total scores multiplied by their GPAs (last 60 hours) totaling 4,500 or greater, will receive strongest consideration. Provisionary status may be awarded to those not having these credentials with specific requirements dependent on recommendations of the departmental graduate faculty.

Internship and Residency Programs

Internships and residency programs in clinical medicine and surgery are offered through the Department of Veterinary Clinical Sciences. Residency programs in pathology are offered through the Department of Veterinary Anatomy, Pathology and Pharmacology. Details of these programs appear in each of these departmental sections.

The Master of Science Degree. The M.S. may be earned with 30 credit hours beyond a bachelor's degree or 21 hours beyond the DVM degree, including not more than six credit hours for the thesis. The plan of study is designed to meet the student's needs and interests and typically includes one or two credits of seminar, one course in biochemistry and one course in statistics. The student must also pass a final oral examination covering the thesis and related course work.

The Doctor of Philosophy Degree. The Ph.D. requires a total of 90 credit hours beyond the bachelor's degree or 60 hours beyond the M.S. or D.V.M. degree, including a minimum of 30 credit hours for research and dissertation. The plan of study is designed to meet the student's needs and interests and typically includes courses in biochemistry, biochemistry techniques, statistics and seminar. Written and oral qualifying examinations are required. Students must prepare a research proposal and complete a dissertation based on original research.

Application Procedure. Applications are accepted at any time; however, all documents should be received prior to March 1 for admission to the summer session, July 1 for the fall semester, and November 1 for the spring semester. Applicants are required to submit scores for the Aptitude Test portion of the Graduate Record Examination. (The Advanced Test in Biology is also recommended.) International applicants are required to take the English Proficiency Exam (a passing score on the TOEFL of 550 or above), unless a student is from a country where English is a first language. The Test of Spoken English (a passing score on the TSE of 220 or above), is required for students receiving graduate teaching assistantships.

Applicants generally select a major professor before they are admitted to the VBS program. They are urged to correspond with a member of the faculty whose interests reflect their own before making application. Information about faculty research interests is available upon written request to the graduate coordinator. After acceptance to the graduate program, the student and major professor select an advisory committee and develop a plan of study consistent with the VBS graduate group requirements and subject to approval of the dean of the Graduate College.

Assistantships. A limited number of graduate teaching assistantships are available in the physiological sciences and infectious diseases areas.

Veterinary Anatomy, Pathology and Pharmacology

Professor and Head Anthony W. Confer, D.V.M., Ph.D.

Residency Programs

A two to three year residency in anatomical or clinical veterinary pathology is offered. Candidates must have the D.V.M. degree or equivalent. The residency program is designed to prepare individuals for careers in teaching, research and service pathology to fulfill the requirements of academics, animal diagnostic facilities and industry. Pursuit of a graduate degree is encouraged for all residents. The M.S. is possible within the residency training program. The Ph.D. is available to qualified residents who wish

to pursue experimental pathology training and requires an additional two to three years in the program. Trainees may omit the M.S. and pursue the Ph.D. directly.

Application Procedure. Applications for the residency program are accepted at any time. Usually one residency training position is available each year. Open positions are listed in the "Educational Opportunities" section of the *Journal of the American Veterinary Medical Association*.

Veterinary Clinical Sciences

Professor and Acting Head James E. Creed, D.V.M., M.S.

Internship and Residency Programs

The department offers graduate professional programs (internships and residencies). Internships are one-year post-D.V.M. clinical programs in small or large animal medicine and surgery. Internships are designed in part to prepare students for residencies or graduate academic programs. Residencies are two- or three-year clinical programs in various disciplines designed in part to prepare for specialty board certification. Currently residencies are offered in small animal surgery, equine medicine, equine surgery, food animal medicine and surgery, and theriogenology. Graduate academic programs may be available in association with some residencies.

Application Procedure. Applications are accepted at any time and are considered as positions become available. Most open positions are listed in the *Veterinary Internship/Residency Matching Program* directory published each October.

Veterinary Infectious Diseases and Physiology

Professor and Head
Robert W. Fulton, D.V.M., Ph.D.

Refer to "Veterinary Biomedical Sciences Graduate Program" above.

Faculty

College of Agricultural Sciences and Natural Resources

Agricultural Economics

Professor and Head

Alan D. Barkema, Ph.D.

Regents Professor and Pat and Jean

Neustadt Chair in Agricultural Economics

Harry P. Mapp, Ph.D.

Regents Professors

Barton W. Brorsen, Ph.D.; Gerald A. Doeksen, Ph.D.; James N. Trapp, Ph.D.

Professors

Kim B. Anderson, Ph.D.; Damona G. Doye, Ph.D.; Francis M. Epplin, Ph.D.; David M. Henneberry, Ph.D.; Shida R. Henneberry, Ph.D.; Darrel D. Kletke, Ph.D.; Ross O. Love, Ph.D.; Robert L. Oehrtman, Ph.D.; James E. Osborn, Ph.D.; Larry D. Sanders, Ph.D.; Raymond J. Schatzer, Ph.D.; Dean F. Schreiner, Ph.D.; Daniel S. Tilley, Ph.D.; Clement E. Ward, Ph.D.; Joseph E. Williams, Ph.D.; Michael Woods, Ph.D.

Associate Professors

Brian Adam, Ph.D.; Michael R. Dicks, Ph.D.; Michael L. Hardin, Ph.D.; Phil Kenkel, Ph.D.; Notie H. Lansford, Ph.D.; David K. Lewis, D.Phil.; Derrell S. Peel, Ph.D.; Arthur Stoecker, Ph.D.; Marcia L. Tilley, J.D.

Assistant Professors

Rodney Holcomb, Ph.D.; Conrad Lyford, Ph.D.

Agricultural Education, Communications and 4-H Youth Development

Professor and Head

James G. Leising, Ph.D.

Professors

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W. Eberle, Ph.D.; Sidney A. Ewing, D.V.M.,
Ph.D.; J. Carl Fox, Ph.D.; A. Alan Kocan,
M.S.P.H., Ph.D.

Associate Professors
Zheng Chen, Endowed Chair, M.D., Ph.D.;
*Jean M. d'Offay, D.T.V.M., Ph.D.; Joseph
P. McCann, Ph.D.; *Rebecca J. Morton,
D.V.M., Ph.D.; John H. Wyckoff III, Ph.D.

Assistant Professors
Michael S. Davis, D.V.M., M.S., Ph.D.;
Terry W. Lehenbauer, D.V.M., M.P.V.M.,
Ph.D.; Jerry R. Malayer, Ph.D.; Jeremiah T.
Saliki, D.V.M., Ph.D.

Teaching Associate
Jean M. Clarke, D.V.M.

Graduate Teaching Associates
John Mathew, B.V.Sc., M.S.; Mahesh
Mohan, B.V.Sc., M.S.; Sharon Ore, M.S.;
Susan Stacy, M.S.

Graduate Research Assistants
Jin Cheng, M.S.; Rebecca Duncan, B.S.;
David Goad, M.S.

Veterinary Clinical Sciences

Professor and Acting Head
*James E. Creed, D.V.M., M.S.

Professors
*Joseph W. Alexander, D.V.M., M.S.;
Kenneth E. Bartels, D.V.M., M.S.; *Michael
A. Collier, D.V.M.; *William C. Edwards,
D.V.M., M.S.; *John P. Hoover, D.V.M.,
M.S.; *Michael D. Lorenz, D.V.M.; *Charles
G. MacAllister, D.V.M.; Thomas Monin,
D.V.M.; *Steven H. Slusher, D.V.M., M.S.;
*Ronald D. Welsh, D.V.M., M.S.

Associate Professors
*Robert J. Bahr, D.V.M.; *Lionel J. Dawson,
B.V.Sc., M.S.; *George A. Henry, D.V.M.;
*Henry W. Jann, D.V.M., M.S.; *John G.
Kirkpatrick, D.V.M.; Jeff Ko, D.V.M., M.S.;
*Gregor L. Morgan, M.V.Sc., Ph.D.;
*Sandra E. Morgan, D.V.M., M.S.; *Robert
A. Smith, D.V.M., M.S.

Assistant Professors
*Mary H. Bowles, D.V.M.; Ellen B.
Davidson, D.V.M.; *W. Tod Drost, D.V.M.;
Susan M. Eddlestone, D.V.M.; Douglas N.
Lange, D.V.M.; *Rebecca S. McConnico,
D.V.M., Ph.D.;Carolynn T. MacAllister,
D.V.M.; *Ronald E. Mandsager, D.V.M.;
*Mark C. Rochat, D.V.M., M.S.; Virginia
Schultz, D.V.M., M.S.; *D. L. Step, D.V.M.;
*Robert N. Streeter, D.V.M.; *Philip R.
Woods, D.V.M., Ph.D., M.R.C.V.S.

Adjunct Assistant Professors
James A. Chalman, D.V.M.; *Leslie J.
Henshaw, D.V.M.

Adjunct Instructor
Petrina A. York, D.V.M.

Residents
Belinda Barnickle, D.V.M.; William R.
DuBois, D.V.M.; Lorraine L. Linn, D.V.M.;
Kevin E. Washburn, D.V.M.; Christine L.
Watson, D.V.M.; Olin K. Balch, D.V.M.,
Ph.D.; Pilar M. Hayes, D.V.M.; Scott R.
Reiners, D.V.M.

Oklahoma Animal Disease Diagnostic Laboratory

Professor and Director
*William C. Edwards, D.V.M., M.S. (toxi-
cologist)

Professor
*Ronald D. Welsh, D.V.M., M.S. (bacteriolo-
gist)

Associate Professors
*Ray W. Ely, D.V.M., Ph.D. (pathologist);
*R. Gayman Helman, D.V.M., Ph.D. (pa-
thologist); *Stanley L. Vanhooser, D.V.M.,
M.S. (pathologist)

Assistant Professors
*Jeremiah T. Saliki, D.V.M., Ph.D. (virolo-
gist); Vickie L. Cooper, D.V.M. (patholo-
gist)

Resident
Karyn Bischoff, D.V.M. (toxicology)

**Board Certification in Specialty Area*

Graduate College

Graduate College Calendar

(Refer also to the "University Calendar")

First Semester 1999-2000, Fall 1999

- August 16, Monday
Class work begins
- August 27, Friday
Last day to file a diploma application
- August 27, Friday
Applications for graduate credit for graduating seniors due
- November 5, Friday
FINAL DRAFT copy of dissertations, theses and reports due
- November 12, Friday
RESULTS of doctoral, Ed.S., and Plan I, Plan II or Plan III master's FINAL EXAMINATIONS due
- November 19, Friday
Application for admission to spring candidacy due for doctoral and Ed.S. candidates
- December 3, Friday
FINAL COPIES of dissertations, theses and reports due by fall candidates
- December 5, Sunday
Graduate College Hooding Convocation
- December 10, Friday
Class work ends

Second Semester 1999-2000, Spring 2000

- January 10, Monday
Class work begins
- January 21, Friday
Last day to file a diploma application
- January 21, Friday
Applications for graduate credit for graduating seniors due
- March 24, Friday
FINAL DRAFT copy of dissertations, theses and reports due
- April 7, Friday
RESULTS of doctoral, Ed.S., and Plan I, Plan II or Plan III master's FINAL EXAMINATIONS due
- April 21, Friday
FINAL COPIES of dissertations, theses and reports due by spring candidates
- April 21, Friday
Application for admission to fall candidacy due for doctoral and Ed.S. candidates
- May 5, Friday
Class work ends

- May 5, Friday
Graduate College Hooding Convocation
- May 6, Saturday
University Commencement

Summer 2000 Regular 8-Week Summer Session

- June 5, Monday
Class work begins
- June 9, Friday
Last day to file a diploma application
- June 9, Friday
FINAL DRAFT copy of dissertations, theses and reports due
- June 9, Friday
Applications for graduate credit for graduating seniors due
- June 23, Friday
RESULTS of doctoral, Ed.S., and Plan I, Plan II or Plan III master's FINAL EXAMINATIONS due
- July 7, Friday
FINAL COPIES of dissertations, theses and reports due by summer candidates
- July 28, Friday
Graduate College Hooding Convocation
- July 28, Friday
Class work ends

First Semester 2000-2001, Fall 2000

- August 21, Monday
Class work begins
- September 1, Friday
Last day to file a diploma application
- September 1, Friday
Applications for graduate credit for graduating seniors due
- November 3, Friday
FINAL DRAFT copy of dissertations, theses and reports due
- November 3, Friday
Application for admission to spring candidacy due for doctoral and Ed.S. candidates
- November 17, Friday
RESULTS of doctoral, Ed.S., and Plan I, Plan II or Plan III master's FINAL EXAMINATIONS due
- December 1, Friday
FINAL COPIES of dissertations, theses and reports due by fall candidates
- December 10, Sunday
Graduate College Hooding Convocation
- December 15, Friday
Class work ends

Second Semester 2000-2001, Spring 2001

- January 16, Tuesday
Class work begins
- January 26, Friday
Last day to file a diploma application
- January 26, Friday
Applications for graduate credit for graduating seniors due
- March 30, Friday
FINAL DRAFT copy of dissertations, theses and reports due
- April 13, Friday
RESULTS of doctoral, Ed.S., and Plan I, Plan II or Plan III master's FINAL EXAMINATIONS due
- April 27, Friday
FINAL COPIES of dissertations, theses and reports due by spring candidates
- April 27, Friday
Application for admission to fall candidacy due for doctoral and Ed.S. candidates
- May 11, Friday
Class work ends
- May 11, Friday
Graduate College Hooding Convocation
- May 12, Saturday
University Commencement

Summer 2001 Regular 8-Week Summer Session

- June 11, Monday
Class work begins
- June 15, Friday
Last day to file a diploma application
- June 15, Friday
FINAL DRAFT copy of dissertations, theses and reports due
- June 15, Friday
Applications for graduate credit for graduating seniors due
- June 29, Friday
RESULTS of doctoral, Ed.S., and Plan I, Plan II or Plan III master's FINAL EXAMINATIONS due
- July 13, Friday
FINAL COPIES of dissertations, theses and reports due by summer candidates
- August 3, Friday
Graduate College Hooding Convocation
- August 3, Friday
Class work ends

Wayne Powell, Ph.D., Dean

**Molly Tovar, Ed.D., Director of
Student Academic Services**

**Michael Heppler, M.Ed., Assistant
Director of Student Academic
Services**

The Graduate College is the hub of advanced study, research and creativity at Oklahoma State University. Faculty and students share an obligation to achieve greater knowledge and to present it to the scholarly community. Research is best done in an atmosphere where common goals exist. An esprit de corps exists in the OSU academic community where the goals are to maintain regional and national recognition, to provide an exciting research environment where students and faculty can make significant contributions to the store of knowledge, and to encourage each individual to reach his or her potential.

For additional information, the Graduate College may be reached at:
Phone: 1-405-744-6368 or
1-800-227-GRAD
FAX: 405-744-6244
E-Mail: grad-i@okway.okstate.edu
URL: <http://www.osu-ours.okstate.edu/gradcoll>

Organization of the Graduate College

The Graduate College administers regulations and standards specified and established by the Graduate Faculty. The Graduate Faculty Council is elected by the Graduate Faculty to work with the dean of the Graduate College in development and administration of policy. The Graduate Faculty Council is the execu-

tive committee of the Graduate Faculty. It formulates and reviews policies concerning with the conduct of graduate study at OSU. All new policies are referred to the Graduate Faculty Council or the general Graduate Faculty for approval.

All departmental requests for permission to offer advanced degrees are referred to the Graduate Faculty Council for recommendation.

All requests for waiver of any rules or regulations as listed in the *Catalog* must be in the form of petitions to the dean of the Graduate College. A supporting letter from the major adviser is also required.

Graduate Council Members

Wayne Powell, Chair
Robert Wettemann, Vice-Chair

Group I --Biological Sciences

Robert Hunger
James Webster
Brian Kahn

Group II--Humanities

Elizabeth Grubgeld
Lisa Lewis
Susan Garzon

Group III--Physical Sciences and Technology

Eric Price
William Warde
Paul Westhaus

Group IV--Social Sciences

Joe Weber
David Knottnerus
Carol Bormann

Group V--Teacher Education

Al Carozzi
Steve Edwards
Adrienne Hyle

Research at Oklahoma State University

Research, a critical dimension of the mission of the University, is vital to the growth, health and progress of the state, the region and the nation.

Over the last several years, national attention has turned to economic development. This renewed emphasis on economic development and high technology has been spurred by the advances made by the Asian and European economic communities.

OSU is deeply involved in meeting this challenge. In recent years, significant strides have been taken in developing programs at the cutting edge of technology and basic research. The progress made by the establishment of the Noble Research Center for Agriculture and Renewable Natural Resources, the Food

and Agricultural Products Research and Technology Center, the Center for Laser Research, the robotics and automated manufacturing laboratories, and the biotechnology programs underscore the University's commitment to find solutions to pressing problems.

The Environmental Institute was established at OSU to stimulate, coordinate and promote interdisciplinary research and education related to the natural environment. The Institute administers the activities of the University Center for Energy Research, the University Center for Water Research, the Spatial and Environmental Information Clearinghouse, and the environmental sciences graduate program. More information about the Institute and its activities is available on the World Wide Web (<http://www.seic.okstate.edu/envinst/>).

The University Center for Energy Research (UCER) encourages research and education in the fields of energy development, production, transmission, use, conservation and pollution. These areas are supported by a campus research grant program, fellowships, coordination of multidisciplinary projects, and transfer of information regarding research and educational opportunities, and results via publications, presentations and seminars.

The University Center for Water Research (UCWR) encourages research and education on national, state and local water issues. Support is provided through two research grant programs, fellowships, coordination of multidisciplinary projects, and transfer of information regarding research and educational opportunities via publication of newsletters, reports and special publications, and sponsorship of seminars.

The Spatial and Environmental Information Clearinghouse (SEIC) acts as an information link serving OSU researchers and the citizens of Oklahoma. Using World Wide Web and WAIS interfaces, SEIC provides a user-friendly method of locating and retrieving local (Oklahoma) and world-wide spatial and environmental data sets. Accessible on the World Wide Web (<http://www.seic.okstate.edu/>), the SEIC home page allows the user access to information and data on the Environmental Institute and SEIC, Oklahoma and the nation. SEIC also provides search and retrieval services for researchers on the OSU campus and throughout the state.

The Center for Laser and Photonics Research (CLPR) conducts cutting-edge research in critical new laser and photonics technologies. Its national and international reputation is based on its leadership in lasers in basic science, industry, medicine, photonics and other



high-tech arenas. The Center provides a focal point of expertise for the support of high-technology industries, research laboratories and medical institutions in Oklahoma and around the country. Faculty are involved in a broad spectrum of research activities including blue-light emitting semi-conducting lasers, development of an optoelectronic THz beam system, construction of a group-velocity matched ultrashort pulse nonlinear frequency conversion schemes, development of the first self-starting and self-mode-locking titanium-sapphire laser, research and development in laser-induced holographic gratings in rare-earth doped glasses and dynamic light scattering studies of colloidal suspensions. The efforts of the Center promote state-of-the-art education for tomorrow's scientists, engineers and technicians, provide important new research in emerging interdisciplinary areas and significantly increase state and national high technology bases. New directions in the Center for Laser and Photonics Research involve a statewide, multidisciplinary clean room user facility for advanced technology materials and device processing and fabrication, a biophotonics initiative to link lasers and photonics to medical research and the health community, and the development of a new photonics advanced degree program, designed to attract high-quality students to OSU physics, chemistry and electrical engineering departments and better prepare them for the job market through interdisciplinary academic and research programs.

The Telecommunications Center has established the University as a world leader in telecommunications technology and has enhanced OSU's ability to disseminate research results.

Major research affiliations exist with the National Center for Groundwater Research, Oak Ridge Associated Universities and National Laboratories, and the Oklahoma Medical Research Foundation. Research facilities exist within each of the academic colleges. Well-equipped laboratories, teaching and diagnostic facilities, and various resource centers provide an excellent environment for creative scholarly research.

At the College of Osteopathic Medicine in biomedical research, one of the largest areas of focus is in the area of neurosciences with projects ongoing in the areas of artificial vision, pain perception and mechanisms of actions of neural acting drugs. Work in this area also includes projects on Alzheimer's and Parkinson's diseases and the modulation of cellular immune responses by drugs of abuse.

Other areas of interest include arthritis, alcoholism/alcohol metabolism, re-

productive endocrinology, kidney physiology and pathogenic free-living amoebae in Oklahoma waters. Additionally, an Aviation Medicine Research and Training Facility is currently under construction that will house multi-person hypobaric and hyperbaric chambers used to study the effects of high altitudes on human physiology or the uses of hyperbarics in the treatment of several diseases such as burns, cancer and diabetes.

In clinical research, the College sponsors a variety of clinical research programs through its Department of Psychiatry and Behavioral Sciences and the Oklahoma Area Health Education Center. Included are a laboratory and field study on psychological factors in cardiovascular disease, effects of compliance to home self breast exams, prevention of alcoholism, drug abuse, suicide, type II diabetes and a computerized home treatment system for patients recovering from traumatic brain injuries.

University Research Council. The University Research Council operates to assure proper consideration of research projects that are multidisciplinary in nature and to provide a mechanism for consideration of administrative problems and policies. The Council serves as an advisory group on all research matters for the president of the University. This Council is composed of the vice-president for research, a representative of the Faculty Council, a representative from Sigma Xi, the director of Grants and Contracts Financial Administration, the director of Computing and Information Services, the associate project director of EPSCOR, the dean of libraries, the director of Federal Relations, and the research directors of the various colleges.

Accreditation

Oklahoma State University is accredited by the North Central Association (NCA) of Colleges and Schools. Programs within the colleges are also accredited by other agencies. (The NCA may be reached at 30 N. LaSalle Street, Suite 2400, Chicago, IL 60601, phone (800) 621-7440.)

In the *College of Agricultural Sciences and Natural Resources*, the forestry program is accredited by the Society of American Foresters. The landscape architecture program (Bachelor of Landscape Architecture) is accredited by the American Society of Landscape Architects. The landscape contracting program is certified by the Association of Landscape Contractors of America. In addition, the College's teacher education program in agricultural education is accredited by the Oklahoma State Department of Education, and the Okla-

homa State Department of Vocational-Technical Education.

In the *College of Arts and Sciences*, the medical technology program is accredited by the National Accrediting Association of Clinical Laboratory Science; the chemistry program is accredited by the American Chemical Society; the Ph.D. program in history is accredited by the American Historical Association; the School of Journalism and Broadcasting as well as the programs in advertising, broadcast journalism, news editorial, and public relations are accredited by the Accrediting Council on Education for Journalism and Mass Communications; the music program is accredited by the National Association of Schools of Music, the theater department by the National Association of Schools of Theater; and the public administration program in the Department of Political Science is accredited by the National Association of Schools of Public Administration. In the Department of Psychology, the doctoral program in clinical psychology is accredited by the American Psychological Association. The communication sciences and disorders program is accredited by the American Speech-Language-Hearing Association and the Oklahoma Speech-Hearing Association.

All programs in the *College of Business Administration* are fully accredited by the American Assembly of Collegiate Schools of Business (AACSB)—the International Association for Management Education. The School of Accounting has separate accreditation by this body.

In the *College of Education*, the aviation programs are accredited by the Federal Aviation Administration. OSU was the first university in Oklahoma with a program that received this designation. The counseling psychology program is accredited by the American Psychological Association. The leisure studies program is accredited by the National Recreation and Park Association and the American Association for Leisure and Recreation, with accredited options in leisure service management and therapeutic recreation. All professional education programs are accredited by the Oklahoma State Board of Education and the North Central Association of Colleges and Schools. Technical and industrial education is accredited by the Oklahoma State Department of Vocational-Technical Education.

In the *College of Engineering, Architecture and Technology*, bachelor's degree programs are accredited by nationally recognized accreditation organizations. Programs in aerospace engineering (an option in mechanical engineering), architectural engineering, biosystems engineering, chemical engi-

Research Centers

Agronomy Research Station	Rural Route, Perkins, OK 74059	547-2385
Caddo Research Station	P.O. Box 42, Fort Cobb, OK 73038	643-2501
Eastern Research Station	Rt. 1, Box 65, Haskell, OK 74436	918-482-3822
Irrigation Research Station	Route 1, Box 15, Altus, OK 73521	482-3459
Kiamichi Forestry Research Station	Rt. 1, Box 228, Idabel, OK 74745	286-5175
Marvin Klemme Research Station	RR 1, Bessie, OK 73622	331-8171
North Central Research Station	Box 141, Lahoma, OK 73754	796-2447
Oklahoma Fruit Research Station	Rt 2, Box 1030, Perkins, OK 74059	547-2672
Oklahoma Pecan Research Station	Sparks, OK 74869	547-2672
	Send mail to Perkins	
Oklahoma Vegetable Research Station	13711 S. Mingo Rd, Bixby, OK 74008	918-369-2441
Panhandle Research Station	Rt. 1, Box 86M, Goodwell, OK 73939	918-369-2441
Sandyland Research Station	Mangum, OK 73554	482-3459
	Send mail to Altus	
South Central Research Station	Rt. 3, Box 9, Chickasha, OK 73018	224-4476
Southwest Agronomy Research Station	Tipton, OK 73570	482-3459
	Send mail to Altus	
U.S. Southern Great Plains Field Station	2000 18th St., Woodward, OK 73801	256-7449
Wes Watkins Agricultural Research & Extension Center	Box 128, Lane, OK 74555	889-7343
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Agricultural Experiment Station	139 Agricultural Hall	744-5398
Agronomy Research Station	Rt. 5, Box 150, Stillwater, OK 74075	624-7036
Center for Aerospace Education Services Project	300 North Cordell	744-7015
Center for Applications of Remote Sensing	213 Scott	744-5178
Center for Environmental Education	408 Classroom Building	744-7233
Center for International Trade Development	204 Center for Int'l Trade Development	744-7693
Center for Laser & Photonics Research	413 Noble Research Center	744-6575
Center for Local Government Technology	308 Center for Int'l Trade Development	744-6049
Crystal Growth Laboratory	145 Physical Science	744-5796
Ecotoxicology Research Laboratory	426 Life Science West	744-5551
Educational Technology Center	002 Willard Hall	744-7124
Electron Microscopy Laboratory	020 Veterinary Medicine	744-6765
Electronics Laboratory	398 Cordell South	744-5716
Engineering Energy Laboratory	216 Engineering South	744-5157
Environmental Institute	003 Life Science East	744-9994
Human Nutrition Center	425 Human Environmental Sciences	744-5040
Human Resources Development Center	204 Willard	744-6275
Industrial Assessment Center	322 Engineering North	744-6055
Manufacturing Processes and Materials Center	1724 W. Tyler, Stillwater, OK 74074	744-7375
Mass Spectrometry Laboratory	025 Physical Science	744-5937
Math and Reading Center	102 Willard	744-7119
Micro Raman Facility	145 Physical Science	744-5807
NMR400 MHz Laboratory	013 Physical Science	744-7999
NMR Oklahoma Statewide Shared Facility	005 Physical Science	744-5394
NMR Solids Laboratory	005 Physical Science	744-5934
NMR Solutions Laboratory	012 Physical Science	744-5950
Noble Research Center for Agriculture and Renewable Natural Resources	139 Agricultural Hall	744-5398
Oklahoma Center for Integrated Design and Manufacturing	203 Engineering North	744-6991
Plant Disease Diagnostic Laboratory	110 Noble Research Center	744-5643
Real-Time Distributed Systems Lab	413 Engineering South	744-5900
Recombinant DNA/Protein Resource Facility	349 Noble Research Center	744-9327
University Center for Energy Research	003 Life Science East	744-9996
University Center for Water Research	003 Life Science East	744-9996
Veterinary Medical Research Program	308 Veterinary Medicine	744-6663
Veterinary Research Station	139 Agricultural Hall	744-5398
Web Handling Research Center	1724 W. Tyler, Stillwater, OK 74074	744-7375

neering, civil engineering, electrical engineering, industrial engineering and management, and mechanical engineering are accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology, Inc. (ABET). Programs in construction management technology, electronics technology, fire protection and safety technology, and mechanical engineering technology are accredited by the Technology Accreditation Commission (TAC) of the Accreditation Board for Engineering and Technology, Inc. (ABET). The program in architecture is accredited by the National Architectural Accrediting Board (NAAB).

Programs culminating in a B.S. in the *College of Human Environmental Sciences* are accredited by specialized agencies. The Foundation for Interior Design Education Research (FIDER) has accredited the undergraduate interior design program. The pre-production and the production management apparel curricula has received approval from the American Apparel Manufacturer's Association (AAMA). The Child Development Laboratory is licensed by the state of Oklahoma Department of Human Services (DHS) and has received a Two Star Differential Quality Certification from DHS. The Child Development Lab is also accredited by the accrediting branch of the National Association for the Education of Young Children (NAEYC). Program approval has been granted to the early childhood education program by the Oklahoma State Board of Education. The American Association of Marriage and Family Therapists (AAMFT) has accredited the master's program in marriage and family therapy. The commission on Accreditation/Approval for Dietetics Education (CAADE) of the American Dietetic Association has approved the Didactic Programming Dietetics (DPD) and accredited the post-baccalaureate Dietetic Internship Program (DI). The School of Hotel and Restaurant Administration is accredited by the Accreditation Commission for Programs in Hospitality Administration (ACPHA). The B.S. in the College of Human Environmental Sciences is accredited by the Council for Accreditation of the American Association of Family and Consumer Sciences.

The *College of Veterinary Medicine* is fully accredited by the American Veterinary Medical Association. The Oklahoma Animal Disease Diagnostic Laboratory is accredited by the American Association of Veterinary Laboratory Diagnosticians and the Boren Veterinary Medical Teaching Hospital is accredited by the American Animal Hospital Association.

Programs at OSU's branch campuses have also received accreditation from national agencies. The OSU College of

Osteopathic Medicine is accredited by the Bureau of Professional Education of the American Osteopathic Association.

OSU-Oklahoma City is accredited by the Commission on Institutions of Higher Education of the North Central Association of Colleges and Schools. In addition, other programs are accredited or certified by the following institutions: Oklahoma Drug and Alcohol Professional Counselors Association, National Association for the Education of Young Children, Rehabilitative Services for Deaf and Hearing Impaired, State Health Department for Emergency Medical Technicians, Council on Law Enforcement Education and Training, National League for Nursing, Oklahoma Board of Nursing Accreditation Commission, and American Veterinary Medical Association.

OSU-Okmulgee is accredited by the Commission on Institutions of Higher Education of the North Central Association of Colleges and Schools. In addition, programs in automotive service technology and automotive body technology are nationally certified by the National Automotive Technicians Education Foundation, Inc. (NATEF). The dietetic technology program is accredited by the American Dietetic Association.

Refer to the appropriate college sections in the *Catalog* for further information on accreditation of specific programs.

Services at OSU

Library

The Oklahoma State University Library contains more than 5.5 million books, documents, and microforms, and about 17,000 serials. The open-stack arrangement of books and periodicals and the computer-assisted literature search and retrieval system support the on-going academic and research programs. The library contains a complete set of U.S. patents and is a regional depository of the federal government. Graduate students are entitled to a 120 day check-out period for books, and can use the interlibrary services.

Computing and Information Services

Computing and Information Services (CIS) is the central provider of computing, data networking, and telephone services for Oklahoma State University. CIS also provides a variety of other important services to the campus including computer training, publications, programming support for institutional information sys-

tems, desktop computing support on site, and a comprehensive Help Desk.

The CIS Help Desk, serving more than 4,000 customers each month, provides diagnostic support and remedial assistance by phone, by electronic mail at helpdesk@vm1.ucc.okstate.edu, or in person at 113 Math Sciences.

All OSU students are given computer access and electronic mail upon enrollment. Students can also access some CIS computers from their homes via dial-up modem facilities. OSU's extensive data communications network provides interfaces to OneNet, MIDnet, the Internet, and the World Wide Web.

CIS supports eight remote computing facilities in various locations around campus with more than 400 microcomputers. A SUN Workstation cluster is located in 113 Engineering South.

The central mainframe computer at OSU is an IBM 9672-R32 Enterprise Server operating MVS/ESA and VM/ESA. Two time-sharing systems, TSO and CMS, are available on the mainframe. CIS also has a DEC System 3000-600 VMS and a DEC 2100A-4/275 RISC DIGITAL UNIX machine.

Additional information about CIS and computing at Oklahoma State University can be found at the World Wide Web site on the Internet (www.okstate.edu/cis_info). It is updated frequently with timely announcements.

Living Accommodations

From high-rise residence halls to single-dwelling apartments, OSU has all types of housing to meet many preferences. Wentz residence hall is designated for students needing year round housing (12 months). This 10 story air-conditioned building offers single and double occupancy, with priority given to single graduate students. Wentz also offers room computer network access. Stout is an upper-class residence hall for students needing housing for the academic year (nine months). This four story non-air-conditioned hall offers inexpensive single occupancy. Optional meal plans are offered in neighboring cafeterias. Other amenities include an open visitation policy, extensive study space and parking adjacent to the hall.

University Apartments are available primarily to married and graduate students and on a limited basis to juniors and seniors. The apartment complex features two-bedroom units. To be eligible, the student must be a full-time student (nine credit hours per semester) or be enrolled in six credit hours and be employed by the university 50 percent of the time.

To apply for either housing service, an application and deposit must be filed with the appropriate office. For further information, contact the Office of Residential Life or University Apartments. Early application is suggested.

Students with Children

Information on child care in the Stillwater community is available at the following locations on campus:

Family Resource Center—1207 W. McElroy

Nontraditional Student Services—060 Student Union

Student Life Center—Student Union

Student Government Association—040 Student Union

Health Care

Every student enrolled at OSU is eligible for health care at the University Health Center. Four agencies serve the University community to provide a wide range of mental health services. Low-cost life and health insurance is also available.

Recreation

Intellectual exercising involves complete development of the mind, body and spirit. Opportunities for students to use their free time include concerts, lectures, films, and other media forms. Many student organizations function to enhance the educational experience of the student. The Colvin Physical Education Center offers a wide variety of organized and informal recreational activities including intramural sports of many types.

The Student Union offers a host of programs and services. The facilities include a complete food service, a theater, hotel, game rooms, lounges and meeting rooms, bookstores, diverse specialty shops, banking facilities and a travel agency.

Graduate Student Association

The goal of the Graduate Student Association is to improve all aspects of graduate education and graduate student life at OSU. The Association has representatives from each department offering a graduate degree program. Members are nominated by the department heads with membership conferred by the dean of the Graduate College. Each representative is appointed for a term of one year if the student is in good academic standing and is enrolled in at least two credit hours.

Financial Aid

Tuition and Fees

Refer to the section on "Costs."

Tuition Waiver Policy for Graduate Assistants and Spouses

The University will waive the nonresident portion of tuition for graduate assistants who are enrolled full-time and who are employed at least one-fourth time for the entire semester in research or instruction related to their degree programs.

The nonresident tuition for summer will be waived even if the student is not employed as a graduate assistant for that period if the student held an assistantship for the preceding spring semester.

A spouse of a nonresident student employed as a graduate assistant for at least one-quarter time, is also eligible for a nonresident tuition waiver.

Teaching and Research Assistantships

The University awards numerous teaching and research assistantships with competitive stipends. Fellowship opportunities are available through several programs. Service expected and the number of hours of graduate work a student may take are governed by the terms of the appointment. Applications should be addressed to the head of the department in which the appointment is desired.

In-state Tuition Waiver Scholarships

This award is also referred to as the general fee waiver.

Eligibility: U.S. citizen or permanent resident; regular admission to a graduate degree program; cumulative grade-point average greater than 3.00.

Application: Successful completion of the Free Application for Federal Student Aid (FAFSA) annually (packet available in Office of Student Financial Aid, 110 Hanner Hall); apply directly to academic departments.

Award: Varies; awards granted by semester.

Deadline: Contact department for deadline.

OSU Foundation Graduate Fellowships

Eligibility: Grade-point average greater than 3.50; acceptance into a graduate degree program; no prior work completed on the particular degree being sought.

Application: Nominations are made by the student's department head.

Award: Variable.

Deadline: Variable.

Oklahoma Tuition Aid Grant (Need Based)

Eligibility: Oklahoma resident; enrolled in a graduate degree program; making satisfactory progress toward a degree.

Application: Successful completion of the Free Application for Federal Student Aid (FAFSA). Grants administered and awarded by Oklahoma State Regents for Higher Education.

Award: Varies according to need.

Deadline: Priority deadline is February 1 for consideration for the subsequent fall semester.

Minority Doctoral Study Grant Program

The Oklahoma State Regents for Higher Education have set aside special funds to underwrite assistance programs for minority graduate students who are studying in public higher education institutions in Oklahoma with college teaching as a career objective. The Doctoral Study Grant Program is for students pursuing the doctoral degree with a commitment to teach in Oklahoma colleges and universities. For further information, contact the Oklahoma State Regents for Higher Education, P.O. Box 54009, Oklahoma City, OK 74154-2054.

Minority Tuition Waivers

As part of a social justice policy enacted by the Oklahoma State Regents for Higher Education, minority nonresident graduate students are eligible for a waiver of their nonresident tuition whether or not they hold departmental assistantships. Eligible applicants should contact the associate dean or director of student academic services in the Graduate College prior to the beginning of each semester.

Presidential Fellowships for Water, Energy and the Environment

These awards are offered for doctoral level study and research in the areas of water resources, energy resources and environmental issues. Focus areas include, but are not limited to: resource development, production, use and management; biodiversity; innovative technology development; risk analysis and management; policy development and analysis; pollution prevention, assessment, reduction and clean-up. Current stipends are \$19,200 annually and may continue up to three years.

To receive additional information concerning the fellowship program, contact the Environmental Institute, 003 Life Science East, Oklahoma State University, Stillwater, OK 74078.

Student Employment

University Placement provides assistance to OSU students seeking part-time employment. Students are informed of job opportunities on campus and in the Stillwater community. Applications are available in 360 Student Union. Jobs on campus usually offer 12 to 20 hours of work per week in clerical, technical, food service, or general labor positions. Rate of pay and work schedules vary.

Miscellaneous Sources of Financial Aid

1. Electronic data bases that may have information are:
 - Community of Science (COS), databases of research information, including funding opportunities. COS can be accessed via the World Wide Web (<http://cos.gdb.org/>).
 - Federal Information Exchange, Inc. (FEDIX), an on-line data base of government information for colleges, universities and other organizations. FEDIX can be accessed via the World Wide Web (<http://web.fie.com/>).
 - Science and Technology Information System (STIS), an electronic dissemination system that provides fast, easy access to National Science Foundation information and publications. STIS can be accessed via the World Wide Web (<http://www.nsf.gov/nstf/homepage/infopub.htm>).
2. University and public libraries have information on federal, state and private sources of aid. Factors other than financial need are often taken into account.
3. Many companies and labor unions have programs to help defray the cost of advanced education for their employees or members of their families.

- Students should check foundations, religious organizations, fraternities or sororities, town or city clubs, community and civic organizations such as the American Legion, YMCA, 4-H Clubs, Kiwanis, Jaycees, Chamber of Commerce, and the Masonic Lodge.
- Organizations connected with a student's field of interest often provide scholarships. These organizations may be listed in the U.S. Department of Labor's Occupational Outlook Handbook, or a student can often find out more about these by contacting faculty members in the major field.

Departmental Scholarships

These awards are controlled by specific departments or those which require nomination from the department on behalf of the student. Individual departments may know if particular awards or scholarships are available in the discipline.

National Fellowships

- Fulbright—Contact Office of International Programs, 307 Center for International Trade Development, 405-744-6535.
- National Science Foundation—Contact Office of University Research Services, 001 Life Science East, 405-744-9991.

Oklahoma State University Loans

OSU provides opportunities for students who need financial assistance. These funds are available to students who meet the eligibility requirements of the various programs and are making satisfactory progress in their college work. The Short-term Loan program provides up to a maximum of \$200 per semester for the purpose of meeting educationally-related expenses.

Additional information is available in the Office of Student Financial Aid in a data base program called FINDS. Additionally, the Office of University Research Services often has information on miscellaneous forms of financial aid. There is no centralized location for graduate student financial aid; therefore, the student should also contact the reference section of the library for information.

Special Programs

Certification Programs

Oklahoma State University offers Oklahoma State Department of Education-approved post-bachelor's certification programs for school counselors, psychometrists, reading specialists, and library media specialists. Certification is also offered in speech and language pathology and audiology and in special education (emotionally disturbed and learning disabilities).

Master's degrees are available in most of these programs and doctorates are available in many.

Post-master's level certification programs are available in: elementary school principal; school superintendent; secondary school principal; school psychologist; and school counselor.

Inquiries concerning any aspect of the Teacher Education program should be addressed to the Office of Teacher Education or the head of the department offering the program.

Off-campus Programs

Research and Graduate Education Center in Tulsa

Oklahoma State University offers graduate courses through the Research and Graduate Education Center (RGEC) in Tulsa. All courses offered by OSU faculty are considered resident credit for degrees granted by Oklahoma State University. Courses offered by the University of Oklahoma at the RGEC can be applied to OSU degree requirements as transfer credit.

The graduate and certification programs that Oklahoma State University offers through the RGEC are:

College of Arts and Sciences

M.S. in Computer Science

M.A. in English

Teaching English as a Second Language

College of Business Administration

M.S. in Accounting

Master of Business Administration

M.S. in Economics

M.S. in Management Information Systems/Accounting Information Systems

College of Education

M.S. in Applied Behavioral Studies

Community Counseling

Emotionally Disturbed

Gifted and Talented

Learning Disabilities

M.S. in Curriculum and Instruction

Curriculum/Supervision

Elementary Education

Reading

Certification Program in Educational

Administration

Certification Program for School Superintendent

Reading

M.S. in Occupational and Adult

Education

Adult and Continuing Education

Human Resources Development

Vocational Education

M.S. in Trade and Industrial Education

College of Engineering, Architecture and Technology

M.S. in Chemical Engineering

M.S. in Civil Engineering

Construction Engineering and Management

Environmental and Water Resource Engineering

Geotechnical Engineering

Transportation Engineering

M.S. in Electrical Engineering

M.S. in Engineering and Technology Management

M.S. in Environmental Engineering

M.S. in Industrial Engineering and Management

M.S. in Mechanical Engineering

Interdisciplinary

M.S. in Environmental Science

M.S. in Natural and Applied Sciences Aviation and Space Sciences

M.S. in Telecommunications Management

Prior to enrollment in RGEC courses, students should secure approval from their advisers concerning the appropriateness of any courses relative to the degree objective.

Off-campus Program in Engineering

A master's degree in engineering may be obtained with all course requirements being met at off-campus centers of Oklahoma State University, the University of Tulsa, and the University of Oklahoma. At least one-half of the hours needed must consist of courses taught by Graduate Faculty members of Oklahoma State University. The remainder of the hours may be made up of transfer credits from the University of Oklahoma earned on campus or at its off-campus centers and/

or the University of Tulsa, and a maximum of eight hours of transfer credits from other institutions with approved graduate programs. All other requirements of the regular master's degree, as outlined in the *Catalog*, must be met.

Such a master's degree has the same designations as the one earned on-campus, except that the transcript will show the wording "Off-campus."

Extension Credit

Courses offered through the extension mode are considered equivalent to courses offered through traditional formats. Any student wishing to enroll in a graduate-credit course offered through this format must make application for admission to the Graduate College at OSU.

Correspondence Credit

Oklahoma State University does not offer graduate courses by correspondence and does not accept credit taken by correspondence toward an advanced degree.

Interdisciplinary Programs

Oklahoma State University has a series of multidisciplinary graduate programs designed to provide students with a breadth of knowledge that is not ordinarily found in traditional programs. Descriptions are given below of the following multidisciplinary programs:

- Agriculture
- Engineering and Technology Management
- Environmental Science
- Food Science
- Manufacturing Systems Engineering
- Management Information Systems/Accounting Information Systems
- Natural and Applied Sciences with programs of study in
 - Aviation and Space Sciences
 - Gerontology and Graduate Certificate
 - Interdisciplinary Sciences
 - Health Care Administration
 - Natural Sciences
- Plant Science
- Telecommunications Management

Agriculture

The Master of Agriculture degree is designed for students interested in graduate professional training with a strongly applied research orientation. The degree is offered in the following

areas of emphasis: agricultural economics, agricultural education, agronomy, animal science, entomology, forestry, horticulture and landscape architecture, and plant pathology. The purpose of this degree is to provide a program which will give additional specialization in technical fields as well as increased breadth of training.

Students who are interested in working toward the Ph.D. degree should follow the regular Master of Science degree program. This program will provide a greater breadth of study than the Master of Agriculture program. Emphasis will be given to practical application of the technical aspects of the discipline as well as discipline interrelationships. The principal focus, however, is on an applied research concept and a broader program than is normally available with the specialized research degree.

A baccalaureate degree in agriculture or a related field is required for admission. The candidate must meet requirements for acceptance into the Graduate College and be recommended by the departmental graduate committee responsible for the program.

Environmental Science

Program Coordinator Edward T. Knobbe, Ph.D.

The environmental science program at Oklahoma State University emphasizes that an understanding of, and solution to, many environmental problems involves the application of skills and knowledge of more than one of the traditional disciplines. Graduate Faculty members from the agricultural, biological, physical, or social sciences, education and engineering join for the purpose of offering graduate programs at the master's and doctor's levels.

The University has had nine decades of experience and development in the application of scientific knowledge to society's problems. Important resources for graduate students are campus research and learning institutes and laboratories, cooperative programs with public and private agencies, and off-campus research and teaching facilities. Many of these are staffed by personnel drawn from more than one discipline, and many serve to address problems which are multidisciplinary or interdisciplinary in scope and solution. The environmental science degree programs at the University are designed to utilize these resources and serve students whose interests transcend the traditional demarcations of knowledge and whose goals include the broad understandings and skills obtained by crossing disciplinary lines in the classroom and laboratory.

Graduates from the environmental science program are expected to have skills and knowledge that are applicable to a wide range of research, management, and planning vocations. Government, industry, and private consulting firms offer employment opportunities for environmental science graduates.

Programs of Study. The breadth of offerings at Oklahoma State University affords flexibility to the student interested in specific aspects of the environment. A student can design a unique degree plan to target a particular focus area that meets his or her professional goals. The student's graduate committee assists in this process to help ensure focus, breadth, and quality of the degree plan. Areas of concentration span a variety of areas such as political science, geography, geology, civil and environmental engineering, recreation, forestry, toxicology, biology, chemistry, agronomy, and agriculture. The flexibility of this program allows the student to focus on an environmental topic not normally addressed by a single discipline.

The Master of Science Degree. To obtain the M.S. degree in environmental science, a student must complete a 12-hour core curriculum consisting of an environmental problem analysis class (ENVIR 5100), an advanced environmental studies course (ENVIR 5300), and one course each in social science and physical science. A minimum of 18 additional credit hours are selected by the student and his or her committee and adviser. A thesis completes this 36-hour degree program. Specific requirements for the master's degree can be obtained from the program coordinator.

The Doctor of Philosophy Degree. To obtain the Ph.D. degree in environmental science, a student must propose and undertake a minimum of a 60-hour plan of study. The plan of study must include a minimum of 36 credit hours of course work consisting of six hours of a skill component of three credit hours, a doctoral seminar and 27 credit hours that are selected by the student and his or her committee that reflect the biological, social and physical aspects of the concentration area. In addition, this course work will include ENVIR 5100 and ENVIR 5300 as designated in the M.S. degree requirements. Research and courses should reflect the student's professional goals. A dissertation is required and consists of a minimum of 15 credit hours. Specific requirements for the doctoral degree can be obtained from the program coordinator.

Admission. To participate in the environmental science program, a student must first make application to the Graduate College. Application materials specific to

the environmental science program include a statement of academic, research and professional goals, three letters of recommendation, complete transcripts, and a Graduate Record Exam (GRE) report. A TOEFL score of at least 575 is required of all international students.

All applications to environmental science graduate programs should be submitted at least 60 days before the opening of the semester for which enrollment is first intended. International students should supply all application materials by March 1 for fall enrollment, and July 1 for spring enrollment. The Graduate College will provide the necessary forms.

Financial Assistance. Fee waiver scholarships are available through the Graduate College for environmental science students. Such scholarships are available for those who can qualify as Oklahoma residents. Priority is given to minority students, and those who can demonstrate financial need. To be considered, a FAFSA must be completed.

Graduate research assistantships and other funding opportunities are often available through faculty members participating in the environmental science program or through one of the several research institutions or centers on campus. The initial application should specify an interest in an assistantship.

Additional information about the environmental science graduate program can be found on the World Wide Web (www.seic.okstate.edu/envinst/envsci).

Food Science

Program Coordinator Gerald Fitch, Ph.D.

The following departments participate in the food science program: Agricultural Economics, Agronomy, Animal Science, Biochemistry and Molecular Biology, Biosystems and Agricultural Engineering, Horticulture, Microbiology and Molecular Genetics, and Nutritional Sciences.

Food science is an interdisciplinary graduate program designed to provide an opportunity for students to acquire basic knowledge of food industry encompassing the biological and physical sciences. The increasing complexity of the problems involved in the production, processing, and utilization of food demands increased fundamental knowledge to solve these problems. There is a great demand for personnel with advanced training in the broad area of food science to staff research and quality assurance facilities of industry, universities and the federal government.

Admission Requirements. Admission to either the Master of Science or Doctor of Philosophy degree programs requires an undergraduate major in animal science, biochemistry, dairy science, food science, human nutrition, microbiology or poultry science. Students majoring in other curricula may qualify by remedying specific undergraduate deficiencies recognized by the student's graduate committee. A student enrolling in a degree program must have been accepted by an adviser prior to official admission.

Manufacturing Systems Engineering

Program Coordinator John W. Nazemetz, Ph.D.

This interdisciplinary master's degree is designed to address the needs of manufacturing managers, particularly those in small- to medium-size firms, in all aspects of manufacturing systems, including management as well as the hardware aspects of manufacturing.

Jointly sponsored by the schools of Electrical and Computer Engineering, Industrial Engineering and Management, and Mechanical and Aerospace Engineering, this program produces graduates capable of direct contributions in the design, selection, and implementation of up-to-date computerized manufacturing systems.

To pursue this degree a student enrolls in one of the three schools listed above and is advised by a faculty member in that school. The student's advisory committee is composed of members from each of the three schools. For more information students should contact the program coordinator in the School of Industrial Engineering and Management.

Natural and Applied Sciences

Aviation and Space Sciences
Program Coordinator Steve Marks, Ed.D.

Gerontology
Program Coordinator Joe Weber, Ph.D.

Interdisciplinary Sciences
Program Coordinator Wayne Powell, Ph.D.

Health Care Administration
Program Coordinator Mike Branson, Ph.D.

Natural Sciences
Program Coordinator Wayne Powell, Ph.D.

The Master of Science in natural and applied sciences consists of four pro-

grams, each with different specializations designed to address the needs of students with specific interests. The four are aviation and space sciences, gerontology, interdisciplinary sciences and natural sciences. Within interdisciplinary sciences there is a well-defined specialization in health care administration. For detailed information on these programs of study, students should contact the program coordinators. Bulletins describing the requirements of each program are also available from the Graduate College.

Programs of Study. *Aviation and Space Sciences.* Students will take a minimum of 11 credit hours of core courses from research, organizational theory, and administration and management. The remaining courses, to total a minimum of 32 credit hours, will come from the multidisciplinary course list or additional courses from the core list. Other courses may substitute upon approval from the advisory committee. Students may select the research component—thesis, report, or creative component—with approval of the advisory committee. Six credit hours are allowed for the thesis option and two credit hours are allowed for the research report. Credit hours allowed for the creative component varies.

Gerontology. In addition to the general admission criteria, students in gerontology must meet three conditions to be eligible for admission:

1. Overall grade-point average of at least 3.00;
2. GRE score with a 900 minimum score (total verbal and quantitative) or an MAT score of at least 35.

Gerontology offers two plans to obtain a master's degree. The first plan requires 36 credit hours, including a creative component and/or an internship. The second plan includes a thesis and requires a minimum of 33 credit hours, including six hours for the thesis. The student's advisory committee will assist the student in selecting the courses for the plan of study which best address the student's professional and personal goals.

Gerontology Graduate Certificate. The graduate certificate in gerontology, approved by the Oklahoma State Regents for Higher Education, will provide documentation that students have completed a program of instruction and educational experiences in the field of gerontology at the graduate level.

Admission into the program is based on the following criteria:

1. Applicants must have met the University's graduate admission requirements and be currently pursuing a master's or doctoral degree from one of the academic departments at OSU.

2. A student who has already completed a master's or doctoral degree from Oklahoma State University or another accredited institution would also be eligible to complete the gerontology certificate requirements.

3. Students must complete a minimum of 21 graduate credit hours involving at least six different courses of formal instruction, in addition to three credit hours of creative or basic applied research activities related to aging populations.

Upon satisfactory completion of the program, students will receive a certificate and a notation on their transcripts. For more information, contact the Graduate College, 202 Whitehurst, or the Department of Family Relations and Child Development, 242 Human Environmental Sciences.

Interdisciplinary Sciences. This program is for students who desire to increase their competence in a particular thematic area by taking a series of courses in several disciplines. This multidisciplinary approach provides educational opportunities for a variety of careers.

Interdisciplinary sciences consists of no fewer than three separate fields of study with at least six hours in each field. No more than 15 hours may be taken in any one area. The advisory committee will assist the student in formulating the plan of study.

Health Care Administration. This specialization within interdisciplinary sciences is designed for individuals who seek to pursue a career in the field of health care management. The program requires students to take core courses in health care administration and research methods along with a series of electives selected from applicable courses in business and social sciences. The multidisciplinary approach to the health care administration discipline provides students with a unique perspective on the complex issues facing the profession today.

Natural Sciences. This program is for science teachers and other individuals who desire a broader program than that offered in departmental programs. The goal of the program is to provide the student with a breadth of training in science and related areas.

To enter the program, the student should have a minimum of 30 credit hours of science, with biological, physical, and earth sciences represented. An undergraduate grade-point average of 3.00 is required for unqualified admission. Students with a grade-point average below 3.00, but 2.50 or better, may be admitted on a probationary basis.

Particular courses are not specified for the degree; the student's advisory

committee assists the student in selecting appropriate courses. However, not more than two-thirds of the courses for the degree may be taken in any one of the areas of biological, physical, or earth sciences.

Financial Assistance. In-state fee waiver scholarships are available on a limited basis for eligible students. Interested students should contact the program director in the Graduate College. Eligibility criteria include Oklahoma residency, enrollment in residence credit hours, admission into the program, and successful completion of the FAFSA form for the academic year in which the student is seeking aid. The FAFSA packets are available in the Office of Student Financial Aid, 110 Hanner Hall.

Plant Science

Program Coordinator Arron Guenzi, Ph.D.

Solutions to current problems in plant science often require integration of knowledge from a number of disciplines. The plant science program at Oklahoma State University provides the opportunity for the exceptional Doctor of Philosophy student to develop an academic and research program tailored to his or her individual interests and needs. Faculty participating in this program come from the departments of Agronomy, Biochemistry and Molecular Biology, Botany, Entomology, Forestry, Horticulture and Landscape Architecture, Microbiology and Molecular Genetics, and Plant Pathology. The multidisciplinary nature of this program allows students to experience many facets of plant science and affords them the flexibility to seek employment in a variety of settings in the plant sciences. Students, in consultation with their graduate committees, develop a program in one of three specialization areas (cellular and molecular, organismal or ecological), but are expected to develop a sound foundation across the disciplines of plant study.

Admission Requirements. Application for admission must first be made to the Graduate College. Additional information required by the plant science steering committee includes a statement defining plant science interests, a resume, three letters of reference, an abstract of the Master of Science thesis (if applicable), GRE scores (the Advanced Biology GRE is also desirable), and a minimum TOEFL of 570 (if applicable). A student must be accepted by a faculty adviser prior to official admission.

Financial Assistance. Students seeking financial assistance should inquire directly to the department(s) of interest within the plant science program.

Steering Committee

Arron C. Guenzi, Plant and Soil Sciences

Biao Ding, Botany

Andrew J. Mort, Biochemistry and Molecular Biology

Jack W. Dillwith, Entomology

Stephen W. Hallgren, Forestry

Jeffrey Anderson, Horticulture and Landscape Architecture

David H. Demezas, Microbiology and Molecular Genetics

Jacqueline Fletcher, Plant Pathology

Telecommunications Management

Program Director Rick L. Wilson, Ph.D.

In response to industry's need for skilled and knowledgeable telecommunications management graduates, Oklahoma State University offers a Master of Science degree in telecommunications management. This program is offered through traditional means to on-campus students as well as via distance learning technologies to students at remote locations.

The telecommunications management program draws on the combined expertise of three OSU colleges—the College of Arts and Sciences, the College of Business Administration, and the College of Engineering, Architecture and Technology. As a result, the telecommunications management student will have a traditional home department to achieve a depth of knowledge in one discipline, while developing broad knowledge in business, technical and communication disciplines.

This program prepares graduates for managing the telecommunications technologies as well as managing in a competitive environment with telecommunications systems. The graduates of this program are likely to be employed by providers or users of telecommunications technologies.

Telecommunications Management Curriculum

The program curriculum consists of a minimum of 33 credit hours, including seven core courses, one laboratory, one practicum, and three electives. Students may choose either a part-time or full-time sequence. Full-time students can complete the program in one and one-half years while part-time students may be able to complete it in two years.

Students may choose electives from one of two tracks. Track I is the technical track consisting of computer science, electrical engineering, or management science and information systems

courses. Track II is the management/mass communications track consisting of management, decision analysis, or mass communications courses.

Admission Requirements. Qualified graduates of colleges and universities of recognized standards are eligible to seek admission to the OSU Graduate College. Applicants must submit the completed application form to the Graduate College with official transcripts of all academic work and degrees received.

In addition to the OSU Graduate College's standard requirements, the telecommunications management program admissions committee will consider students' letters of recommendation, GMAT or GRE scores, previous academic performance, and telecommunications experience.

Program information can be accessed via the World Wide Web (<http://www.mstm.okstate.edu>).

General Regulations

Full authority on all academic decisions within the Graduate College rests with the dean of the Graduate College. The Graduate College policies and procedures described in the *Catalog* are for informational purposes. They are subject to regular review and may be revised at any time by the dean of the Graduate College in consultation with the Graduate Faculty Council.

Responsibilities

All graduate students are expected to read and to comply with the written regulations. The regulations presented in the Catalog may be supplemented by written departmental or program requirements available at departmental offices. Admission to a specific graduate program obligates the student to adhere to the policies of that program.

General regulations in the following sections relate to requirements for admission, enrollment, and academic standing. Subsequent sections outline requirements for the following degrees: master's, Doctor of Philosophy, Doctor of Education, and Specialist in Education. Particular attention should be given to timing and substantive requirements for matriculation, especially admission, the plan of study, residence, language proficiency, research and thesis or report, and graduation. The regulations are prescribed by the Graduate Faculty with

the intent of assuring high-quality graduate programs and effective interaction of Graduate Faculty members and graduate students.

A request for waiver of any regulation must be made in writing to the dean of the Graduate College for presentation to the Graduate Faculty Council for action. Such a request must be approved by the major adviser. The student and the major adviser should present sufficient information to allow the Graduate Faculty Council to evaluate reasons for requesting a waiver and to make a decision concerning departure from normal Graduate College regulations.

Admission to the Graduate College

Qualified graduates of colleges and universities of recognized standing are eligible to seek admission to the Graduate College. Applicants must submit the completed application form to the Graduate College, with official transcripts of all academic work and degrees received.

1. The student should request all institutions previously attended to send two copies of the official transcript to the Graduate College, Oklahoma State University.
2. To be official, the transcript must show the complete scholastic record, bear the official seal of the institution, and be signed by the issuing officer.

To assure adequate time, application forms and transcripts should be received by the Graduate College at least 30 days prior to expected enrollment. The application fee must accompany the Application for Admission. *Transcripts and other documents become the property of Oklahoma State University.*

Standardized Test Scores

Many departments require standardized test scores, such as the Graduate Record Examination. Applicants must contact the appropriate department head for information regarding departmental requirements for these tests. (Refer to the table "Graduate Admission Requirements.")

International Student Admission

International applicants are expected to submit applications, financial affidavits, transcripts, and results of the Test of English as a Foreign Language (TOEFL) examination by March 1 for fall enrollment and by July 1 for spring enrollment.

TOEFL. As a condition of admission to regular graduate study at OSU, all persons for whom English is a second language are required to present a score of 550 or above on the TOEFL regardless of the number of semesters or terms completed in other institutions of higher education, including OSU, or prior enrollment in English language programs. Some departments require a score above 550. Students should contact the department for specific TOEFL requirements. Persons who present a TOEFL score of 500 or above and who demonstrate unusual academic promise may be admitted to graduate study on probationary status, but the number of such persons will not exceed two percent of the regularly enrolled graduate student population of the previous fall semester.

Submission of the TOEFL score with the application is never waived.

English Proficiency Test for International Students. Before international students who have no prior course work from a U.S. university can complete their first enrollment at Oklahoma State University, they are required to take the Test of English Language Proficiency (TELP) administered by the University Testing and Evaluation Service. This test, scheduled on campus before each semester and summer session, *is required in addition to the TOEFL.* International students are normally required to enroll in a section of English 0003 to enhance their English skills during their first semester of graduate study at OSU. A waiver of this course requirement can be granted to students who score sufficiently high on the TELP or who make both a 600 on the TOEFL and a 5.0 on the Test of Written English (TWE).

Spoken English Proficiency for Employment. OSU policy requires all persons for whom English is a second language to demonstrate an acceptable level of spoken English before being employed in an instructionally related capacity. Employment requires demonstrated proficiency on the Test of Spoken English (TSE) as determined by the University. Other spoken English examinations are not acceptable as substitutes for the TSE. This test may be taken on campus or at any of the many testing sites provided by the Educational Testing Service. This test score is used as a condition of employment, not a condition for admission to the Graduate College.

International Teaching Assistant Program. Any international teaching assistant who has not previously taught in the classroom is required to participate in the international teaching assistant orientation and evaluation workshop offered at the beginning of the fall and spring semesters. Students must receive an evaluation of "pass" prior to teaching in the

classroom. For further information, contact the Office of the Dean of the Graduate College, 202 Whitehurst.

Types of Admission

Oklahoma State University uses the 4.00 scale to calculate grade-point averages; that is, an "A" yields four points per credit hour, a "B" yields three points, a "C" yields two points, a "D" yields one point, and an "F" yields zero points. If an applicant's prior college or university uses a different scale, the grade-point average must be converted to the 4.00 scale to determine whether the applicant meets Oklahoma State University grade-point admission requirements for one of the types of admission. Therefore, all references to grade-point averages are based on a 4.00 scale. References to credit hours are to semester credit hours.

When the applicant's file is complete, the faculty in the department or program of the student's area of interest is asked to review the material and recommend an admission status to the dean of the Graduate College. The final decision for admission to the Graduate College is determined by the dean on the basis of the department's recommendations, prior academic performance of the applicant, and availability of space, facilities, and faculty advisers in the program. The decision is conveyed to the applicant by means of a letter. Admission to the Graduate College means only that the student will be permitted to enroll in courses through the Graduate College. It does not necessarily imply that the student has been or will be admitted to a program leading to an advanced degree or that the student will be able to obtain a graduate degree. Opportunities for receiving graduate credit and graduate degrees are dependent on the admission status granted to the student.

Unqualified Admission. Students planning to work toward a graduate degree in a recognized graduate program may be admitted without qualification provided they meet all Graduate College and departmental requirements.

1. Admission to full graduate status in a degree program is contingent on the presentation of an undergraduate degree from an accredited college or university, an acceptable academic record, and the recommendation of the major department and the dean of the Graduate College.
2. If a student fails to provide proof of the receipt of an undergraduate degree or fails to remain in good standing academically, academic participation may be terminated or the status may be changed to probationary or unclassified.

Special Student Status. An applicant may be admitted to the Graduate College as a special student if he or she does not have immediate plans to become a degree candidate but wants to take graduate courses, prerequisites or other courses. *International students with an F-1 visa may not enroll as special students.*

1. A special student must meet all of the academic requirements described for unqualified admission except that he or she need not be admitted or recommended for admission by a department or program.
2. The student is responsible for filing a new application for admission to the Graduate College should he or she wish to become a degree candidate. The application will be evaluated by faculty of the department or program and the dean of the Graduate College to ascertain admissibility to the degree program.
3. As such work is not guided by a plan of study or approved by an adviser, no more than nine semester credit hours of course work taken while a special student may be used on a plan of study to meet requirements for a degree.
4. Special students are subject to the same academic regulations as those students admitted into degree programs.

Probation or Provisional Status. Applicants who are graduates of accredited colleges and universities and who have attained less than an acceptable grade-point average in all undergraduate work may be admitted provisionally or on probation on recommendation of the major department at Oklahoma State University and concurrence by the dean of the Graduate College. Alternatively, a student who has been in full graduate standing or special student status may be placed on probation or continued provisionally if academic performance in courses taken in graduate status at Oklahoma State University falls below a "B" average. Students with acceptable academic records but without the background necessary for a particular degree program may also be admitted provisionally. Students admitted provisionally or on a probationary basis may be granted full graduate standing after performing at an acceptable academic level. Failure to meet required academic levels while in a probationary status will result in dismissal from the Graduate College.

Transfer of Graduate Credits

Transfer of graduate credits to the Graduate College is possible only when

the student was formally admitted to the graduate college at another accredited institution and the course(s) is certified as graduate credit by that institution.

The work must be recommended by the adviser as a part of an approved plan of study. The acceptance of transferred work requires the recommendation of the student's advisory committee and approval by the dean of the Graduate College at the time a program of study is planned. A maximum of nine credit hours with a grade of "B" or better in each course can be accepted as transfer credits toward a master's degree. Doctoral students must complete at least 30 hours of their program at OSU. However, no more than nine hours may be transferred from institutions that do not grant doctoral degrees.

Departmental or Program Requirements

The General Regulations of the Graduate College are minimum requirements that must be met by all graduate students at OSU. Students are also subject to any additional requirements that are determined by their program of study. Students should always make sure to receive copies of specific program requirements by contacting the program office.

Readmission to the Graduate College

A prospective student must enroll for courses at OSU within a year after his or her admission date to retain active status. A graduate or prospective student who does not enroll within one year must reapply for admission. A student who interrupts enrollment for one year must re-apply for admission, or obtain approval from the department to continue admission, and will then be subject to the regulations in effect at the time of readmission.

Audit

A student who does not wish to receive credit in a course may, with the approvals of the student's adviser and the instructor of the course concerned, attend the class strictly as a visitor. A student who applies to audit a course promises that he or she will not use the audit to avoid the rule against excessive hours, and that he or she will not petition or ask in any way for the privilege of taking an examination to obtain credit after he or she has audited the course. (Laboratory courses, private music lessons and art courses are not open for audit.)

If a student is already enrolled for credit in a course, but wishes to change to auditing that course, the student must officially drop the course (or, if appropriate, withdraw), at the time the student changes to audit.

A student who has established a permanent record at OSU may have the audited course recorded on his or her transcript with "AU" appearing in place of the grade. Not later than one week after the close of that semester, the student must present to the Office of the Registrar the instructor's copy of the audit form with a signed statement from the instructor, on the reverse side, that it is appropriate for the course to be recorded on the student's transcript. Any individual 65 years or older may audit a class at no charge.

Enrollment

Students with a bachelor's degree are expected to register in the Graduate College unless they want to obtain another bachelor's degree. If they register as an undergraduate, the courses taken cannot be given graduate credit at a later date.

Students in the Graduate College may enroll in a course which does not carry graduate credit or audit courses if such courses are recommended by an adviser and approved by the dean of the Graduate College.

An advance fee payment is required of all new and readmitted students.

Students will be permitted to enroll (late fee will be charged) or to add a course through the first week of a regular semester or third day of a summer session. For short courses, students will not be permitted to enroll after the first day of the course.

Enrollment Procedure

1. Enrollment forms (Trial Schedules) are available in the Graduate College.
2. Advanced degree candidates have their Trial Schedule forms approved and signed by their departmental advisers and take them to the Graduate College prior to enrolling. Special students have their Trial Schedule forms approved in the Graduate College prior to enrolling.
3. After having the Trial Schedule form approved in the Graduate College, graduate students complete the enrollment process in the Sectioning Room located on the fourth floor of the Student Union.

Graduate Admission Requirements

Requirements are subject to departmental revision. 1 = Test is required, 2 = Test is recommended, 3 = GRE or Miller may be interchanged, with departmental consent, 4 = GRE or GMAT may be interchanged. Note: All applicants must submit references to department, (I.o.r. = letter of recommendation).

Major	Degree	GRE Gen Sub	GMAT	Miller Analogy (MAT)	Additional Requirements
AGRICULTURAL SCIENCES AND NATURAL RESOURCES					
Agricultural Economics	MS, PhD				No entrance exam. GRE or Miller. See specific departmental section.
Agricultural Education	MS, PhD				
Agriculture	MAG				
(Agricultural Economics, Agricultural Education, Agronomy, Animal Science, Entomology, Forest Resources, Horticulture & Landscape Architecture, & Plant Pathology)					
Animal Science	MS				No entrance exam.
Animal Breeding	PhD				No entrance exam.
Animal Nutrition	PhD				No entrance exam.
Biochemistry and Molecular Biology	MS, PhD		2		
Entomology	MS, PhD	1	2		
Forest Resources	MS	2			
Horticulture	MS	1			3 I.o.r.; stmt of interest area.
Plant Pathology	MS, PhD		2		No minimum score.
Plant and Soil Sciences	MS				No entrance exam.
Crop Science	PhD				No entrance exam; 3 I.o.r.; stmt of interest area.
Soil Science	PhD				No entrance exam.
ARTS AND SCIENCES					
Botany	MS	1	2		3 I.o.r.; stmt of intent.
Chemistry	MS, PhD	2	2	2	Placement exams.
Computer Science	MS PhD				PhD: 75 percentile quantitative section; 50 percentile advanced.
English	MA, PhD				MA: 3.00 GPA; BA in English or equivalent for TESL or Technical Writing; 2 I.o.r.; writing sample. PhD: 3.50 GPA; MA in English; 3 I.o.r.; writing sample.
Geography	MS	1			3.00 GPA; 3 I.o.r.
Geology	MS	2	2		3.00 GPA; 3 I.o.r.
History	MA PhD				3.50 GPA; 3 I.o.r.
Mass Communications	MS				3.00 GPA; 3 I.o.r.; stmt of goals & purpose.
Mathematics	MS, PhD	2			3 I.o.r. & stmt of intent.
Microbiology, Cell and Molecular Biology	MS, PhD		2		
Pedagogy and Performance	MM				Audition, dept. application, 3.00 GPA.
Philosophy	MA	2			
Physics	MS, PhD	2	2		
Political Science	MA	1			See department admission requirements.
Psychology	MS PhD				Dept. application; 3 I.o.r.
Sociology	MS, PhD		2		See departmental admission requirements.
Speech (Speech Communication)	MA		2		3.00 GPA minimum & 3 I.o.r. (English is second language, TSE: 220.)
(Speech and Language Pathology and Audiology)					(English is second language, TSE: 220; TOEFL: 550.); 3.00 GPA; 3 I.o.r.; interview.
(Theater)					No entrance exam.
Statistics	MS, PhD				No entrance exam.
Wildlife and Fisheries Ecology	MS, PhD				Aptitude: MS-1000, PhD-1150. Advanced: MS-600, PhD-650. Same as Wildlife and Fisheries Ecology.
Zoology	MS, PhD				

Major	Degree	GRE Gen Sub	GMAT	Miller Analogy (MAT)	Additional Requirements
BUSINESS ADMINISTRATION					
Accounting	MS				3.25 GPA; GMAT 500.
Business Administration	MBA				3 i.o.r. & an essay.
Business Administration emphasis in: (Accounting)	PhD				GMAT required, high GPA, & 3 i.o.r.
(Finance)					3 i.o.r.
(Management)					3 i.o.r.
(Marketing)					3 i.o.r.
Economics	MS, PhD				3 i.o.r.
Management Information Systems /Accounting Information Systems	MS				
EDUCATION					
Applied Behavioral Studies	MS	3		3	3 i.o.r.; career aspirations & goals stmt.
	PhD				4 i.o.r.; career aspirations & goals stmt; proof of written work.
Applied Educational Studies	EdD	3		3	See specific dept.
Counseling and Student Personnel	MS	3		3	3 i.o.r.; career aspirations & goals stmt.
Curriculum and Instruction	MS				
	EdD			1	Complete folder of info.
Education	EdS	3			
Educational Administration	MS, EdD	3		3	
Health, Physical Education and Leisure	MS	3		3	
Higher Education	MS, EdD	3		3	
Occupational and Adult Education	MS, EdD	3		3	MS: no entrance exam; no i.o.r. EdD: MAT or GRE, complete folder of info. No entrance exam; no i.o.r.
Technical Education	MS				
Trade & Industrial Education	MS				No entrance exam; no i.o.r.
ENGINEERING, ARCHITECTURE AND TECHNOLOGY					
Architectural Engineering	MArchE				
Architecture	MArch				See specific school admis- sion requirements.
Biosystems Engineering	MBioE, MS, PhD	2			
Chemical Engineering	MChemE, MS, PhD	1			3 i.o.r.
Civil Engineering	MCivile, MS, PhD	2			3 i.o.r.
Control Systems Engineering	MS				
Environmental Engineering	MEnvirE, MS	2			3 i.o.r.
Electrical Engineering	MElecE, MS, PhD				No entrance exam.
Engineering and Technology Management	MS				
General Engineering	MGenE, MS, PhD	2			
Industrial Engineering and Management	MIE&Mgmt, MS, PhD	2			
Manufacturing Systems Engineering	MMSE	2			TOEFL 600; technical under- graduate degree. Class rank required.
Mechanical Engineering	MMechE, MS, PhD	2	2		
HUMAN ENVIRONMENTAL SCIENCES					
Design, Housing and Merchandising	MS	1			3.00 GPA; 3 i.o.r.; goal stmt; writing competency assess- ment first semester.
Family Relations and Child Development	MS	1			3.00 GPA, 3 i.o.r., 2 pp goals stmt, TOEFL 575.
Hospitality Administration	MS	4			3.00 GPA; GRE 525 or GMAT 900; 2 years relevant experi- ence.
Human Environmental Sciences (Design, Housing and Mer- chandising; Family Relations and Child Development, Nutritional Sciences)	PhD			3	
Nutritional Sciences	MS				
INTERDISCIPLINARY					
Environmental Science	MS, PhD				No entrance exam; 3.00 GPA; 3 i.o.r.; TOEFL 575. No entrance exam.
Food Science	MS, PhD				
International Studies	MS				
Natural and Applied Sciences	MS				Gerontology only GRE 900; MAT 35.
Plant Science	PhD	2			3 i.o.r.; resume; stmt of interests.
Telecommunications Management	MS				3 i.o.r.; 1 page essay.
OSTEOPATHIC MEDICINE					
Biomedical Sciences	PhD				
VETERINARY MEDICINE					
Veterinary Biomedical Sciences	MS, PhD				

Phone-in Enrollment

Graduate students may enroll by telephone if they have been accepted into the Graduate College. Students must have no academic or financial holds on their enrollment and must have the required advance fee payment on file in the Office of the Bursar. Students may use the local number (405) 744-6368 or the toll-free number 1-800-227-GRAD.

Minimum and Maximum Hours of Enrollment

Any graduate student using the facilities and faculty resources of the University must be enrolled. Every graduate student is expected to satisfactorily complete no fewer than six semester credit hours during each 12-month period until the degree is awarded. Students who are involved in research throughout the year are expected to enroll each semester.

The total registration shall not exceed 18 credit hours for a semester or nine credit hours for a summer session. Regardless of the number of hours taken, a student may not count more than 16 credit hours taken in the fall or spring semester nor more than nine semester credit hours earned in a summer session toward a degree. For short-course sessions less than eight weeks in length, enrollment shall not exceed one credit hour for each week.

Faculty Members. No member of the faculty, with the rank of associate professor or above or equivalent rank at the time of completing the requirements, may be granted a degree from this institution. This regulation applies to faculty members in the schools of engineering holding the rank of assistant professor or above.

Enrollment Regulations for Graduate Assistants and Fellows. Graduate students employed by the University part-time may register only for the amount of credit recommended by the head of the major department and approved by the dean of the Graduate College. In general, students employed 20 hours per week may not register for more than 10 semester credit hours of course work for a semester and five hours during a summer session. Other employment will permit registration for an appropriate number of hours. Graduate students whose employment is such that results will be used for a thesis, however, may register for additional thesis credit as recommended by the research adviser and approved by the dean of the Graduate College.

Any graduate student holding an assistantship or fellowship must enroll in at least six resident semester credit hours

during the fall and spring semesters and at least three resident semester credit hours for each summer session.

If a graduate assistant enrolls in more credit hours than allowed for percentage of time employed, a petition for excessive hours, available in the Graduate College, must be completed and returned to the Graduate College for approval.

Employment—Enrollment

If Employed:	Petition to take:	
	Fall/Spring	Summer
100% or full time	more than 6 hours	more than 3 hours
75% or 3/4 time	more than 7 hours	more than 3 hours
60%	more than 8 hours	more than 4 hours
50% or 1/2 time	more than 10 hours	more than 5 hours
30–40%	more than 12 hours	more than 6 hours
25% or 1/4 time	more than 13 hours	more than 7 hours

Full-time or Half-time Status. Full-time or half-time status of graduate students is:

Regular Semester	
Full-time	Half-time
9 or more hrs.	4–8 hrs.
Summer Session	
Full-time	Half-time
4 or more hrs.	2–3 hrs.

The Office of the Registrar considers employment as a teaching or research assistant when determining enrollment status. A student holding a 0.50 FTE graduate assistant appointment, and enrolled in a minimum of six hours during the fall or spring semester, or three hours during the summer semester, will be certified as a full-time graduate student.

Enrollment and Financial Assistance.

For the purpose of receiving monetary assistance through the Office of Student Financial Aid, the amount of the award is related only to the total number of credit hours in which enrolled. Certifiable enrollment status, based upon a combination of enrollment and employment, only assists with the deferral of loan repayments, never qualification for aid, which is based solely on enrollment.

Enrollment During the Research Phase

Because enrollment reflects the involvement of University faculty members, the graduate student must maintain continuous enrollment in thesis and/or problems courses for credit during the entire research phase of the program. Such enrollment is not limited by the maximum number of credit hours of thesis which may apply toward a degree.

In particular, students must be enrolled in at least two hours during the semester in which they take their final examination or meet other requirements. They must also be enrolled in at least two hours during the semester in which they graduate.

Academic Regulations

Refer also to the sections on "Adding Courses," "Dropping Courses," and "Withdrawing from the University."

Graduate-credit Courses

Courses numbered 5000 and above are primarily for graduate students, and only graduate students and seniors who have obtained prior approval may enroll. The majority of courses on the master's and doctoral plans of study will be 5000 level and above.

Courses numbered 3000 and 4000 that are identified by an asterisk in the "Course Listings" of the *Catalog* can be taken by graduate students. Graduate students enrolled in these courses will be considered as taking the courses for graduate credit and expected to fulfill all academic requirements as proposed by the professor.

Courses numbered 3000 and 4000 that are identified by an asterisk may be used to meet requirements for a graduate degree on the plan of study if approved by the student's advisory committee and the dean of the Graduate College. Courses that are not identified by an asterisk may not be used to fulfill requirements for a graduate degree.

Academic Standing

Minimum Grade Requirements. A grade-point average of "B" (3.00) is required to (1) maintain good standing as a graduate student and (2) meet requirements for a degree. In determining whether a student has met minimum requirements for a degree, grades for courses on the plan of study are averaged separately from other courses not on the plan of study. In order to continue enrollment in the Graduate College, a student is expected to maintain a cumulative graduate GPA of at least 3.00. In order to receive a degree, a student must have a minimum 3.00 GPA in the course work listed on the plan of study. This course work does not include the research hours (those used to fulfill the thesis, report or creative component requirements) on the plan of study. The

student must also have at least a 3.00 GPA in the hours designated as research hours on the plan of study. The grade-point averages for research hours and course work hours are figured separately.

After a plan of study has been approved, a course with a grade below a "B" cannot be replaced on the plan without approval of the dean of the Graduate College.

A course with a grade below "C" cannot be used as part of the minimum number of semester credit hours required for the degree.

Some departments have more stringent requirements. The major department should be consulted concerning minimum grade requirements.

Academic Warning and Strict Academic Probation. Grades below "B" are considered below the acceptable standard for graduate students. Any student who receives such a grade will be sent a letter of warning from the Graduate College. If a student's overall GPA drops below a 3.00, the student is subject to being placed on *strict academic probation*. A student on *strict academic probation* is required to earn a minimum grade of "B" in each course during the next semester of full-time enrollment or two semesters of part-time enrollment. Failure to do so may result in suspension from the University.

Departments are notified when students in their programs have been given academic warnings, been placed on strict academic probation, or been suspended. The department has the option to request that the student be granted a one semester reprieve from an academic suspension. However, further requests for continuance of students who have violated conditions of their probations are not usually granted.

Grades for Thesis (5000) and Dissertation (6000). The grade of "X," indicating research progress, may be assigned to thesis (5000) and dissertation (6000) courses until the research is finished. Advisers also have the option of assigning a letter grade each semester. By assigning the grade of "X," the adviser acknowledges that the student has made progress on thesis or dissertation research. Upon completion of the thesis or dissertation, the adviser submits a Change of Grade form to have the final grade entered for the thesis or dissertation.

The "X" grade can also be assigned in a course identified as the creative component portion of a master's degree. Each department in which a creative component is an option has identified one class in which "X" may be assigned if more than one semester is required to

complete the creative component. Upon completion of the creative component, the adviser submits a Change of Grade form to have the final grade entered.

Pass-No Pass Grading System. The "P" or "NP" grade refers only to the final grade in the course as recorded by the Office of the Registrar. Homework will be assigned and evaluated, and tests and examinations will be given. Students taking the course on a "P" or "NP" basis are expected to satisfy these course requirements. "P" indicates a grade equivalent to an "A," "B," or "C" while "NP" indicates a grade equivalent to "D" or "F."

Graduate students may take a course utilizing the Pass-No Pass grading system with the consent of their major advisers and the dean of the Graduate College, but courses taken under this system *cannot* be used on a plan of study to meet graduate degree requirements unless the following requirements are met.

A graduate student wishing to use a course taken on a Pass-No Pass basis on his or her plan of study to meet degree requirements *must* submit a letter, along with the Trial Schedule form at the time of enrollment, to the major adviser. The major adviser will consider the request and if approved, the letter and Trial Schedule form will be submitted to the dean of the Graduate College for approval. A student who chooses the Pass-No Pass grading system may change to the usual grading system with the consent of his or her major adviser and the dean of the Graduate College any time prior to the last date on which a course may be added. Once the deadline has passed, a student will not be permitted to change his or her choice of grading system.

Grade Appeals. A student may appeal a grade given by an instructor in a case in which he or she believes the grade awarded is inconsistent with announced grading policy. The student should consult the *"Student Rights and Responsibilities"* or contact the Office of the Executive Vice-President for information regarding initiating the appeals process.

Application for Diploma—Graduation

At the time of enrollment for the last semester or summer session of work toward a degree, the student completes an Application for Diploma card. Completion of that card initiates clearance procedure toward graduation by the Graduate College and the Office of the Registrar. The student is billed for the graduation fee along with tuition. If all requirements for the degree are not met according to deadlines specified in the

Graduate College Calendar, the student must complete a new Application for Diploma at the time of re-enrollment. *Applications for diplomas are to be submitted during the first two weeks of a regular semester or the first week of a summer session.*

Records and Transcripts

All permanent records are stored in the Office of the Registrar in Whitehurst Hall. Requests for grades, transcripts and diplomas should be made to that office.

A graduate student who does not complete the requirements in time to receive the degree at the end of the semester may secure a statement from the Office of the Registrar when all requirements for the degree have been satisfied. Such a statement will not be issued until all grades for the semester have been recorded.

Master's Degree Programs

Accounting, MS
 Agricultural Economics, MS
 Agricultural Education, MS
 Agriculture, MAg (Agricultural Economics, Agricultural Education, Agronomy, Animal Science, Entomology, Forest Resources, Horticulture and Landscape Architecture, and Plant Pathology)
 Animal Science, MS
 Applied Behavioral Studies, MS
 Architectural Engineering, MArchE
 Architecture, MArch
 Biochemistry and Molecular Biology, MS
 Biosystems Engineering, MBioE, MS
 Botany, MS
 Business Administration, MBA
 Chemical Engineering, MChemE, MS
 Chemistry, MS
 Civil Engineering, MCivilE, MS
 Computer Science, MS
 Control Systems Engineering, MS
 Counseling and Student Personnel, MS
 Curriculum and Instruction, MS
 Design, Housing and Merchandising, MS
 Economics, MS
 Educational Administration, MS
 Electrical Engineering, MElecE, MS
 Engineering and Technology Management, MS
 English, MA
 Entomology, MS

Environmental Engineering, MEnvirE, MS
 Environmental Science, MS
 Family Relations and Child Development, MS
 Food Science, MS
 Forest Resources, MS
 General Engineering, MGenE, MS
 Geography, MS
 Geology, MS
 Health, Physical Education and Leisure, MS
 Higher Education, MS
 History, MA
 Horticulture, MS
 Hospitality Administration, MS
 Industrial Engineering and Management, MIE&Mgmt, MS
 International Studies, MS
 Management Information Systems/Accounting Information Systems, MS
 Manufacturing Systems Engineering, MMSE
 Mass Communications, MS
 Mathematics, MS
 Mechanical Engineering, MMechE, MS
 Microbiology, Cell and Molecular Biology, MS
 Natural and Applied Sciences, MS
 Nutritional Sciences, MS
 Occupational and Adult Education, MS
 Pedagogy and Performance, MM
 Philosophy, MA
 Physics, MS
 Plant Pathology, MS
 Plant and Soil Sciences, MS
 Political Science, MA
 Psychology, MS
 Sociology, MS
 Speech, MA (Speech Communication; Speech and Language Pathology and Audiology; Theater)
 Statistics, MS
 Technical Education, MS
 Telecommunications Management, MS
 Trade and Industrial Education, MS
 Veterinary Biomedical Sciences, MS
 Wildlife and Fisheries Ecology, MS
 Zoology, MS

Abbreviations:

MA	Master of Arts
MAG	Master of Agriculture
MArch	Master of Architecture
MArchE	Master of Architectural Engineering
MBA	Master of Business Administration

MBioE	Master of Biosystems Engineering
MChemE	Master of Chemical Engineering
MCivileE	Master of Civil Engineering
MElecE	Master of Electrical Engineering
MEnvirE	Master of Environmental Engineering
MGenE	Master of General Engineering
MIE&Mgmt	Master of Industrial Engineering & Management
MM	Master of Music
MMSE	Master of Manufacturing Systems Engineering
MMechE	Master of Mechanical Engineering
MS	Master of Science

Admission to a Program. Some departments require that any student seeking a master's degree take an examination (e.g. GRE, GMAT) before being admitted to a program of study. See the table on "Graduate Admission Requirements" or contact the head of the major department.

Basic Requirements. The master's degree may be earned by one of three plans:

Plan I—with thesis, 30 credit hours, consisting of 24 hours of course work and six hours of research;

Plan II—with report, 32 credit hours, consisting of 30 hours of course work and two hours of research;

Plan III—with no thesis or report, 32 credit hours of course work including the creative component. The Plan III program *must* contain a creative component that is explicitly identified on the plan of study. The creative component may be a special report, an annotated bibliography, a project in research or design, or other creative activity, as designated by the advisory committee.

The number of credits specified for each plan are minimums set by the Graduate College. Departmental requirements may exceed these.

The major department, with the approval of the dean of the Graduate College, decides which alternatives are open to the candidates. Some departments also require a minimum number of semester credit hours of upper-division and graduate courses in the major field, including courses taken as an undergraduate.

Residence Requirements. Candidates for a master's degree must complete a minimum of 21 semester credit hours from OSU if they follow Plan I, or 23 semester credit hours if they follow Plan II or III. Nine semester credit hours of the 30 or 32 required for the degree may be completed by courses taken at another

Summary of Procedure for Master's Degree

Dean-Dean of Graduate College; GCO-Graduate College Office; DH-Department Head; TA-Temporary Adviser; Adviser-Person designated by department head to advise; Comm-Committee

Procedure	Initiate through Approved by	Time
1. Apply for admission. (Follow instruction sheet carefully. If relevant, see "Requirements for Admission to Teacher Education" in the "College of Education.")	Dean Dean	Complete 30 days prior to enrollment. (60 days prior for international students.)
2. Read "General Regulations" and "Master's Degree" sections, then secure registration materials in the Graduate College.	GCO	
3. Secure assignment of a temporary adviser from major department head and enroll for the first semester.	DH & TA Dean	
4. Plan program with advice of department head or designated Graduate Faculty member and submit plan of study.	Adviser Dean	Prior to completing the 17th credit hour.
5. Proceed with course work and research assignment.	Adviser	
6. Complete the Application for Diploma card at the time of enrollment; make any corrections needed on plan of study.	GCO	At the time of enrollment for the semester or session in which the degree is to be conferred. (Application is good for stated degree date only. File new application if conferring of degree is delayed.)
7. Take comprehensive written examinations as required by major department.	Adviser	
8. Complete research, prepare final draft copy of thesis or report and submit it at least one week prior to the final examination, along with a copy of the abstract, to each member of the examining committee and to the Graduate College. The final draft must be complete and legible. Ordinary proofreading marks and minor handwritten additions, changes, etc. are permitted, but the copy should be in such condition that it can be read easily and understood clearly. The style should be determined by the advisory committee. The <i>Graduate College Style Manual</i> lists specific requirements for formatting the document. The adviser must sign the copy submitted to the Graduate College.	Dean Adviser	Deadlines published yearly.

Procedure	Initiate through Approved by	Time
9. Take final examination or defense and have committee chairperson notify Graduate College of the examination results immediately following conclusion of the examination.	Adviser Dean	Deadlines published yearly.
10. Make any changes in thesis or report as required by examining committee and by the Graduate College. Advisory committee members sign final copies of thesis or report. The Graduate College makes the final decision on acceptance of the thesis or report. Candidate submits four approved copies of thesis and six approved copies of the abstract or one copy of a report and six approved copies of the abstract.	Adviser Dean	Deadlines published yearly
11. Pay binding fee in the Office of the Bursar and return form to the Graduate College.	GCO	Form to be obtained from the Graduate College after the thesis has been formally accepted by that office.
12. Arrange for cap, gown and hood at Student Union Bookstore and attend Commencement.		

accredited college or university.

A student who holds a D.V.M., M.D., D.O., D.D.S., or equivalent professional medical degree may receive up to nine hours credit toward a master's degree, subject to the recommendation of the advisory committee and the approval of the dean of the Graduate College. However, a student receiving this credit may not transfer additional hours to OSU from other graduate programs.

The last eight semester credit hours for the degree must be taken on the Stillwater campus unless a written request by the student to take the work at another location is approved by the head of the major department and the dean of the Graduate College.

Advisement. The student should go to the department head, who may assign an adviser or advisory committee to assist the student in planning and pursuing the entire program for a degree. The advisory committee must include a minimum of three members of the Graduate Faculty.

Level of Courses Applied to Graduate Degree. Graduate students must enroll in no fewer than 21 semester credit hours of 5000- and 6000-level courses through Oklahoma State University as presented on the plan of study to meet requirements for the master's degree.

Plan of Study. The preliminary plan of study for the degree must be submitted to the Graduate College *prior to completion of the 17th graduate credit hour* for students working for a master's degree in residence. The student should secure the plan of study forms from the Graduate College, develop the plan with the adviser, and submit to the Graduate College.

Students seeking a master's degree in Teacher Education must be admitted to the master's curriculum in Teacher Education before submitting a plan of study.

The plan of study is subject to modification as the student progresses, but all changes must have the approval of the adviser. A final, accurate plan of study must be filed in the Graduate College by the end of the second week of the semester or session in which the degree is to be conferred.

Graduate credit, up to a maximum of nine hours, used to obtain one master's degree can be counted toward completion of another master's degree.

Major Subject or Field. A major field of study may cross departmental lines subject to the decision of the major department.

Before receiving a master's degree, the student must have completed in the major department or field a minimum of 16 semester credit hours above the

prerequisites required for graduate work in that subject or field.

Minor Subject or Field. To minor in a subject or field, a student must complete, as a minimum, enough semester credit hours as a graduate student to satisfy, with undergraduate credits, the requirements for an undergraduate major in that department. The minor may vary from six to 15 semester credit hours.

A student may minor in two departments if the requirements are met for each and the major department and both minor departments approve.

Language Requirements. A candidate for the master's degree may be required to demonstrate a reading knowledge of a modern foreign language. Any such requirement of the department is included on the plan of study and is to be filled out at the time the preliminary plan is approved by the student's adviser.

If a foreign language is required, the head of the major department must certify that it has been met before a final examination can be scheduled.

A foreign language requirement for a master's degree may be met either by examination or by college credit, according to individual department requirement.

Written Examinations. Some departments require a written examination covering the major and minor fields. It is usually taken before the thesis or report has been completed. Arrangements for taking the examination should be made with the department at least three weeks in advance. The written examination must be passed before a final examination is scheduled.

A student who fails all or part of the written examination should consult the chairman of the examination committee to find out what must be done before taking another examination.

Thesis or Report. Any student working on a thesis or report should obtain a copy of the *Graduate College Thesis Dissertation Handbook*, published by and available from the Graduate College. It is also available via the World Wide Web (<http://www.osu-ours.okstate.edu/gradcoll>). A thesis or report must conform to the format specifications set forth in this manual. The style of the document is to be determined by the advisory committee and should be reflective of publications in the student's discipline.

After completing the research, the student prepares a final draft copy (complete and legible final draft) of the proposed thesis or report, and submits a copy, along with the abstract, to each member of the examining committee, and to the Graduate College. The proof copy must be signed by the adviser and be submitted to the Graduate College no

later than the stated deadline date (see "Graduate College Calendar").

Thesis. The student must submit to the Graduate College four copies of the thesis with six copies of the abstract no later than the stated deadline (see "Graduate College Calendar"). The thesis copies become the property of the University. Two copies are filed in the Library and two copies are kept by the major department. There is a binding fee, payable at the Office of the Bursar.

Report. The student must submit to the Graduate College one copy of a report, with six copies of the abstract. It must be bound in a pressboard cover as described in the *Graduate College Thesis Dissertation Handbook*. The final copy of the report, must be submitted to the Graduate College no later than the stated deadline (see "Graduate College Calendar").

Human Subjects and Research. Oklahoma State University follows federal guidelines which require a review of any research involving human subjects. All such research must be approved by the Institutional Review Board (IRB) before human subjects are involved. Guidelines on how to obtain permission to use human subjects in research are available from the departmental graduate coordinator or the executive secretary of the IRB, located in the Office of the Vice-President for Research. The information provides examples of activities subject to careful review and those which are easily approved.

Because University policy requires prior approval of all research involving human subjects, the letter from the IRB granting approval of the research must be included in the appendix of any thesis or dissertation submitted to the Graduate College in fulfillment of degree objectives. Failure to obtain approval for use of human subjects means that the thesis or dissertation cannot be accepted.

Final Examination. If the thesis or report option is used, the student arranges with the major department for the final examination after the draft copy of the thesis or report has been filed in the Graduate College and distributed as described in the preceding section. The final examination may be oral or written or both.

The final examination is primarily a defense of the thesis or report. If the defense is judged inadequate, a decision on whether to permit re-examination will be made by the advisory committee. Examinations are open to all members of the Graduate Faculty, and may be attended by anyone else who obtains the permission of the committee.

The committee will notify the Graduate College immediately of results of the final examination. Following satisfactory

completion of the final examination, the candidate will make changes in the thesis or report as required by the committee and by the Graduate College, and submit it in final form signed by the committee to the Graduate College.

A student who fails to pass either a written or oral final examination should consult the chairman of the examining committee. Another examination cannot be given for two months after a failure, and a department may limit the number of times that the examination may be repeated.

If the non-thesis option is used, the department head or adviser must notify the dean of the Graduate College that the student has satisfactorily completed all departmental requirements. Both positive and negative results must be reported to the Graduate College.

Time Limit. Students are expected to complete the requirements for the master's degree within five years from first enrollment after admission to the master's degree program. Any extension of this time limit must be approved by the Graduate Faculty Council.

To determine whether or not courses taken more than five years before the anticipated date of the degree can be counted toward the degree, the student should consult the departmental graduate adviser. Such courses cannot be accepted except on a complete plan of study which gives the date that the requirements for the degree are to be completed. They must be a part of a study plan and can be approved only for a specified time. Courses taken more than 10 years prior to actual graduation will not be accepted on a plan of study without a formal request from the advisory committee and approval of the Graduate Faculty Council.

Continuous Enrollment. A graduate student must maintain continuous enrollment during the entire research phase of the program. Such enrollment is not limited by the maximum number of credit hours of thesis which may apply to the degree. Continuous enrollment can be met with six credit hours during each 12-month period or two credit hours in each of the fall, spring and summer semesters. Students who are using physical or faculty resources of the University are expected to be enrolled during each semester in at least two credit hours.

Failure to maintain continuous enrollment requires submission of a new application for readmission to the graduate program. If readmitted, all requirements in effect at the time of readmission, must be completed.

Special Requirements for Selected Master's Degrees. Requirements for the Master of Agriculture, Master of Architec-

ture, Master of Architectural Engineering, Master of Business Administration, and Master of Engineering are described in detail elsewhere in the *Catalog*. Each degree has requirements that are program specific and exceed the minimal requirements specified by the Graduate College.

Doctor of Philosophy Degree Programs (Ph.D.)

Agricultural Economics
Agricultural Education
Animal Breeding and Reproduction
Animal Nutrition
Applied Behavioral Studies
Biochemistry and Molecular Biology
Biomedical Sciences
Biosystems Engineering
Business Administration
Chemical Engineering
Chemistry
Civil Engineering
Computer Science
Crop Science
Economics
Electrical Engineering
English
Entomology
Environmental Science
Food Science
General Engineering
History
Human Environmental Sciences (Design, Housing and Merchandising; Family Relations and Child Development; Nutritional Sciences)
Industrial Engineering and Management
Mathematics
Mechanical Engineering
Microbiology, Cell and Molecular Biology
Physics
Plant Pathology
Plant Science
Psychology
Sociology
Soil Science
Statistics
Veterinary Biomedical Sciences
Wildlife and Fisheries Ecology
Zoology

The Doctor of Philosophy degree is granted in recognition of high achieve-

ment in scholarship and independent investigation. The candidate must prove his or her acceptability by (1) successfully completing a series of courses comprising a plan of study, (2) passing various examinations demonstrating academic competence; (3) carrying out a research program under supervision and preparing an acceptable dissertation, and (4) demonstrating initiative, creative intelligence, and ability to plan and carry out research in his or her chosen field.

Basic Requirements. The Doctor of Philosophy degree requires six semesters of full-time graduate study (a minimum of 90 semester credit hours) beyond the bachelor's degree, or four semesters of full-time graduate study (a minimum of 60 semester credit hours) beyond the master's degree. This includes a minimum of 15 credits for the dissertation (6000). Students may use 90 hours beyond the bachelor's degree as a degree total only if admitted directly into the doctoral program from the bachelor's degree.

A student who holds a D.V.M., M.D., D.O., D.D.S., or equivalent professional medical degree may also have the minimum credit hour requirement reduced to 60 hours, subject to the recommendation of their advisory committee and the approval of the dean of the Graduate College. A student may only receive one 30-hour credit reduction in the Ph.D. requirements regardless of the number of master's or professional degrees that he or she holds.

Admission to a Program. A student who wishes to earn a Doctor of Philosophy degree may be required to take examinations based on a year of graduate study, or to produce other evidence of scholarly achievement consistent with expected academic competence in a field of specialization. Contact the head of the major department for the requirements for admission to the doctoral program.

The instructions for admission, registration, and other information given under "General Regulations" are also applicable to those who are working toward doctoral degrees.

Temporary Adviser. At the beginning of a student's doctoral program, the head of the major department will designate a member of the Graduate Faculty to serve as temporary adviser to the student. The temporary adviser will arrange the collection of information about the student and assist him or her in the early selection of courses.

Advisory Committee. Upon recommendation of the head of the major department or of the graduate committee of the department, an advisory committee of not fewer than four members will be ap-

pointed by the dean of the Graduate College. The duties of the advisory committee consist of (1) advising the student, (2) assisting the student in preparing a plan of study, (3) preparing and administering the qualifying examination, (4) assisting in planning and conducting the research, (5) supervising the writing of and passing upon the dissertation, and (6) conducting the dissertation defense.

The major adviser of the advisory committee must be a full member of the Graduate Faculty. Under special circumstances, the dean of the Graduate College may approve a substitute adviser. Each doctoral committee must have at least one member of the Graduate Faculty from outside the student's major department.

The student should consult the members of the advisory committee frequently and keep them informed on the progress of his or her work.

Preliminary Conference. As soon as the student is notified that an advisory committee has been appointed, the student should arrange with the chairperson for a conference with the committee. During the conference, the preparation and qualifications of the student for graduate work will be discussed and appropriate plans made for future study.

Plan of Study. After the preliminary conference, the student should complete the plan of study for the degree, have it approved by the advisory committee, and submit the original copy to the Graduate College.

The plan must include all the acceptable graduate work that has been completed and all that will be taken for the doctoral degree. The plan should include approximately 75 percent of courses at the 5000-6000 level and at least 15 hours dissertation credit. Forms for preparing the plan of study may be obtained in the Graduate College. The plan of study must include a minimum of 60 hours beyond the master's degree. Courses from the master's degree are not listed on the doctoral plan of study.

Because the acceptance of work which the student desires to use toward the degree rests with the advisory committee, it is important to plan a complete program and have it approved by the dean of the Graduate College as soon as possible. Courses taken more than 10 years prior to actual graduation will not be accepted on a plan of study without a formal request from the advisory committee and approval of the Graduate Faculty Council.

The plan of study is to be submitted prior to the completion of the first year of the doctoral degree program.

Changes in the plan can be made with the approval of the advisory committee and the dean of the Graduate College. A final, accurate and approved plan must be filed at the beginning of the semester or summer session in which the degree is to be conferred.

Minor Subject or Field. As a means of giving depth and breadth to their doctoral programs, most departments require work in a minor field or at least a selection of extra-departmental courses. To minor in a subject or field, as a minimum, the graduate student must complete graduate level work beyond requirements for an undergraduate degree in the minor department. A department in which a student indicates a minor must certify to the dean of the Graduate College the satisfactory completion of requirements for a minor.

Character of Work. The satisfactory completion of course work (see "General Regulations") is only one requirement for receiving the degree. The student must also: (1) pass a qualifying examination, (2) prepare an acceptable dissertation, (3) demonstrate the ability to do independent study, (4) pass a defense of dissertation, and (5) comply with other requirements of the major department.

Residence Requirements. A minimum of 30 semester credit hours must be taken at Oklahoma State University. All credit accepted toward the degree beyond the master's degree must be on the student's plan of study and be approved by the advisory committee.

One year of the last two years must be spent in continuous residence at this institution.

With prior approval by the advisory committee, the student may do research for the degree *in absentia*. Research conducted while not in residence is under the supervision of the major adviser and the advisory committee.

Courses taken at the University Center at Tulsa (UCT) while registered through Oklahoma State University are considered residence credit. Courses taken from the other three cooperating universities at UCT are considered to be transfer credit.

Language Requirement. Foreign language or other proficiency requirements may be specified to meet the need for specific skills and areas of knowledge that facilitate research and contribute to wider understanding. Specific requirements are determined by degree-granting departments or programs. In many fields, a reading knowledge of one or two modern foreign languages is an important part of scholarship and necessary for research. In other fields, proficiency in special and related disciplines may be

Summary of Procedure for Doctoral Degree

Dean-Dean of Graduate College; DH-Department Head; TA-Temporary Adviser; Comm-Committee; Ch-Chair of Committee

Procedure	Initiate through Approved by	Time
Apply for admission. (Follow instruction sheet carefully.)	Dean Dean	Complete 30 days prior to enrollment (60 days prior for international students).
2. Secure assignment of a temporary adviser from major department head and enroll.	DH & TA Dean	
3. Request the appointment of advisory committee.	TA Dean	
4. Prepare plan of study with assistance of committee. Submit one original approved copy to Graduate College.	Comm Dean	Prior to enrollment date (see "University Calendar") during second full semester of enrollment beyond master's degree.
5. Fulfill foreign language requirement or attain other required proficiencies.		Prior to qualifying examination.
6. Complete major portion of course work and plan dissertation program with committee. Submit copy of approved dissertation outline to Graduate College.	Ch Dean	As early in the research stage as possible.
7. Apply for and take qualifying examination.	Ch	As early in the doctoral program as feasible.
8. Submit results of qualifying examination and/or application for admission to candidacy (Form G-4).	Comm Dean	Not less than six months prior to Commencement in which degree will be conferred.
9. Verify accuracy of plan of study in Graduate College. Secure committee approval for any necessary changes. Check on time limit for the degree.	Comm Dean	At the beginning of the semester or summer session in which degree is to be conferred.

Procedure	Initiate through Approved by	Time
10. Complete the Application for Diploma card at the time of enrollment.	Dean	At the time of enrollment for the semester or session in which the degree is to be conferred. (Application is good for stated time only. File new application if conferring of degree is delayed.)
11. Complete research, prepare final draft copy of dissertation and submit it at least one week prior to the examination, along with a copy of the abstract, to each member of the committee and to the Graduate College. The final draft must be complete and legible. Ordinary proof-reading marks and minor handwritten additions, changes, etc., are permitted, but the copy should be in such condition that it can be read easily and understood clearly. The format must follow the <i>Graduate College Style Manual</i> recommendations; however, the style is to be determined by the advisory committee. The adviser must sign the copy submitted to the Graduate College.	Ch Comm Dean	Deadlines published yearly.
12. Schedule dissertation defense. Committee chairperson notifies Graduate College of the results immediately following conclusion of the examination.	Ch Dean	
13. Make any changes in dissertation required by examining committee and by the Graduate College. Advisory committee members sign final copies of dissertation. The Graduate College makes the final decision on acceptance of the dissertation. Candidate submits four approved copies of the dissertation and six approved copies of the abstract.	Ch Comm Dean	Deadlines published yearly.
14. Pay binding and microfilming fees in the Office of the Bursar; complete questionnaire and microfilming agreement form and return all forms to the Graduate College.		Form to be obtained from the Graduate College after dissertation has been formally accepted by that office.
15. Rent or buy cap, gown, and hood at Student Union Bookstore and attend Commencement.		

required that will contribute to the needs of the individual program.

Qualifying Examination. The qualifying examination is comprehensive, covering the entire area of the student's graduate study. The examination may be written, oral or both. The examination must be passed not less than six months before the degree is granted (see "Admission to Candidacy"). The results of the examination are reported to the Graduate College on Form G-4.

Before taking the qualifying examination, the student must have an approved plan of study and dissertation proposal on file in the Graduate College, and have the approval of the advisory committee.

In case of failure to pass any part of this examination, the student will be notified in writing of the conditions under which another examination can be taken. A second examination may not be given earlier than four months after a failure.

If the results of the second examination are unsatisfactory, no other examination may be given without the approval of the Graduate Council.

Admission to Candidacy. A student must be admitted to candidacy at least six months before the commencement in which the Doctor of Philosophy degree will be received.

Before being admitted to candidacy, the student must have passed the qualifying examination, and have an approved plan of study and dissertation outline filed in the Graduate College.

Dissertation. A dissertation (doctoral thesis) is required of each doctoral candidate. The subject of the dissertation must be approved by the advisory committee and the dissertation is prepared under the direction of members of the committee or a special dissertation committee approved by the advisory committee chairperson.

The dissertation must follow specifications in the *Graduate College Thesis Dissertation Handbook*, available from the Graduate College. It is also available via the World Wide Web (<http://www.osu-ours.okstate.edu/gradcoll>). All dissertation copies must have the necessary approval signatures before submission to the Graduate College.

After completing the research, the student prepares a final draft copy (complete and legible) of the proposed dissertation and submits a copy, along with the abstract, to each member of the committee and to the Graduate College. The copy being submitted to the Graduate College must be approved by the student's dissertation adviser. The final draft copy must be submitted to the Graduate College no later than the stated

deadline date (see "Graduate College Calendar").

Human Subjects and Research. Oklahoma State University follows federal guidelines which require a review of any research involving human subjects. All such research must be approved by the Institutional Review Board (IRB) before human subjects are involved. Guidelines on how to obtain permission to use human subjects in research are available from the departmental graduate coordinator or the executive secretary of the IRB, located in the Office of the Vice-President for Research. The information provides examples of activities subject to careful review and those which are easily approved.

Because University policy requires prior approval of all research involving human subjects, the letter from the IRB granting approval of the research must be included in the appendix of any dissertation submitted to the Graduate College in fulfillment of degree objectives. Failure to obtain approval for use of human subjects means that the thesis or dissertation cannot be accepted.

Final Examination. The final examination is primarily a defense of the dissertation. If the defense is judged inadequate, a re-examination decision will be made by the advisory committee. The examination is open to all members of the Graduate Faculty and may be attended by anyone else who obtains the permission of the committee.

The committee will notify the Graduate College immediately of results of the final examination. Following satisfactory completion of the final examination, the candidate will make any changes required by the committee and by the Graduate College and submit the dissertation in final form signed by the committee to the Graduate College.

Four copies of the dissertation in final form and six copies of the abstract must be submitted to the Graduate College no later than the stated deadline (see "Graduate College Calendar"). The dissertation copies become the property of the University; two copies are filed in the Library and two copies are kept by the major department. There is a binding fee, payable at the Office of the Bursar.

All dissertations are microfilmed by University Microfilms, Inc. The student is required to pay a fee for microfilming the complete document and for publication of an abstract of about 350 words. The student must complete a University Microfilms Agreement Form after the dissertation has been accepted by the Graduate College. Copyrighting the dissertation is not required, but can be done at a small additional cost with the approval of the dean of the Graduate College.

Time Limit. Students are expected to complete the requirements of the Ph.D. degree within seven years from their first enrollment in the degree program. After that time a new program of study must be arranged with the advisory committee and filed in the Graduate College. No courses over 10 years old at the time of graduation may be used to fulfill requirements.

If all requirements for the degree are not completed within four years after the qualifying examination was passed, a second qualifying examination must be repeated successfully.

Any exception to these time limits must be approved by the Graduate Faculty Council.

Continuous Enrollment. A graduate student must maintain continuous enrollment during the entire research phase of the program. Such enrollment is not limited by the maximum number of credit hours of thesis which apply to the degree. Continuous enrollment can be met with six credit hours during each 12-month period or two credit hours in each of the fall, spring and summer semesters. Students who are using physical or faculty resources of the University are expected to be enrolled during each semester in at least two credit hours.

Failure to maintain continuous enrollment requires submission of a new application for readmission to the graduate program. If readmitted, all requirements of the Graduate College and the department in effect at the time of readmission, must be completed.

Doctor of Education Degree Programs (Ed.D.)

Applied Educational Studies
Curriculum and Instruction
Educational Administration
Higher Education
Occupational and Adult Education

The degree of Doctor of Education is a professional degree conferred in recognition of outstanding ability as an educator in some special field or fields as shown by: (1) satisfactory completion of a program of study; (2) passing examinations showing an understanding of the field of specialization and its relation to allied subjects; (3) the preparation of a dissertation demonstrating ability to approach problems with a high degree of originality and independence; and (4) passing an examination covering the dissertation and related fields.

Basic Requirements. The minimum time required for the doctor's degree is six semesters of full-time graduate study (a minimum of 90 semester credit hours) beyond the bachelor's degree, or four semesters of full-time graduate study (a minimum of 60 semester credit hours) beyond the master's degree. Courses at the 5000 and 6000 level should make up approximately 75 percent of the plan of study and must include 10 hours for the doctoral dissertation. The student must register for the dissertation in the same way he or she registers for other courses. Students may use 90 hours beyond the bachelor's degree as a degree total only if admitted directly into the doctoral program from the bachelor's degree.

A student who holds a D.V.M., M.D., D.O., D.D.S., or equivalent professional medical degree may also have the minimum credit hour requirement reduced to 60 hours, subject to the recommendation of their advisory committee and the approval of the dean of the Graduate College. A student may only receive one 30-hour credit reduction in the Ph.D. requirements regardless of the number of master's or professional degrees that he or she holds.

Admission to a Program. The student can secure an application form from the Graduate College along with information concerning areas and programs of study offered. The application will be evaluated by the faculty of the appropriate department and by the Graduate College. A student planning to seek the Doctor of Education degree must provide specific information as requested by the College of Education (i.e., vita, letters of recommendation, protocols of scholarly work, and test scores). Test scores required are the Miller Analogies Test and/or the aptitude portion of the Graduate Record Examination. A student should contact his or her department head to determine which tests are required and to obtain materials concerning the personnel folder.

When the student's personnel folder is complete, the graduate review committee will review the student's records and recommend to the dean of the Graduate College whether or not the student should be admitted. The dean of the Graduate College will inform the student by letter of admission status.

Temporary Adviser. At the beginning of a student's doctoral program, the head of the major department will designate a member of the Graduate Faculty to serve as temporary adviser to the student. The temporary adviser will guide the student in the selection of courses for the first semester or summer session.

Advisory Committee. Upon recommendation of the head of the major depart-

ment or of the graduate committee of the department, an advisory committee of not fewer than four members will be appointed by the dean of the Graduate College. At least one member of the advisory committee must be from a department or program outside the student's major field of study. The duties of the advisory committee consist of (1) advising the student, (2) assisting the student in preparing a program of study, (3) preparing and administering the qualifying examination, (4) assisting in planning and conducting the research, (5) supervising the writing and subsequent approval of the dissertation, and (6) conducting the final examination.

Preliminary Conference. As soon as the student is notified that an advisory committee has been appointed, a conference should be arranged with the chairperson and committee. Before the conference the student must see that the chairperson has transcripts of previous work and other information that will be needed in the conference. During the conference the preparation of the student for graduate study will be discussed and plans made for future study.

Plan of Study. After the preliminary conference, the student should complete the plan of study for the degree, have it approved by the advisory committee and submit the original copy to the Graduate College. One copy will be retained by the student and three copies sent to the Graduate College.

The plan must include all the acceptable graduate work that has been completed and all that will be taken for the degree. The plan should include approximately 75 percent of courses at the 5000-6000 level and 10 hours dissertation credit. Forms for preparing the plan of study may be obtained in the Graduate College. The plan of study must include a minimum of 60 hours beyond the master's degree or 30 hours beyond the Ed.S. Courses from the master's degree or Ed.S. are not listed on the doctoral plan of study.

Because the acceptance of work which the student desires to use toward the degree rests with the advisory committee, it is important to plan a complete program and have it approved by the dean of the Graduate College as soon as possible. Courses taken more than 10 years prior to actual graduation will not be accepted on a plan of study without a formal request from the advisory committee and approval of the Graduate Faculty Council.

The plan of study is to be submitted prior to the completion of the first year of the doctoral program.

Changes in the plan can be made with the approval of the advisory commit-

tee and the dean of the Graduate College. A final, accurate and approved plan must be filed at the beginning of the semester or summer session in which the degree is to be conferred.

Character of Work. Completing a number of courses with a "B" average (see "General Regulations") is one of the requirements for the doctoral degree. The student must also: (1) pass a qualifying examination, (2) prepare an acceptable dissertation, (3) demonstrate the ability to do independent study, (4) pass a defense of dissertation, and (5) comply with other requirements of the major field or department.

Residence Requirements. A minimum of 30 semester credit hours must be taken at Oklahoma State University. One academic year of the last two, as determined by the appropriate department, must be spent in continuous residence at this institution.

The residence requirement can be met by two semesters of full-time graduate study. Any other way of meeting the residence requirement must have the approval of the student's advisory committee and of the dean of the Graduate College.

Courses taken at the University Center at Tulsa (UCT) while registered through Oklahoma State University are considered residence credit. Courses taken from the other three cooperating universities are considered to be transfer credit.

Foreign Language and Research Instruments Proficiency. All candidates will be expected to have a command of those instruments necessary in the study of educational problems. The doctoral advisory committee of each candidate may require evidence of proficiency in one or more foreign languages, educational research, statistics, and computer usage.

Qualifying Examination. Before taking the qualifying examination, the student must have completed the main areas in a plan of study which has been approved by the advisory committee, have the approval of his or her advisory committee, and have an approved outline for the dissertation on file in the Graduate College and in the office of the department concerned.

The qualifying examination is designed to measure the student's proficiency in the field of specialization, the breadth and depth of his or her professional education background and his or her knowledge of cognate subjects. The examination may be both written and oral but part of it must be written. This examination must be passed and the result reported to the Graduate College on Form G-4 at least six months before the

degree is granted (see "Admission to Candidacy" in the "Doctor of Philosophy" section).

In case of failure to pass this examination, the student will be notified by the examining committee of the condition under which another examination may be taken. A student who fails on either the qualifying or final examination cannot take another examination for four months. If the result of the second examination is unsatisfactory, no other examination may be given without the approval of the Graduate Council.

Dissertation. A dissertation (doctoral thesis) is required of each candidate for the Doctor of Education degree. The dissertation has three principal functions: (1) training in research, (2) promoting professional growth, and (3) contributing to professional knowledge in education. Not every dissertation will be expected to serve these three functions in the same way or to the same extent.

The format specifications, procedures, and regulations for the dissertation are the same as for the Ph.D. The Ed.D. candidate should refer to the "Doctor of Philosophy" section on dissertations and submission procedures through the Graduate College.

Human Subjects and Research. Oklahoma State University follows federal guidelines which require a review of any research involving human subjects. All such research must be approved by the Institutional Review Board (IRB) before human subjects are involved. Guidelines on how to obtain permission to use human subjects in research are available from the departmental graduate coordinator or the executive secretary of the IRB, the Graduate College, or Office of the Vice-President for Research. The information provides examples of activities subject to careful review and those which are easily approved.

Because University policy requires prior approval of all research involving human subjects, the letter from the IRB granting approval of the research must be included in the appendix of any thesis or dissertation submitted to the Graduate College in fulfillment of degree objectives. Failure to obtain approval for use of human subjects means that the thesis or dissertation cannot be accepted.

Time Limit. Students are expected to complete the requirements for the Doctor of Education degree within seven years after beginning course work in the degree program. Otherwise a new program of study must be arranged with the advisory committee and filed in the Graduate College. No courses over 10 years old at the time of graduation may be used to fulfill requirements.

If all requirements for the degree are not completed within four years after the qualifying examination was passed, a second qualifying examination must be repeated successfully.

Any exception to these time limits must be approved by the Graduate Faculty Council.

Continuous Enrollment. Continuous enrollment must be maintained during the entire research phase of the program. Such enrollment is not limited by the maximum number of credit hours of thesis which apply to the degree. Continuous enrollment can be met with six credit hours during each 12-month period or two credit hours in each of the fall, spring and summer semesters. Students who are using physical or faculty resources of the University are expected to be enrolled during each semester in at least two credit hours.

Failure to maintain continuous enrollment requires submission of a new application for readmission to the graduate program. If readmitted, all requirements of the Graduate College and the department in effect at the time of readmission, must be completed.

Specialist in Education Degree Program (Ed.S.)

Education

The Specialist in Education degree is a post-master's professional degree. It is conferred as an appropriate recognition of achievement as evidenced by:

1. Successful professional performance in the area of the student's specialization.
2. Satisfactory completion of a program of graduate study of approximately two academic years.
3. Satisfactory performance on examinations designed to reveal the student's undertaking of the field of specialization and its relation to other areas.
4. Preparation of a thesis dealing with some aspect of concern to the student's profession and its defense before a committee of the Graduate Faculty.

Admission. The student can secure application forms from the dean of the Graduate College along with information concerning areas and programs of study offered. The application will be evaluated by the faculty of the appropriate department and by the Graduate College.

Admission to a Program. A student planning to seek the Specialist in Education degree must provide specific infor-

mation as requested by the College of Education (i.e., vita, letters of recommendation, protocols of scholarly work, and test scores). Test scores required are the Miller Analogies Test and/or the aptitude portion of the Graduate Record Examination. A student should contact the department head to determine which tests are required and obtain materials concerning the personnel folder.

When the student's personnel folder is complete, the graduate review committee for Specialist in Education programs will review the student's records and recommend to the dean of the Graduate College whether or not the student should be admitted to the program. The dean of the Graduate College will inform the student by letter regarding admission.

Temporary Adviser. At the beginning of a student's Specialist in Education program, the head of the major department will designate a member of the Graduate Faculty to serve as temporary adviser to the student. The temporary adviser will guide the student in the selection of courses for the first semester or summer session.

Advisory Committee. The dean of the Graduate College will appoint an advisory committee nominated by the head of the department in which he student wishes to specialize. This committee (1) conducts the preliminary examination and conference, (2) approves the proposed plan of study, (3) supervises the student's progress in the program, (4) supervises the research, and (5) arranges for and conducts the final examination. The advisory committee consists of three members of the graduate faculty, with the chair holding associate or full membership status. All three members may be chosen within the student's area of study. Additional members may come from other disciplines.

Plan of Study. As soon as practical after the appointment of the committee, the student will arrange with the chair for a conference for the purpose of planning a program of study. The plan of study will include all graduate work required to complete the program. The original copy of the plan of study should be submitted to the Graduate College. This plan may be modified with the approval of the advisory committee and the dean of the Graduate College. Courses taken more than 10 years prior to actual graduation will not be accepted on a plan of study without a formal request from the advisory committee and approval of the Graduate Faculty Council. The plan of study should be submitted prior to completion of the first year of study in the Ed.S. program.

Credit-hour Requirements. A minimum of 60 semester credit hours beyond the bachelor's degree or 33 hours beyond the master's degree are required for the Specialist in Education degree. This may include as many as 10 credit hours for the practicum study and accompanying report.

Character of Work. Completing an appropriate number of courses with a "B" average (see "General Regulations") is only one of the requirements for this degree. The student must also: (1) pass a qualifying examination, (2) conduct an appropriate study of education, (3) show qualities of professional leadership, and (4) pass a final examination.

Residence Requirements. The candidate must be enrolled full-time at OSU for one academic year of the two years required for the degree. Two summer sessions are considered equivalent to one semester for purposes of meeting the residence requirement.

Ordinarily the last 20 hours, including the study and report, must be earned in residence on the Stillwater campus of Oklahoma State University. Any deviation must be recommended by the advisory committee and approved by the dean of the Graduate College. No more than nine hours may be transferred from another university.

Qualifying Examination. A qualifying examination is required of all candidates for the Specialist in Education degree. The nature of this exam is determined within each specialization.

Time Limit. Students must complete all requirements for the Specialist in Education degree within five years after beginning course work in the degree program. No course over 10 years old at the time of graduation may be used to satisfy degree requirements. Any exception to these time limits must be approved by the Graduate Faculty Council after recommendation from the advisory committee.

Continuous Enrollment. Continuous enrollment must be maintained during the duration of the program through enrollment in at least six credit hours over any 12 month period. Normally this requirement is met by enrolling in at least two credit hours in each of the spring, summer and fall terms. Students who are using physical or faculty resources of the University are expected to be enrolled each semester in at least two hours.

Failure to maintain continuous enrollment requires submission of a new application for readmission to the graduate program. If readmitted, all requirements of the Graduate College and the program in effect at the time of readmission must be completed.

Credit toward an Ed.D. or a Ph.D. A student holding an Ed.S. may have the credit hour requirements for a Ph.D. or Ed.D. reduced to 30 hours subject to recommendation by the advisory committee and approval of the dean of the Graduate College. However, all of the remaining 30 hours toward the doctoral degree must be taken at the 5000 or 6000 level and all must be taken at OSU.

Graduate Faculty

The four groups of the Graduate Faculty are full members and emeriti, and associate members and emeriti. Members of the Graduate Faculty, their degrees held and degree-granting institutions, and most recent academic title at OSU are listed below. Dates following indicate: first, the year that the faculty member was appointed to his or her present position; second, the year that the faculty member was initially appointed to a position at Oklahoma State University. A single date means that these two coincided.

Members

- CHARLES I. ABRAMSON, B.A. (Boston Univ.), M.A. (ibid), Ph.D. (ibid); *Assistant Professor of Psychology*; 1993.
- BRUCE J. ACKERSON, B.S. (Univ. of Nebraska), M.S. (Univ. of Colorado), Ph.D. (ibid); *Regents Professor of Physics*; 1991, 1977.
- SCOTT THOMAS ACTON, B.S. (Virginia Tech), M.S. (Univ. of Texas, Austin), Ph.D. (ibid); *Associate Professor of Electrical and Computer Engineering*; 1994.
- BRIAN D. ADAM, B.S. (Wheaton College), M.S. (Univ. of Nebraska, Lincoln), Ph.D. (Univ. of Illinois); *Associate Professor of Agricultural Economics*; 1994, 1990.
- NATALIE ADAMS, B.S. (Louisiana State Univ.), M.Ed. (Univ. of Southwestern Louisiana), Ph.D. (Louisiana State Univ.); *Associate Professor of Curriculum and Educational Leadership*; 1997.
- LEE C. ADKINS, B.S. (Florida State Univ.), M.A. (Louisiana State Univ.), Ph.D. (ibid); *Professor of Economics and Legal Studies in Business*; 1998, 1988.
- ALAN C. ADOLPHSON, B.A. (Western Washington Univ.), Ph.D. (Princeton Univ.); *Professor of Mathematics*; 1987, 1983.
- MOHAMED SAMIR AHMED, B.S. (Cairo Univ.), M.S. (Ein-Shams Univ.), M.S. (McGill Univ.), Ph.D. (Univ. of Oklahoma); P.E.; *Professor of Civil and Environmental Engineering*; 1991, 1980.
- DOUGLAS B. AICHELE, B.A. (Univ. of Missouri), M.A. (ibid), Ed.D. (ibid); *Professor and Associate Head of the Department of Mathematics*; 1980, 1969.
- ROBERT W. ALLEN, B.S. (Univ. of Tulsa), Ph.D. (Purdue Univ.); *Adjunct Associate Professor of Biochemistry and Microbiology*, OSU-COM; 1995, 1993.
- H. JACK ALLISON, B.S. (Louisiana State Univ.), M.S. (ibid), Ph.D. (O.S.U.); P.E.; *Professor of Electrical and Computer Engineering*; 1976, 1961.
- ZUHAIR F. AL-SHAIEB, B.S. (Damascus Univ.), M.S. (Univ. of Missouri, Rolla), Ph.D. (ibid); *Brown Monnett Professor, Regents Professor and Head of the Department of Geology*; 1994, 1972.
- DALE E. ALSPACH, B.S. (Univ. of Akron), Ph.D. (Ohio State Univ.); *Regents and Southwestern Bell Professor of Mathematics*; 1990, 1979.
- ORLEY M. AMOS, JR., B.A. (Wichita State Univ.), M.S. (Iowa State Univ.), Ph.D. (ibid); *Professor of Economics and Legal Studies in Business*; 1988, 1979.
- JEFFREY ANDERSON, B.A. (Rutgers Univ.), Ph.D. (Univ. of Florida); *Professor of Horticulture and Landscape Architecture*; 1996, 1986.
- KIM B. ANDERSON, B.S. (O.S.U.), M.S. (ibid), Ph.D. (ibid); *Professor of Agricultural Economics*; 1990, 1982.
- MICHAEL P. ANDERSON, B.S. (Brigham Young Univ.), M.S. (Univ. of Minnesota), Ph.D. (ibid); *Associate Professor of Plant and Soil Sciences*; 1990.
- MICHAEL APPLGATE, B.A. (Brigham Young Univ.), Ph.D. (Iowa State Univ.); *Professor of Economics and Legal Studies in Business*; 1990, 1974.
- ANDREW S. ARENA, JR., B.S. (Univ. of Arizona), M.S. (Univ. of Notre Dame), Ph.D. (ibid); *Associate Professor of Mechanical and Aerospace Engineering*; 1998, 1993.
- BAHRM H. ARJMANDI, B.S. (N.S. & F.C. Tehran), M.S. (Pittsburg State Univ.), Ph.D. (Kansas State Univ.); *Associate Professor of Nutritional Sciences*; 1998.
- LYNN K. ARNEY, B.S. (Univ. of Tulsa), M.E. (Northeastern Oklahoma State Univ.), Ed.D. (O.S.U.); *Associate Professor of Educational Studies*; 1988, 1985.
- RICHARD ARTHUR AUKERMAN, B.S. (Univ. of North Dakota), M.S. (ibid), Ph.D. (ibid); *Professor of Management*; 1987, 1980.
- LINDA AUSTIN, B.A. (State Univ. of New York, Stony Brook), M.S. (Univ. of Illinois), M.A. (Univ. of Rochester), Ph.D. (ibid); *Associate Professor of English*; 1989, 1985.
- DAVID EDWARD BALK, B.A. (Immaculate Conception College), M.A. (Marquette Univ.), Ph.D. (Univ. of Illinois); *Professor and Head of the Department of Family Relations and Child Development*; 1997.
- DONNA KAY BANDY, B.A. (Univ. of Iowa), M.A. (Drexel Univ.), Ph.D. (ibid); *Associate Professor of Physics*; 1991, 1987.
- JOHN A. BANTLE, B.A. (Eastern Michigan Univ.), M.S. (ibid), Ph.D. (Ohio State Univ.); *Professor of Zoology and Associate Dean for Research, College of Arts and Sciences*; 1991, 1976.
- LETICIA BARCHINI, B.A. (Univ. Nacional de Tucuman, Argentina), Ph.D. (Univ. Nacional de Cordoba, Argentina); *Associate Professor of Mathematics*.
- BILLY J. BARFIELD, B.S. (Texas A & M Univ.), Ph.D. (ibid); P.E.; *Professor and Head of the Department of Biosystems and Agricultural Engineering*; 1992.
- ROBERT W. BARKER, B.S. (Northeastern Oklahoma State Univ.), Ph.D. (O.S.U.); *Professor of Entomology*; 1991, 1975.
- LAURA L. B. BARNES, B.A. (Univ. of Nebraska, Lincoln), M.A. (ibid), Ph.D. (ibid); *Assistant Professor of Educational Studies*; 1995, 1990.
- NICHOLAS T. BASTA, B.S. (Pennsylvania State Univ.), M.S. (Iowa State Univ.), Ph.D. (ibid); *Associate Professor of Plant and Soil Sciences*; 1991.
- RICHARD P. BATTEIGER, B.A. (Ohio Univ.), M.A. (Univ. of Florida), Ph.D. (ibid); *Associate Professor of English*; 19889, 1985.
- CAROLYN J. BAUER, B.S. (O.S.U.), M.S. (ibid), Ed.D. (ibid); *Professor of Curriculum and Educational Leadership*; 1985, 1966.
- PATRICIA A. BELL, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Texas); *Professor and Head of the Department of Sociology*; 1987, 1981.
- CAROL L. BENDER, B.S. (Texas Tech Univ.), M.S. (Oregon State Univ.), Ph.D. (Univ. of California, Riverside); *Professor of Entomology and Plant Pathology*; 1997, 1986.
- BRUCE A. BENJAMIN, B.A. (Westminster College), Ph.D. (Univ. of Oklahoma); *Assistant Professor of Pharmacology*, OSU-COM; 1997.
- RICHARD C. BERBERET, B.A. (Carroll College), Ph.D. (Univ. of Nebraska); *Professor of Entomology*; 1980, 1971.
- KENNETH DARRELL BERLIN, B.A. (North Central College, Illinois), Ph.D. (Univ. of Illinois, Urbana); *Regents Professor of Chemistry*; 1971, 1960.
- JOE G. BERRY, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Kansas State Univ.); *Professor of Animal Science*; 1988, 1980.
- DENNIS EARL BERTHOLF, B.S. (Univ. of Kansas), M.A. (New Mexico State Univ.), Ph.D. (ibid); *Professor of Mathematics*; 1988, 1968.
- GARRY R. BICE, B.S. (Cornell Univ.), M.S. (ibid), Ph.D. (Ohio State Univ.); *Professor of Curriculum and Educational Leadership*; 1990, 1985.
- TERRENCE G. BIDWELL, B.S. (O.S.U.), M.S. (ibid), Ph.D. (ibid); *Professor of Plant and Soil Sciences*; 1996, 1988.
- BIRNE BINEGAR, B.S. (Univ. of California, Los Angeles), M.S. (ibid), Ph.D. (ibid); *Associate Professor of Mathematics*; 1993, 1988.
- JAMES BRYAN BLAIR, B.S. (West Virginia Univ.); Ph.D. (Univ. of Virginia); *Professor and Head of the Department of Biochemistry and Molecular Biology*; 1990.
- JAMES T. BLANKEMEYER, A.B. (Temple Univ.), M.A. (ibid), Ph.D. (ibid); *Professor and Interim Head of the Department of Microbiology and Molecular Genetics*; 1993, 1977.
- JAMES E. BOSE, B.S. (O.S.U.), M.S. (ibid), Ph.D. (ibid); P.E.; *Professor and Director of the Division of Engineering Technology*; 1977, 1960.
- DONALD L. BOSWELL, B.A. (Univ. of Central Florida), M.S. (Indiana State Univ.), Ph.D. (ibid); *Associate Professor of Applied Health and Educational Psychology*; 1991.
- GREGORY BOWES, B.A. (Augustana College), M.S. Ed. (Northern Illinois Univ.), Ed.D. (ibid); *Professor of Educational Studies*; 1996.

- DONNA H. BRANSON, B.A. (Dominican University), M.S. (Univ. of Rhode Island), Ph.D. (Michigan State Univ.); *Professor and Head of the Department of Design, Housing and Merchandising*; 1987, 1983.
- MICHAEL BRANSON, B.S. (Illinois Benedictine College), M.A. (Arizona State Univ.), Ph.D. (ibid); *Associate Professor of Industrial Engineering and Management*; 1985.
- JAMES E. BREAZILE, B.S. (Univ. of Missouri), D.V.M. (ibid), Ph.D. (Univ. of Minnesota); *Professor of Veterinary Infectious Diseases and Physiology*; 1986, 1978.
- GEORGE M. BRENNER, B.S., (Univ. of Kansas), M.S. (Baylor Univ.), Ph.D. (Univ. of Kansas); *Professor and Chairman of the Department of Physiology and Pharmacology*; OSU-COM; 1982, 1976.
- KATHLEEN BRIGGS, B.S. (Brigham Young Univ.), M.S. (ibid), Ph.D. (ibid); *Associate Professor of Family Relations and Child Development*; 1997, 1992.
- GLENN BROADHEAD, B.A. (Los Angeles State Univ.), M.A. (Univ. of California, Davis), Ph.D. (ibid); *Associate Professor of English*; 1995.
- B. WADE BRORSEN, B.S. (O.S.U.), M.S. (ibid.), Ph.D. (Texas A & M Univ.); *Regents Professor of Agricultural Economics*; 1992, 1991.
- ANTHONY EDWARD BROWN, B.A. (Baylor Univ.), M.P.A. (Univ. of Tennessee), Ph.D. (ibid); *Associate Professor of Political Science and Coordinator of Programs, University Center at Tulsa*; 1985, 1980.
- DONALD N. BROWN, B.A. (Harvard Univ.), M.A. (Univ. of Arizona), Ph.D. (ibid); *Professor of Sociology*; 1982, 1971.
- GLENN OWEN BROWN, B.S. (Arizona State Univ.), M.S. (Colorado State Univ.), Ph.D. (ibid); *Associate Professor of Biosystems and Agricultural Engineering*; 1992, 1987.
- ROBERT MILTON BROWN, B.A. (Univ. of Houston), M.A. (ibid.), Ph.D. (Univ. of Maryland); *Associate Professor of English and Director of Extension, College of Arts and Sciences*; 1994, 1990.
- ALAN W. BRUNKEN, B. Arch. (O.S.U.), M. Arch. (Massachusetts Inst. of Technology); *AIA; Professor of Architecture*; 1986, 1973.
- GERALD HENRY BRUSEWITZ, B.S. (Univ. of Wisconsin), B.S.M.E. (ibid), M.S. (ibid), Ph.D. (Michigan State Univ.); P.E.; *Regents Professor of Biosystems and Agricultural Engineering*; 1992, 1969.
- BENNY D. BRUTON, B.S. (East Central Oklahoma State Univ.), M.S. (O.S.U.), Ph.D. (Texas A & M Univ.); *Adjunct Professor of Entomology and Plant Pathology*; 1997.
- DAVID S. BUCHANAN, B.S. (North Dakota State Univ.), M.S. (Univ. of Nebraska), Ph.D. (ibid); *Professor of Animal Science*; 1988, 1980.
- KAY SATHER BULL, B.S.B.A. (Roosevelt Univ.), M.B.A. (ibid), Ph.D. (Univ. of Wisconsin); *Professor of Applied Health and Educational Psychology*; 1988, 1979.
- RICHARD A. BUNCE, B.S. (Marietta College), Ph.D. (Univ. of Wisconsin, Madison); *Professor of Chemistry*; 1988, 1983.
- HERMANN G. BURCHARD, Dipl.-Math. (Univ. of Hamburg), Ph.D. (Purdue Univ.); *Professor of Mathematics*; 1977, 1972.
- MARTIN BURLINGAME, B.A. (Willamette Univ.), M.Ed. (ibid), Ph.D. (Univ. of Chicago); *Professor and Head of the School of Educational Studies*; 1992.
- ROBERT L. BURNAP, B.S. (Univ. of Michigan), M.S. (Univ. of California, Los Angeles), Ph.D. (Univ. of California, Santa Barbara); *Associate Professor of Microbiology and Molecular Genetics*; 1996, 1991.
- DAVID KIM BURNHAM, B.S. (Brigham Young Univ.), M.S. (ibid), Ph.D. (Univ. of Texas Health Sciences Center, Dallas); *Associate Professor of Microbiology and Molecular Genetics*; 1993, 1988.
- GEORGE E. BURROWS, B.S. (Univ. of California, Davis), D.V.M., M.S. (Washington State Univ.), Ph.D. (ibid); *Professor of Veterinary Anatomy, Pathology and Pharmacology*; 1983, 1978.
- JOSEPH F. BYRNES, B.A., B.D. (Montfort Seminary), M.S. (Univ. of Notre Dame, Chicago), Ph.D. (Univ. of Chicago); *Professor of History*; 1988, 1976.
- JOHN L. CADDEL, B.S. (Texas A & I Univ.), Ph.D. (O.S.U.); *Professor of Plant and Soil Sciences*; 1986, 1977.
- NOMA JO CAMPBELL, B.S. (O.S.U.), M.S. (Kansas State Univ.), Ed.D. (Virginia Polytechnic Inst. and State Univ.); *Professor of Educational Studies and Director of the University Testing and Evaluation Service*; 1990, 1975.
- ANN CANDLER-LOTVEN, B.S.Ed. (Lamar Univ.), M.Ed. (Univ. of Houston), Ed.D. (ibid); *Professor of Curriculum and Educational Leadership, Dean of the College of Education, and Director of Professional Education*; 1995.
- LOWELL CANEDAY, B.A. (Le Tourneau College), M.A. (Univ. of Wyoming), Ph.D. (Univ. of Minnesota); *Professor of Applied Health and Educational Psychology, and Associate Dean for Graduate Studies, College of Education*; 1992, 1981.
- ALFREDO CARLOZZI, B.A. (Iona College), M.A. (Trinity Univ.), Ed.D. (Univ. of Houston); *Associate Professor of Applied Health and Educational Psychology*; 1983, 1979.
- GEORGE OLNEY CARNEY, B.A. (Central Missouri State College), M.A. (ibid), Ph.D. (O.S.U.); *Regents Professor of Geography*; 1981, 1968.
- NANCY J. CARPENTER, B.A. (Albion College), M.S. (Univ. of Michigan), Ph.D. (ibid); *Adjunct Professor of Biochemistry and Microbiology*; OSU-COM; 1995.
- BRIAN J. CARTER, B.S. (Rutgers Univ.), M.S. (Pennsylvania State Univ.), Ph.D. (ibid); *Professor of Plant and Soil Sciences*; 1993, 1982.
- SALLY CARTER, B.S. (Arkansas Tech. Univ.), M.Ed. (Univ. of Arkansas); Ed.S. (ibid), Ed.D. (ibid); *Associate Professor of Curriculum and Educational Leadership*; 1995, 1990.
- TRACY S. CARTER, B.S. (Iowa State Univ.), M.S. (Michigan State Univ.), Ph.D. (ibid); *Adjunct Associate Professor of Zoology*; 1985, 1978.
- BRETT F. CARVER, B.S. (Univ. of Georgia), M.S. (North Carolina State Univ.), Ph.D. (ibid); *Professor of Plant and Soil Sciences*; 1992, 1985.
- KENNETH E. CASE, B.S.E.E. (O.S.U.), M.S.I.E. (ibid), Ph.D. (ibid); P.E.; *Regents Professor of Industrial Engineering and Management*; 1997, 1975.
- CHRISTINE M. CASHEL, B.S. (Russell Sage College), M.S. (ibid), Ed.D. (Temple Univ.); *Professor and Assistant Head of the School of Applied Health and Educational Psychology*; 1990, 1985.
- KATHRYN CASTLE, B.A. (Univ. of Oklahoma), M.A. (Emory Univ.), Ed.D. (Univ. of Virginia); *Professor of Curriculum and Educational Leadership*; 1985, 1975.
- IBRAHIM CEMEN, B.S. (Istanbul Univ.), M.S. (Ohio State Univ.), Ph.D. (Pennsylvania State Univ.); *Professor of Geology*; 1987, 1984.
- GOUTAM CHAKRABORTY, B. Tech. (Indian Institute of Technology, Kharagpur), M.S. (Univ. of Iowa), Ph.D. (ibid); *Associate Professor of Marketing*; 1991.
- FRANK W. CHAMBERS, B.S.M.E. (Purdue Univ.), M.S.M.E. (Univ. of Pennsylvania), Ph.D. (Purdue Univ.); P.E.; *Associate Professor of Mechanical and Aerospace Engineering*; 1989.
- JOHN P. CHANDLER, B.S. (Lehigh Univ.), M.S. (Indiana Univ.), Ph.D. (ibid); *Professor of Computer Science*; 1991, 1970.
- JOHN M. CHANEY, B.A. (Univ. of Central Oklahoma), M.S. (Univ. of Missouri), Ph.D. (ibid); *Associate Professor of Psychology*; 1996, 1991.
- JEN-TSEH CHANG, B.A. (Tsing-Hua Univ.), Ph.D. (Harvard Univ.); *Associate Professor of Mathematics*; 1993, 1988.
- CIDA S. CHASE, B.A. (Kansas State Teachers College), M.S. (ibid), M.A. (Univ. of Oklahoma), Ph.D. (ibid); *Professor of Foreign Languages and Literatures*; 1992, 1977.
- LANNY GORDON CHASTEEN, B.B.A. (Univ. of Texas), M.B.A. (Univ. of Arkansas), Ph.D. (ibid); *Arthur Anderson Centennial Professor and Head of the School of Accounting*; 1987, 1969.
- JAMES RICHARD CHOIKE, B.S. (Univ. of Detroit), M.S. (Purdue Univ.), Ph.D. (Wayne State Univ.); *Professor of Mathematics*; 1983, 1970.
- CYRIL R. CLARKE, B.V.Sc. (Univ. of Pretoria, RSA), Ph.D. (Louisiana State Univ.); *Professor of Veterinary Anatomy, Pathology and Pharmacology, Diplomate (American College of Veterinary Clinical Pharmacology)*; 1996, 1987.
- WILLIAM WADE CLARKSON, B.S.E. (Duke Univ.), M.S. (Clemson Univ.), Ph.D. (Cornell Univ.); P.E.; *Associate Professor of Civil and Environmental Engineering*; 1990, 1987.
- P. LARRY CLAYPOOL, B.S. (Southwest Missouri State College), M.A. (Univ. of Missouri), Ph.D. (Texas A & M Univ.); *Professor of Statistics*; 1979, 1967.
- KENNETH D. CLINKENBEARD, B.S. (Univ. of California), Ph.D. (Johns Hopkins Univ.), D.V.M. (Univ. of California); *Professor of Veterinary Anatomy, Pathology and Pharmacology*; 1990, 1986.
- ARCHIE C. CLUTTER, B.S. (Iowa State Univ.), M.S. (Univ. of Nebraska, Lincoln), Ph.D. (ibid); *Associate Professor of Animal Science*; 1992, 1987.
- JAMES W. COGDELL, B.S. (Yale Univ.), Ph.D. (ibid); *Professor of Mathematics*; 1988.
- JANET C. COLE (HENDERSON), B.S. (South Dakota State Univ.), M.S. (Kansas State Univ.), Ph.D. (Texas A & M Univ.); *Professor of Horticulture and Landscape Architecture*; 1993, 1988.
- FRANK L. COLLINS, B.S. (N.W. State Univ. of Louisiana), M.S. (ibid), Ph.D. (Auburn Univ.); *Professor of Psychology*; 1989.
- THOMAS C. COLLINS, B.S. (Univ. of Georgia), M.S. (ibid), Ph.D. (Univ. of Florida), M.S. (George Washington Univ.); *Professor of Physics and Vice President for Research*; 1991.

- A. W. CONFER, B.S. (O.S.U.), M.S. (Ohio State Univ.), D.V.M. (O.S.U.), Ph.D. (Univ. of Missouri); *Professor and Head of the Department of Veterinary Anatomy, Pathology and Pharmacology, and Food Animal Research Endowed Chair; Diplomate (American College of Vet Pathologists);* 1985, 1981.
- ROBERT S. CONRAD, B.S. (O.S.U.), Ph.D. (Univ. of Oklahoma); *Professor and Chairman of the Department of Biochemistry and Microbiology;* OSU-COM; 1982, 1974.
- JOHN BRIAN CONREY, B.A. (Univ. of Santa Clara), Ph.D. (Univ. of Michigan); *Professor of Mathematics;* 1987, 1983.
- KENNETH E. CONWAY, B.A. (State Univ. of New York College, Potsdam), M.S. (State Univ. of New York College, Syracuse), Ph.D. (Univ. of Florida); *Professor of Entomology and Plant Pathology;* 1987, 1978.
- GLENNIS M. COUCHMAN, B.S. (Kansas State Univ.), M.S. (ibid), Ph.D. (O.S.U.); *Associate Professor of Family Relations and Child Development;* 1994, 1989.
- RICK L. COWELL, B.S. (O.S.U.), D.V.M. (ibid), M.S. (ibid); *Professor of Veterinary Anatomy, Pathology and Pharmacology; Diplomate (American College of Vet Pathologists);* 1989, 1985.
- MARK COX, B.A. (DePauw Univ.), M.F.A. (Vermont College); *Associate Professor of English;* 1995, 1991.
- BRUCE CRAUDER, B.A. (Haverford College), M.A. (Columbia Univ.), Ph.D. (ibid); *Professor of Mathematics, and Associate Dean for Instruction, College of Arts and Sciences;* 1990, 1986.
- JOHN R. CROSS, B.A. (O.S.U.), M.A. (Univ. of Tulsa), Ph.D. (Univ. of Missouri, Columbia); *Associate Professor of Sociology;* 1990, 1985.
- NICHOLAS L. CROSS, B.S. (Florida State Univ.), Ph.D. (Rockefeller Univ.); *Professor of Veterinary Anatomy, Pathology and Pharmacology;* 1996, 1991.
- LARRY A. CROWDER, B.S. (Eastern Illinois Univ.), M.S. (Purdue Univ.), Ph.D. (ibid); *Professor of Entomology and Plant Pathology;* 1985, 1984.
- GERRIT CUPERUS, B.S. (Univ. of Minnesota, Morris), M.S. (Univ. of Minnesota, St. Paul), Ph.D. (ibid); *Regents Professor of Entomology and Plant Pathology;* 1992, 1982.
- KEVIN M. CURRIER, B.S. (State Univ. of New York, Albany), M.A. (ibid), Ph.D. (ibid); *Associate Professor of Economics and Legal Studies in Business;* 1989, 1984.
- JOHN C. CUSHMAN, B.S. (Ursinus College), M.S. (Rutgers Univ.), Ph.D. (ibid); *Associate Professor of Biochemistry and Molecular Biology;* 1998, 1995.
- JOHN P. DAMICONE, B.S. (Univ. of Rhode Island), M.S. (Univ. of Massachusetts), Ph.D. (ibid); *Associate Professor of Entomology and Plant Pathology;* 1995, 1990.
- ROBERT EMMETT DARCY, B.A. (Univ. of Wisconsin), M.A. (Univ. of Kentucky), Ph.D. (ibid); *Regents Professor of Political Science;* 1991, 1977.
- CHARLES ROBERT DAVIS, B.S. (Univ. of Oklahoma), M.Ed. (ibid), Ph.D. (ibid); *Associate Professor of Curriculum and Educational Leadership and Director of External Teaching Centers;* 1988, 1978.
- MARCIA M. DICKMAN, B.S. (Purdue Univ.), M.S. (ibid), Ph.D. (ibid); *Associate Professor of Educational Studies, and Assistant to the Vice President for Student Affairs;* 1991, 1986.
- MICHAEL R. DICKS, B.S. (California State Polytechnic Univ.), M.S. (Univ. of Missouri, Columbia), Ph.D. (ibid); *Associate Professor of Agricultural Economics;* 1992, 1989.
- JACK W. DILLWITH, B.S. (California State Polytechnic Univ.), M.S. (St. Mary's Univ.), Ph.D. (Univ. of Nevada, Reno); *Professor of Entomology;* 1991, 1986.
- GEORGE SUMTER DIXON, JR., B.S. (Univ. of Georgia), M.S. (ibid), Ph.D. (ibid); *Professor of Physics and Director of Proposal Development and Special Projects;* 1985, 1970.
- RICHARD A. DODDER, B.A. (Univ. of Kansas), M.A. (ibid), Ph.D. (ibid); *Professor of Sociology;* 1980, 1969.
- GERALD ARTHUR DOEKSEN, B.S. (South Dakota State Univ.), M.S. (O.S.U.), Ph.D. (ibid); *Regents Professor of Agricultural Economics;* 1986, 1978.
- JEAN M. D'OFFAY, B.V.S. (Univ. of Pretoria, South Africa), Dip.T.V.M. (Edinburgh, Scotland), Ph.D. (Univ. of Missouri, Columbia); *Associate Professor of Veterinary Infectious Diseases and Physiology;* 1991, 1986.
- JOHN MARTIN DOLE, B.S. (Michigan State Univ.), Ph.D. (Univ. of Minnesota); *Associate Professor of Horticulture and Landscape Architecture;* 1994, 1989.
- HOWARD GLEN DOLEZAL, B.S. (Texas A & M Univ.), M.S. (ibid), Ph.D. (Colorado State Univ.); *Professor of Animal Science;* 1988, 1983.
- PATRICK B. DORR, B.S. (O.S.U.), M.S. (ibid), Ph.D. (North Texas State Univ.); *Professor of Accounting;* 1989, 1977.
- RONALD L. DOUGHERTY, B.S. (Univ. of Missouri, Rolla), M.S. (ibid), Ph.D. (ibid); *Professor of Mechanical and Aerospace Engineering;* 1992, 1985.
- DAMONA G. DOYE, B.S. (O.S.U.), M.S. (ibid), Ph.D. (ibid); *Associate Professor of Agricultural Economics;* 1990, 1986.
- DAVID DUVAL, B.A. (Univ. of California, Berkeley), M.A. (San Jose State Univ.), Ph.D. (Univ. of Colorado); *Professor of Zoology;* 1995.
- RICHARD EBERLE, B.A. (Univ. of California, Los Angeles), Ph.D. (Baylor College of Medicine); *Professor of Veterinary Infectious Diseases and Physiology and Associate Dean for Research, College of Veterinary Medicine;* 1990.
- LEA L. EBRO, B.S. (Univ. of the Philippines), B.S. (ibid), M.S. (Iowa State Univ.), Ph.D. (Ohio State Univ.); *Professor of Nutritional Sciences;* 1984, 1978.
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- CHARLES G. SANNY, B.S. (Oklahoma Baptist Univ.), Ph.D. (Univ. of Oklahoma); *Professor of Biochemistry and Microbiology*; OSU-COM; 1989, 1985.
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- JOHN R. SAUER, B.S. (St. John's Univ.), M.S. (New Mexico Highlands Univ.), Ph.D. (Tulane Univ.); *Regents and Sarkeys Distinguished Professor of Entomology and Plant Pathology*; 1987, 1969.
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- AVDHESH TYAGI, B.S. (Univ. of Allahabad), M.S. (Univ. of Roorkee), Ph.D. (Univ. of California, Berkeley); P.E.; *Associate Professor of Civil and Environmental Engineering*; 1980.
- RONALD J. TYRL, B.A. (Park College), M.S. (Oregon State Univ.), Ph.D. (ibid); *Professor of Botany*; 1977, 1972.
- DAVID C. ULLRICH, B.A. (Univ. of Wisconsin, Madison), M.A. (ibid), Ph.D. (ibid); *Professor of Mathematics*; 1996, 1983.
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- LINDA YU, B.S. (National Taiwan Univ.), M.S. (Univ. of Illinois, Urbana), Ph.D. (ibid); *Professor of Biochemistry and Molecular Biology*; 1988, 1981.
- AKIHIKO YUKIE, B.S. (Univ. of Tokyo), M.S. (ibid), Ph.D. (Harvard Univ.); *Associate Professor of Mathematics*; 1989, 1987.
- ROGER C. ZIERAU, B.S. (Trinity College), Ph.D. (Univ. of California, Berkeley); *Associate Professor of Mathematics*; 1993, 1988.
- WILLIAM G. ZIKMUND, B.S. (Univ. of Colorado), M.S. (Southern Illinois Univ.), D.B.A. (Univ. of Colorado); *Professor of Marketing*; 1980, 1972.
- FARREL J. ZWERNEMAN, B.S.C.E. (Univ. of Texas), M.S.C.E. (ibid), Ph.D. (ibid); P.E.; *Centennial Professor of Civil and Environmental Engineering*; 1990, 1985.
- CHARLES M. BACON, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Michigan State Univ.); P.E.; *Professor Emeritus of Electrical and Computer Engineering*; 1994, 1966.
- DANIEL DELANO BADGER, B.S. (Virginia Polytechnic Inst.), M.S. (O.S.U.), Ph.D. (Michigan State Univ.); *Professor Emeritus of Agricultural Economics*; 1990, 1964.
- JOHN THOMAS BALE, JR., B.S. (O.S.U.), M.S. (ibid), Ed.D. (Univ. of Oklahoma); *Regents Service Professor Emeritus of Administrative Services*; 1993, 1967.
- DONALD J. BANKS, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Georgia); *Professor Emeritus of Agronomy*; 1990, 1966.
- GEORGE LEWIS BARNES, B.S. (Michigan State Univ.), M.S. (ibid), Ph.D. (Oregon State Univ.); *Professor Emeritus of Entomology and Plant Pathology*; 1986, 1958.
- EDDIE BASLER, JR., B.S. (Univ. of Oklahoma), M.S. (ibid), Ph.D. (Washington Univ.); *Professor Emeritus of Botany*; 1986, 1957.
- BENNETT LEE BASORE, B.S. (O.S.U.), Sc.D. (Massachusetts Inst. of Technology); P.E.; *Professor Emeritus of Electrical and Computer Engineering and Head Emeritus of the School of General Engineering*; 1990, 1967.
- DAVID GEORGE BATCHELDER, B.S. (Kansas State Univ.), M.S. (O.S.U.); P.E.; *Professor Emeritus of Biosystems and Agricultural Engineering*; 1985, 1955.
- CALVIN GREENWOOD BEAMES, JR., B.A. (New Mexico Highlands Univ.), M.S. (ibid), Ph.D. (Univ. of Oklahoma); *Professor Emeritus of Zoology*; 1990, 1962.
- BERNARD R. BELDEN, B.Ed. (State Univ. of New York, Plattsburg), M.A. (New York Univ.), Ph.D. (Syracuse Univ.); *Professor Emeritus of Curriculum and Educational Leadership*; 1987, 1959.
- KENNETH JOHN BELL, B.S. (Case Inst. of Technology), M.Ch.E. (Univ. of Delaware), Ph.D. (ibid); P.E.; *Regents Professor Emeritus of Chemical Engineering; Kerr Mcgee Chair in Chemical Engineering*; 1996, 1961.
- DAVID SHELLEY BERKELEY, A.B. (Juanita College), A.M. (Harvard Univ.), Ph.D. (ibid); *Professor Emeritus of English*, 1987, 1948.
- HANS RUDOLF BILGER, Ph.D. (Univ. of Basel); *Professor Emeritus of Electrical and Computer Engineering*; 1997, 1963.
- LEO VERNON BLAKLEY, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Chicago); *Professor Emeritus of Agricultural Economics*; 1986, 1947.
- LAWRENCE L. BOGER, B.S. (Purdue Univ.), M.A. (Michigan State Univ.), Ph.D. (ibid); *Professor Emeritus of Agricultural Economics and President Emeritus*; 1988, 1977.
- JAMES H. BOGGS, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Purdue Univ.); *Professor Emeritus of Mechanical and Aerospace Engineering and Vice-President Emeritus for Academic Affairs and Research*; 1991, 1943.
- LLOYD ALLEN BRINKERHOFF, B.S. (Univ. of Arizona), M.S. (ibid), Ph.D. (Univ. of Minnesota); *Professor Emeritus of Entomology and Plant Pathology*; 1978, 1948.
- HARRY KERN BROBST, A.B. (Brown Univ.), M.A. (Univ. of Pennsylvania), Ph.D. (ibid); *Professor Emeritus of Psychology*; 1974, 1946.
- LARRY TODD BROWN, B.A. (Univ. of Kentucky), Ph.D. (Princeton Univ.); *Professor Emeritus of Psychology*; 1990, 1961.
- RALPH GUPTON BUCKNER, A.B. (Westminster College), B.S. (Kansas State Univ.), D.V.M. (ibid), M.S. (Univ. of Oklahoma); *Professor Emeritus of Veterinary Pathology*; 1986, 1956.
- GEORGE BURROWS, D.V.M. (University of California-Davis), Ph.D. (Washington State Univ.); *Professor Emeritus of Anatomy, Pathology and Pharmacology; Diplomate (American Board of Vet Toxicology)*.
- LINVILLE JOHN BUSH, B.S. (Univ. of Kentucky), M.S. (Ohio State Univ.), Ph.D. (Iowa State Univ.); *Professor Emeritus of Animal Science*; 1987, 1958.
- JACK EDWARD BYNUM, B.A. (Pacific Union College), M.A. (Andrews Univ.), M.S. (Southern Oregon College), Ph.D. (Washington State Univ.); *Professor Emeritus of Sociology*; 1993, 1972.
- H. STEPHEN CALDWELL, B.A. (Hanover College), M.S. (DePauw Univ.), Ph.D. (Purdue Univ.); *Professor Emeritus of Psychology*; 1995, 1971.
- WILLIAM GEORGE CHAMBERLAIN, B.Arch. (O.S.U.), M.Arch (ibid); Registered Architect (Oklahoma, Arkansas; A.I.A., NCARB); *Professor Emeritus of Architecture*; 1988, 1947.
- IVAN CHAPMAN, B.A. (San Francisco State College), M.S. (ibid), Ph.D. (Univ. of Missouri); *Professor Emeritus of Sociology*; 1985, 1969.
- BOBBY L. CLARY, B.S. (Univ. of Georgia), Ph.D. (O.S.U.); P.E.; *Professor Emeritus of Agricultural Engineering*; 1992, 1966.
- HAROLD A. COONRAD, B.S. (O.S.U.), M.S. (ibid), Ed.D. (Indiana Univ.); *Professor Emeritus of Business Education and Administration*; 1979, 1948.
- R. JEWELL CRABTREE, B.S. (Univ. of Missouri), M.S. (Iowa State Univ.), Ph.D. (Michigan State Univ.); *Associate Professor Emeritus of Agronomy*; 1990, 1975.
- JERRY JOSEPH CROCKETT, B.S. (Northwestern State College), M.S. (Fort Hays Kansas State College), Ph.D. (Univ. of Oklahoma); *Professor Emeritus of Botany*; 1988, 1968 (1962-1968).
- LAVOY I. CROY, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Illinois); *Professor Emeritus of Agronomy*; 1990, 1955.
- CLARENCE M. CUNNINGHAM, B.S. (Texas A & M Univ.), M.S. (Univ. of California), Ph.D. (Ohio State Univ.); *Associate Professor Emeritus of Chemistry*; 1985, 1954.
- WILLIAM P. DAWKINS, B.A. (Rice Institute), B.S.C.E. (ibid), M.S. (ibid), Ph.D. (Univ. of Illinois, Urbana); P.E.; *Professor Emeritus of Civil and Environmental Engineering*; 1994, 1969.
- OTIS CLIFFORD DERMER, B.S. (Bowling Green State College), Ph.D. (Ohio State Univ.); *Regents Service Professor Emeritus of Chemistry*; 1975, 1934.
- JOSEPH PAUL DEVLIN, B.S. (Regis College), Ph.D. (Kansas State Univ.); *Professor Emeritus of Chemistry*; 1996, 1961.
- RICHARD NORMAN DEVRIES, B.S. (Univ. of Nebraska), M.S. (ibid), Ph.D. (Utah State Univ.); *Professor Emeritus of Civil Engineering*; 1987, 1969.
- JUDITH SHELTON DOBSON, B.S. (Univ. of Wisconsin), M.S. (Univ. of Nebraska), Ph.D. (Univ. of Wyoming); *Professor Emeritus of Applied Behavioral Studies*; 1994, 1971.
- RUSSELL LEE DOBSON, B.A. (Northeastern State College, Oklahoma), M.T. (ibid), Ed.D. (Univ. of Oklahoma); *Professor Emeritus of Curriculum and Instruction*; 1993, 1967.

Full Members Emeriti

- DONALD CLAYTON ABBOTT, B.S. (Kansas State Univ.), M.S. (ibid), Ph.D. (ibid); *Professor Emeritus of Biochemistry*; 1986, 1954.
- BETTY ABERCROMBIE, B.S. (O.S.U.), M.Ed. (Phillips Univ.), Ed.D. (O.S.U.); *Professor Emeritus of Health, Physical Education and Leisure*; 1975, 1970.
- FREDERICK GENE ACUFF, B.A. (Manhattan Bible College), M.S. (Kansas State Univ.), Ph.D. (Univ. of Missouri); *Professor Emeritus of Sociology*; 1988, 1962.
- THEODORE LEE AGNEW, B.A. (Univ. of Illinois), M.A. (ibid), M.A. (Harvard Univ.), Ph.D. (ibid); *Professor Emeritus of History*; 1984, 1947.
- DONALD EMERSON ALLEN, B.S. (Ohio State Univ.), M.A. (ibid); *Professor Emeritus of Sociology*; 1969, 1967.
- WILTON T. ANDERSON, B.S. (Northwestern State College), M.C.E. (Univ. of Oklahoma), Ed.D. (Univ. of Colorado); *Professor and Head Emeritus of the Department of Accounting*; 1960.
- DALE ELLSWORTH ARMSTRONG, B.A. (Century College), M.P.A. (Univ. of Texas), Ph.D. (ibid); *Associate Professor Emeritus of Accounting*; 1990, 1965.

- WILLIAM A. DREW, A.B. (Marietta College), Ph.D. (Michigan State Univ.); *Professor Emeritus of Entomology*; 1990, 1958.
- CECIL W. DUGGER, B.S. (Texas A & M Univ.), M.Ed. (ibid), Ed.D. (O.S.U.); *Professor Emeritus of Aviation and Space Education*; 1995, 1965.
- NORMAN NEVILL DURHAM, B.S. (North Texas State Univ.), M.S. (ibid), Ph.D. (Univ. of Texas); *Professor Emeritus of Microbiology and Molecular Genetics*; 1995, 1954.
- WILLIAM HARRISON EASTON, B.S. (Univ. of Florida), M.S. (Univ. of Minnesota); *Professor Emeritus of Mechanical and Aerospace Engineering*; 1969, 1942.
- RICHARD W. EGGERMAN, B.A. (Baylor Univ.), M.A. (Univ. of Illinois, Urbana), Ph.D. (ibid); *Professor Emeritus of Philosophy*; 1998, 1970.
- RAYMOND D. EIKENBARY, B.S. (O.S.U.), M.S. (Clemson Univ.), Ph.D. (ibid); *Professor Emeritus of Entomology and Plant Pathology*; 1994, 1964.
- EDMUND JULIUS EISENBRAUN, B.S. (Univ. of Wisconsin), M.S. (ibid), Ph.D. (ibid); *Regents Professor Emeritus of Chemistry*; 1987, 1962.
- BERNARD WILLIAM EISSENSTAT, B.S. (Univ. of Rochester), M.S. (Univ. of Iowa), Ph.D. (Univ. of Kansas); *Professor Emeritus of History*; 1986, 1969.
- HAMED K. EL DIN, B.S. (Cairo Univ.), M.S. (California Inst. of Technology), Ph.D. (Univ. of Iowa); P.E.; *Professor Emeritus of Industrial Engineering and Management*; 1988, 1967.
- CARL B. ESTES, B.S. (Univ. of Oklahoma), M.S. (O.S.U.), Ph.D. (ibid); P.E.; *Professor Emeritus and Head Emeritus of the School of Industrial Engineering and Management*; 1991, 1969.
- I. DWAIN EUBANKS, B.S. (Univ. of Texas), Ph.D. (ibid); *Professor Emeritus of Chemistry*; 1992, 1967.
- LLOYD C. FAULKNER, D.V.M. (Colorado State Univ.), Ph.D. (Cornell Univ.); *Professor Emeritus of Physiological Science and Associate Dean Emeritus for Research and Graduate Studies, College of Veterinary Medicine*; 1992, 1981.
- EARL JOHN FERGUSON, B.S. (Texas A & M Univ.), M.S. (O.S.U.), Ph.D. (ibid); *Professor Emeritus of Industrial Engineering and Management*; 1986, 1956.
- LEROY HENRY FISCHER, B.A. (Univ. of Illinois), M.A. (ibid), Ph.D. (ibid); *Oppenheimer Professor Emeritus of History*; 1984, 1946.
- DONALD D. FISHER, B.A. (Washington State Univ.), M.A. (ibid), Ph.D. (Stanford Univ.); *Regents Service Professor Emeritus of Computing and Information Science*; 1988, 1969.
- ERNEST CHESTER FITCH, JR., B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Oklahoma); *Professor Emeritus of Mechanical and Aerospace Engineering*; 1984, 1953.
- ROBERT CARL FITE, B.A. (Central State College), M.S. (O.S.U.), Ph.D. (Northwestern Univ.); *Professor Emeritus of Geography and Director Emeritus of Programs for Professionals*; 1946.
- JOHN LEROY FOLKS, B.A. (O.S.U.), M.S. (ibid), Ph.D. (Iowa State Univ.); *Regents Service Professor Emeritus of Statistics*; 1998, 1961.
- JOHN RICHARD FRANZMANN, B.S. (Univ. of Connecticut), M.S. (ibid), Ph.D. (O.S.U.); *Professor Emeritus of Agricultural Economics*; 1987, 1964.
- ROBERT DAVID FREEMAN, B.S. (North Georgia College), M.S. (Purdue Univ.), Ph.D. (ibid); *Professor Emeritus of Chemistry*; 1988, 1955.
- DONALD KARL FROMME, B.M. (Boston Univ.), Ph.D. (Univ. of Iowa); *Professor Emeritus of Psychology*; 1991, 1967.
- RONDAL ROSS GAMBLE, B.S. (Central State College, Oklahoma), M.Ed. (Adams State College), Ph.D. (Univ. of Oklahoma); *Professor Emeritus of Applied Health and Educational Psychology*; 1997, 1966.
- LLOYD LEE GARRISON, B.S. (State Teachers College, Missouri), M.Ed. (Univ. of Missouri), Ed.D. (ibid); *Regents Service Professor Emeritus of Administrative Services and Business Education*; 1986, 1951.
- JAMES ELMER GARTON, B.S. (O.S.U.), M.S. (Utah State Univ.), Ph.D. (Univ. of Missouri); P.E.; *Professor Emeritus of Biosystems and Agricultural Engineering*; 1985, 1949.
- LYNN LAMARR GEE, A.B. (Brigham Young Univ.), M.S. (Colorado A & M College), Ph.D. (Univ. of Wisconsin); *Professor Emeritus of Microbiology and Molecular Genetics; Head Emeritus of the Department of Microbiology*; 1977, 1954.
- ROBERT KARL GHOLSON, B.A. (Univ. of Chicago), B.S. (Univ. of Illinois), Ph.D. (ibid); *Professor Emeritus of Biochemistry and Molecular Biology*; 1993, 1962.
- ROY GLADSTONE, B.S. (Univ. of Illinois), M.S. (ibid), Ph.D. (ibid); *Professor Emeritus of Psychology*; 1980, 1949.
- BRYAN P. GLASS, A.B. (Baylor Univ.), M.S. (Texas A & M Univ.), Ph.D. (O.S.U.); *Professor Emeritus of Zoology and Director Emeritus of the University Museum*; 1985, 1946.
- BERTIS LAMON GLENN, D.V.M. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Oklahoma); *Professor Emeritus of Anatomy, Pathology and Pharmacology*; 1984, 1953.
- GEORGE GORIN, B.A. (Brooklyn College), M.A. (Princeton Univ.), Ph.D. (ibid); *Professor Emeritus of Chemistry*; 1990, 1955.
- DONALD W. GRACE, B.S. (Carnegie Inst. of Technology), M.S. (ibid), M.S. (Stanford Univ.), Ph.D. (ibid); *Professor Emeritus of Computing and Information Sciences*; 1987, 1970.
- FENTON GRAY, B.S. (Univ. of Utah), Ph.D. (Ohio State Univ.); *Professor Emeritus of Plant and Soil Sciences*; 1982, 1951.
- VICKI GREEN, M.A. (Univ. of California, Berkeley), M.A. (ibid), Ph.D. (Colorado State Univ.); *Professor Emeritus of Psychology*; 1995, 1974.
- KATHRYN MOORE GREENWOOD, B.S. (O.S.U.), M.S. (New York Univ.), Ed.D. (O.S.U.); *Professor Emeritus of Clothing, Textiles and Merchandising*; 1985, 1955.
- GEORGE ALEXANDER GRIES, A.B. (Miami Univ.), M.S. (Kansas State Univ.), Ph.D. (Univ. of Wisconsin); *Professor Emeritus of Botany*; 1982, 1968.
- MARY M. GRULA, B.A. (Univ. of Minnesota), Ph.D. (ibid); *Assistant Professor Emeritus of Microbiology and Molecular Genetics*; 1990, 1962.
- JOHN JAMES GUENTHER, B.S. (Louisiana State Univ.), M.S. (ibid), Ph.D. (Texas A & M Univ.); *Professor Emeritus of Animal Science*; 1987, 1958.
- RAYMOND N. HABIBY, B.A. (American Univ.), L.L.B. (Univ. of Jerusalem), M.A.P.A. (Univ. of Minnesota), Ph.D. (ibid); *Professor Emeritus of Political Science*; 1988, 1965.
- JAKIE ALEXANDER HAIR, B.S. (Clemson Univ.), M.S. (ibid), Ph.D. (Virginia Polytechnic Inst.); *Regents Professor Emeritus of Entomology and Plant Pathology*; 1993, 1967.
- B. CURTIS HAMM, B.S. (O.S.U.), M.B.A. (ibid), Ph.D. (Univ. of Texas); *Professor Emeritus of Marketing*; 1990, 1966.
- JOHN DAVID HAMPTON, B.G.D. (Omaha Univ.), M.S. (Trinity Univ.), Ph.D. (Univ. of Texas); *Professor Emeritus of Applied Behavioral Studies*; 1983, 1967.
- BERTIL LENNART HANSON, B.S. (Northwestern Univ.), M.A. (Univ. of Chicago), Ph.D. (ibid); *Professor Emeritus of Political Science*; 1993, 1959.
- ARTHUR E. HARRIMAN, A.B. (Bucknell Univ.), Ph.D. (Cornell Univ.); *Professor Emeritus of Psychology*; 1990, 1966.
- AIX BANARD HARRISON, B.S. (Univ. of Illinois), M.S. (ibid), Ph.D. (Michigan State Univ.); *Professor Emeritus of Health, Physical Education and Leisure*; 1985, 1950.
- RICHARD DOUGLAS HECOCK, B.A. (Albion College), M.A. (Wayne State Univ.), Ph.D. (Clark Univ.); *Regents Service Professor Emeritus of Geography*; 1993, 1969.
- BOB HELM, B.A. (Wichita State Univ.), M.A. (ibid), Ph.D. (State Univ. of New York, Albany); *Associate Professor Emeritus of Psychology*; 1995, 1972.
- HERBERT JAMES HENDERSON, A.B. (Boston Univ.), M.A. (Columbia Univ.), Ph.D. (ibid); *Professor Emeritus of History*; 1970, 1966.
- ROBERT L. HENDRICKSON, B.S. (Kansas State Univ.), M.S. (ibid), Ph.D. (Univ. of Missouri); *Professor Emeritus of Animal Science*; 1986, 1956.
- LARRY HOCHHAUS, B.S. (Iowa State Univ.), M.A. (ibid), Ph.D. (ibid); *Professor Emeritus of Psychology*; 1996, 1971.
- ERNEST M. HODNETT, B.S. (Univ. of Florida), M.S. (ibid), Ph.D. (Purdue Univ.); *Professor Emeritus of Chemistry*; 1979, 1945.
- JOSEPHINE HOFFER, B.S. (OSU), M.S. (ibid), Ed.D. (ibid); *Associate Professor Emeritus of Family Relations and Child Development*; 1965, 1948.
- WILLIAM L. HUGHES, B.S. (South Dakota School of Mines and Technology), M.S. (Iowa State Univ.), Ph.D. (ibid); *Professor Emeritus of Electrical and Computer Engineering and Director Emeritus of Engineering Energy Laboratory*; 1986, 1960.
- HAZEL INGERSOLL, B.S. (Univ. of Nebraska), M.A. (ibid), Ph.D. (Ohio State Univ.); *Professor Emeritus of Family Relations and Child Development*; 1973, 1950.
- ROBERT LEE JANES, B.S. (California Inst. of Technology), M.S. (ibid), Ph.D. (Illinois Inst. of Technology); P.E.; *Professor Emeritus of Civil Engineering*; 1980, 1963.
- WILLIAM ELBERT JAYNES, B.S. (Ohio State Univ.), M.A. (ibid), Ph.D. (ibid); *Professor Emeritus of Psychology*; 1988, 1967.
- HERBERT M. JELLEY, B.S. (Univ. of Minnesota), Ed.M. (Univ. of Cincinnati), Ed.D. (ibid); *Professor Emeritus of Administrative Services and Business Education*; 1988, 1970.
- GEORGE FREDERICK JEWSBURY, B.A. (Mankato State College), M.A. (Univ. of Washington), Ph.D. (ibid); *Professor Emeritus of History*; 1985, 1967.
- JOHN JOBE, B.S. (Univ. of Tulsa), M.S. (O.S.U.), Ph.D. (ibid); *Regents Professor Emeritus of Mathematics; Noble Professor of Technology Enhanced Learning*; 1994, 1964.

- THOMAS D. JOHNSTEN, B.S. (Kansas State Teachers College), M.S. (Fort Hays Kansas State College), Ed.D. (Univ. of Nebraska); *Professor Emeritus of Curriculum and Instruction*; 1973, 1969.
- ERIC WYNN JONES, M.R.C.V.S. (Royal Veterinary College, London), Ph.D. (Cornell Univ.); *Professor Emeritus of Veterinary Medicine and Surgery and Director Emeritus of Clinical Research*; 1981, 1954.
- RANDALL J. JONES, B.S. (O.S.U.), M.S. (Univ. of Wisconsin), Ph.D. (ibid); *Professor Emeritus of Agronomy and Associate Dean Emeritus of Resident Instruction in Agriculture*; 1981, 1951.
- HELEN ELAINE JORDAN, B.A. (Bridgewater College), M.S. (Virginia Polytechnic Inst.), D.V.M. (Univ. of Georgia), Ph.D. (ibid); *Professor Emeritus of Veterinary Parasitology, Microbiology, and Public Health*; 1992, 1969.
- D. ELAINE JORGENSON, B.A. (Northern Colorado Univ.), M.A. (ibid), Ed.D. (O.S.U.); *Professor Emeritus of Family Relations and Child Development*; 1992, 1968.
- ROBERT B. KAMM, B.A. (Univ. of Northern Iowa), M.A. (Univ. of Minnesota), Ph.D. (ibid); *University Professor Emeritus and President Emeritus of Oklahoma State University*; 1988, 1958.
- THOMAS ALLAN KARMAN, B.A. (Albion College), M.A. (Harvard Univ.), Ph.D. (Univ. of Toledo); *Professor Emeritus of Educational Administration and Higher Education*; 1996, 1972.
- ALLEN EUGENE KELLY, B.S. (Texas A & M Univ.), M.E. (ibid), Ph.D. (Univ. of Texas); P.E.; *Professor Emeritus of Civil and Environmental Engineering; Associate Dean for Research College of Engineering, Architectural and Technology*; 1995, 1970.
- DOUGLAS CHARLES KENT, B.S. (Univ. of Nebraska), M.S. (ibid), Ph.D. (Iowa State Univ.); *Professor Emeritus of Geology*; 1995, 1969.
- JAMES PERRY KEY, B.S. (Univ. of Tennessee), M.Ed. (Virginia Polytechnic Inst.), Ed.D. (North Carolina State Univ.); *Professor Emeritus of Agricultural Education*; 1975, 1969.
- DON F. KINCANNON, B.A. (O.S.U.), M.S. (ibid), Ph.D. (ibid); P.E.; *Regents Professor Emeritus of Civil and Environmental Engineering*; 1987, 1966.
- CLYDE B. KNIGHT, B.S. (East Central State College, Oklahoma), M.S. (O.S.U.), Ed.D. (ibid); *Professor Emeritus of Occupational and Adult Education*; 1996, 1966.
- ROGER ERDMAN KOEPPE, A.B. (Hope College), M.S. (Univ. of Illinois), Ph.D. (ibid); *Professor Emeritus and Head Emeritus of the Department of Biochemistry*; 1990, 1959.
- IGNACY I. KOTLARSKI, Magister (M.S.) (Warsaw, Poland), Ph.D. (Univ. of Croclaw, Poland), Docent in Mathematics (Technical Univ. of Warsaw, Poland); *Professor Emeritus of Statistics*; 1993, 1969.
- JAMES N. LANGE, B.S. (Pennsylvania State Univ.), M.S. (ibid), Ph.D. (ibid); *Professor Emeritus of Physics*; 1995, 1965.
- JOHN EDWARD LANGWIG, B.S. (Univ. of Michigan), M.S. (State Univ. of New York, College of Forestry), Ph.D. (ibid); *Professor Emeritus of Forestry*; 1986, 1971.
- GLENN EDWIN LAUGHLIN, A.B. (O.S.U.), L.L.B. (Univ. of Oklahoma), S.J.D. (Univ. of Wisconsin); *Professor Emeritus of Administrative Services and Business Education*; 1947.
- FRANKLIN ROLLIN LEACH, B.A. (Hardin-Simmons Univ.), Ph.D. (Univ. of Texas); *Professor Emeritus of Biochemistry and Molecular Biology*; 1968, 1959.
- RICHARD H. LEFTWICH, A.B. (Southwestern College, Kansas), M.A. (Univ. of Chicago), Ph.D. (ibid); *Regents Professor Emeritus of Economics*; 1985, 1948.
- DANIEL DEE LINGELBACH, B.S. (Kansas State Univ.), M.S. (ibid), Ph.D. (O.S.U.); *Professor Emeritus of Electrical and Computer Engineering*; 1987, 1955.
- MITCHELL O. LOCKS, A.B. (Central YMCA College, Chicago), A.M. (Univ. of Chicago), Ph.D. (ibid); *Professor Emeritus of Management*; 1986, 1970.
- IDELLA LOHMANN, B.A. (O.S.U.), M.A. (ibid), Ed.D. (Univ. of Tulsa); P.E.; *Professor Emeritus of Curriculum and Instruction*; 1975, 1961.
- ROBERT ARNOLD LOWERY, B.S. (O.S.U.), M.S. (ibid), Ed.D. (Indiana Univ.); *Professor Emeritus of Administrative Services and Business Education*; 1975, 1944.
- NEIL ROBERT LUEBKE, B.A. (Midland College), M.A. (Johns Hopkins Univ.), Ph.D. (ibid); *Professor Emeritus of Philosophy*; 1998, 1961.
- J. Q. LYND, B.S. (Univ. of Arkansas), M.S. (Michigan State Univ.), Ph.D. (ibid); *Professor Emeritus of Agronomy*; 1992, 1951.
- ROBERT N. MADDOX, B.S. (Univ. of Arkansas), M.S. (Univ. of Oklahoma), Ph.D. (O.S.U.); P.E.; *Professor Emeritus of Chemical Engineering, Director, PPL, SHEE*; 1986, 1953.
- NORBERT R. MAHNKEN, A.B. (Southwestern College, Kansas), M.A. (Univ. of Nebraska), Ph.D. (ibid); *Professor Emeritus of History*; 1983, 1947.
- GILBERT J. MAINS, B.S. (Duquesne Univ.), Ph.D. (Univ. of California); *Professor Emeritus of Chemistry*; 1994, 1978.
- PHILLIP GORDON MANKE, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Texas A & M Univ.); P.E.; *Professor Emeritus of Civil Engineering*; 1988, 1959.
- ELIZABETH MAX, B.S. (Texas Woman's Univ.), M.L.S. (North Texas State Univ.), Ed.D. (O.S.U.); *Associate Professor Emeritus of Curriculum and Instruction*; 1978, 1970.
- CHARLES V. MAXWELL, B.S. (Univ. of Georgia), M.S. (ibid), Ph.D. (Univ. of Wisconsin); *Professor Emeritus of Animal Science*; 1996, 1968.
- KENNETH ALLEN MCCOLLOM, B.S. (O.S.U.), M.S. (Univ. of Illinois), Ph.D. (Iowa State Univ.); P.E.; *Professor Emeritus of Electrical and Computer Engineering and Dean Emeritus of the College of Engineering, Architecture and Technology*; 1986, 1964.
- JOHN C. McCULLERS, B.A. (Univ. of Texas, Austin), M.A. (ibid), Ph.D. (ibid); *Professor Emeritus of Family Relations and Child Development*; 1988, 1976.
- FRANK EUGENE MCFARLAND, B.A. (Baylor Univ.), M.A. (Columbia Univ.), Ed.D. (ibid); *Professor Emeritus of Applied Behavioral Studies and Director Emeritus of Student Services*; 1984, 1959.
- JULIA LOIS MCHALE, A.B. (Syracuse Univ.), Ph.D. (Univ. of Minnesota); *Professor Emeritus of Psychology*; 1985, 1960.
- WILFREDE E. McMURPHY, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Kansas State Univ.); *Professor Emeritus of Agronomy*; 1991, 1964.
- FAYE C. McQUISTON, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Purdue Univ.); P.E.; *Professor Emeritus of Mechanical and Aerospace Engineering*; 1990, 1962.
- DANIEL JUDSON MILBURN, B.S. (O.S.U.), M.A. (ibid), Ph.D. (Univ. of Oklahoma); *Professor Emeritus of English*; 1978, 1941.
- RUDOLPH JOHN MILLER, B.S. (Cornell Univ.), M.S. (Tulane Univ.), Ph.D. (Cornell Univ.); *Professor Emeritus of Zoology*; 1990, 1962.
- CLAYTON BLAKE MILLINGTON, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Michigan State Univ.); *Professor Emeritus of Administrative Services and Business Education*; 1969, 1960.
- TERENCE JOHN MILLS, B.S. (Western Illinois Univ.), M.S. (ibid), Ed.D. (Indiana Univ.); *Professor Emeritus of Curriculum and Instruction*; 1996, 1970.
- JOHN MILSTEAD, B.A. (Univ. of New Mexico), M.A. (Univ. of Iowa), Ph.D. (Univ. of Wisconsin); *Professor Emeritus of English*; 1986, 1965.
- JOE H. MIZE, B.S.I.E. (Texas Tech Univ.), M.S.I.E. (Purdue Univ.), Ph.D. (ibid); P.E.; *Regents Professor Emeritus of Industrial Engineering and Management*; 1994, 1972.
- ANDREW W. MONLUX, D.V.M. (Iowa State Univ.), M.S. (ibid), Ph.D. (George Washington Univ.); *Professor Emeritus of Veterinary Pathology*; 1985, 1956.
- V. BROWN MONNETT, B.S. (Univ. of Oklahoma), Ph.D. (Univ. of Michigan); *Professor Emeritus of Geology and Associate Dean Emeritus of the College of Arts and Sciences*; 1980, 1947.
- THOMAS EDWIN MOORE, B.A. (Univ. of Texas), M.A. (ibid), Ph.D. (ibid); *Professor Emeritus of Chemistry*, 1982, 1947.
- CLAYTON A. MORGAN, B.A. (Millsaps College), M.Ed. (Univ. of Texas), Ed.D. (ibid); *Professor Emeritus of Psychology*; 1984, 1958.
- PATRICK MONROE MORGAN, D.V.M. (Univ. of Georgia), M.P.H. (Tulane Univ.), Dr.P.H. (ibid); *Professor Emeritus of Veterinary Parasitology, Microbiology and Public Health*; 1995, 1977.
- LAWRENCE G. MORRILL, B.S. (Utah State Univ.), M.S. (ibid), Ph.D. (Cornell Univ.); *Professor Emeritus of Agronomy*; 1994, 1966.
- ROBERT DEAN MORRISON, B.S. (O.S.U.), M.S. (ibid), Ph.D. (North Carolina State Univ.); *Professor Emeritus of Statistics*; 1981, 1946.
- JAMES E. MOTES, B.S. (Kansas State Univ.), M.S. (ibid), Ph.D. (ibid); *Professor Emeritus of Horticulture and Landscape Architecture*; 1982, 1977.
- HORACIO A. MOTTOLA, Licentiate (Univ. of Buenos Aires), Ph.D. (ibid); *Regents Professor Emeritus of Chemistry*; 1998, 1967.
- JAY CLARENCE MURRAY, B.S. (Utah State Univ.), M.S. (Colorado State Univ.), Ph.D. (Cornell Univ.); *Professor Emeritus of Agronomy*; 1992, 1959.
- TED RICHARD NELSON, B.S. (Univ. of Nebraska), M.S. (ibid), Ph.D. (O.S.U.); *Professor Emeritus of Agricultural Economics*; 1987, 1965.
- WILBUR STANLEY NEWCOMER, B.S. (Pennsylvania State Univ.), M.S. (Cornell Univ.), Ph.D. (ibid); *Professor Emeritus of Physiological Science*; 1985, 1950.
- JOSEPH RANDOLPH NORTON, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Texas); *Professor Emeritus of General Engineering*; 1978, 1946.

- AUDREY ELEANOR OAKS, B.S. (State Univ. of New York, Buffalo), M.S. (Univ. of Wisconsin), Ed.D. (O.S.U.); *Associate Professor Emeritus of Curriculum and Instruction*; 1972, 1964.
- GEORGE VAN ODELL, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Texas A & M Univ.); *Professor Emeritus of Biochemistry and Molecular Biology*; 1993, 1956.
- ALEXANDER MEIR OSPOVAT, B.S. (Univ. of Oklahoma), M.A. (ibid), Ph.D. (ibid); *Professor Emeritus of History*; 1988, 1962.
- ARNOLA C. OWNBY, B.S. (O.S.U.), M.S. (ibid), Ed.D. (ibid); *Professor Emeritus of Administrative Services and Business Education*; 1985, 1960.
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- RICHARD NEWTON PAYNE, B.S. (O.S.U.), M.S. (Ohio State Univ.), Ph.D. (ibid); *Professor Emeritus of Horticulture*; 1987, 1957 (1953-54).
- JOSEPH H. PEARL, B.A. (Univ. of Michigan), Ph.D. (ibid); *Professor Emeritus of Applied Behavioral Studies*; 1997, 1971.
- LARRY M. PERKINS, B.S. (Univ. of Nebraska), Ph.D. (Syracuse Univ.); *Professor Emeritus of Sociology*; 1998, 1968.
- DON CLAYTON PETERS, A.B. (Tabor College), M.S. (Kansas State Univ.), Ph.D. (ibid); *Professor Emeritus of Entomology*; 1996, 1971.
- WAYNE A. PETTYJOHN, B.A. (Univ. of South Dakota), M.A. (ibid), Ph.D. (Boston Univ.); *Professor Emeritus of Geology*; 1995, 1980.
- JAMES L. PHILLIPS, B.A. (Univ. of Arizona), M.A. (Southern Illinois Univ.), Ph.D. (ibid); *Professor Emeritus of Psychology*; 1995, 1977.
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- JAMES SAM PLAXICO, B.S. (Clemson College), M.S. (ibid), Ph.D. (Univ. of Minnesota); *Professor Emeritus of Agricultural Economics*; 1988, 1955.
- HAROLD JACKSON POLK, B.A. (San Jose State College), M.A. (ibid), Ed.D. (Univ. of Missouri); *Associate Professor Emeritus of Industrial Arts Education*; 1986, 1969.
- RICHARD WILLIAM POOLE, B.S. (Univ. of Oklahoma), M.B.A. (ibid), Ph.D. (O.S.U.); *Professor Emeritus of Economics*; 1992, 1960.
- JAY G. PORTERFIELD, B.S. (Iowa State Univ.), M.S. (ibid); P.E.; *Professor Emeritus of Agricultural Engineering*; 1982, 1952.
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- ROBERT RAYMOND PRICE, B.S. (O.S.U.), M.S. (ibid), Ed.D. (Pennsylvania State Univ.); *Professor Emeritus and Head Emeritus of the Department of Agricultural Education*; 1965, 1948.
- ROBERT THOMAS RADFORD, B.A. (Baylor Univ.), M.A. (ibid), Ph.D. (Univ. of Texas); *Associate Professor Emeritus of Philosophy*; 1994, 1963.
- WILLIAM WALTER RAMBO, A.B. (Temple Univ.), M.A. (ibid), Ph.D. (Purdue Univ.); *Professor Emeritus of Psychology*; 1992, 1956.
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- DONALD W. ROBINSON, A.B. (Carthage College), M.A. (Bradley Univ.), Ph.D. (ibid); *Professor Emeritus of Psychology and Educational Administration and Higher Education, Dean Emeritus of the College of Education, and Director Emeritus of Teacher Education*; 1988, 1972.
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- LAWRENCE O. ROTH, B.S. (Univ. of Wisconsin), M.S. (O.S.U.), Ph.D. (ibid); P.E.; *Professor Emeritus of Agricultural Engineering*; 1987, 1951.
- ROSCOE ROUSE, B.A. (Univ. of Oklahoma), M.A. (Univ. of Michigan), Ph.D. (ibid); *Librarian Emeritus of the Edmon Low Library and Director Emeritus of the Library Science Institute*; 1987, 1967.
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- MARY MARGUERITE SCRUGGS, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Iowa State Univ.); *Professor Emeritus of Home Economics Education and Associate Dean Emeritus, College of Home Economics*; 1985, 1973.
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- JOHN C. SHEARER, B.S. (New York School of Industrial and Labor Relations), A.M. (Princeton Univ.), Ph.D. (ibid); *Professor Emeritus of Economics*; 1987, 1967.
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- HELMER ELLSWORTH SORENSON, B.E. (Eau Claire State Teachers College), Ph.M. (Univ. of Wisconsin), Ph.D. (ibid); *Professor Emeritus of Education and Dean Emeritus of the College of Education*; 1973, 1949.
- ROBERT M. SPAULDING, A.B. (Univ. of Michigan), A.M. (ibid), Ph.D. (ibid); *Professor Emeritus of History*; 1987, 1971.
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- EDWARD EARL STURGEON, B.S.F. (Univ. of Michigan), M.F. (ibid), Ph.D. (ibid); *Professor Emeritus of Forestry*; 1986, 1966.
- JOHN EARLE SUSKY, B.A. (Univ. of Florida), M.A. (ibid), Ed.D. (O.S.U.); *Professor Emeritus of Philosophy*; 1984, 1961.
- ROBERT L. SWAIM, B.S. (Purdue Univ.), M.S. (ibid), Ph.D. (Ohio State Univ.); P.E.; *Professor Emeritus of Mechanical and Aerospace Engineering*; 1992, 1978.
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- MARVIN PALMER TERRELL, B.S. (Univ. of Arkansas), M.S. (ibid), Ph.D. (Univ. of Texas); P.E.; *Professor Emeritus of Industrial Engineering and Management*; 1996, 1966.
- JOHN E. THOMAS, B.S. (Ohio State Univ.), Ph.D. (Univ. of Wisconsin); *Professor Emeritus and Head of the Department of Entomology and Plant Pathology*; 1981, 1950.
- GLENN WILLIAM TODD, A.B. (Univ. of Missouri), M.A. (ibid), Ph.D. (ibid); *Professor Emeritus and Head Emeritus of the Department of Botany*; 1993, 1958.
- ROBERT TOTUSEK, B.S. (O.S.U.), M.S. (Purdue Univ.), Ph.D. (ibid); *Professor Emeritus and Head Emeritus of the Department of Animal Science*; 1990, 1952.
- RUDOLPH W. TRENTON, Dr. of Law (Univ. of Rome), Dr. of Political Science (Univ. of Turin, Italy); *Professor Emeritus of Economics*; 1979, 1948.
- VERNON TROXEL, B.S. (Illinois State Normal Univ.), M.Ed. (Univ. of Illinois), Ed.D. (ibid); *Professor Emeritus of Curriculum and Instruction*; 1990, 1963.
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- LUTHER GILBERT TWEETEN, B.S. (Iowa State Univ.), M.S. (O.S.U.), Ph.D. (Iowa State Univ.); *Regents Professor Emeritus of Agricultural Economics*; 1987, 1962.
- LOUIS P. VARGA, B.A. (Reed College), M.S. (Univ. of Chicago); *Associate Professor Emeritus of Chemistry*; 1986, 1961.
- HELEN S. VISHNIAC, B.A. (Univ. of Michigan), M.A. (Radcliffe College), Ph.D. (Columbia Univ.); *Professor Emeritus of Microbiology and Molecular Genetics*; 1994, 1978.
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- ODELL LARRY WALKER, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Iowa State Univ.); *Professor Emeritus of Agricultural Economics*; 1993, 1956.
- GEORGE R. WALLER, B.S. (North Carolina State College), M.S. (Univ. of Delaware), Ph.D. (O.S.U.); *Professor Emeritus of Biochemistry*; 1988, 1956.
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- GORDON A. WEAVER, B.A. (Univ. of Wisconsin, Milwaukee), M.A. (Univ. of Illinois), Ph.D. (Univ. of Denver); *Professor Emeritus of English*; 1995, 1975.
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- SHANNON M. TURNER, B.A. (Univ. of the Pacific), Ph.D. (State Univ. of New York at Albany); *Adjunct Assistant Professor of Psychiatry and Behavioral Sciences, OSU-COM*; 1998.
- STEPHEN W. TWEEDIE, B.A. (Cornell Univ.), M.Ed. (ibid), Ph.D. (Syracuse Univ.); *Associate Professor of Geography*; 1976, 1971.
- ANDREW L. URICH, B.A. (Wittenberg), J.D. (Case Western Reserve Univ.); *Associate Professor of Economics and Legal Studies in Business*; 1991, 1986.
- JEAN VAN DELINDER, B.A. (Univ. of Minnesota), M.A. (Univ. of Kansas), Ph.D. (ibid); *Assistant Professor of Sociology*; 1996.
- RONALD VAN DEN BUSSCHE, B.S. (Eastern Kentucky Univ.), M.S. (Memphis State Univ.), Ph.D. (Texas Tech Univ.); *Assistant Professor of Zoology*; 1995.
- SUNNY VANEATON, B.M. (Univ. of Denver), M.A. (ibid), Ph.D. (Univ. of North Texas); *Professor of Music*; 1996.
- STANLEY L. VANHOOSER, B.S. (Texas A & M Univ.), B.S. (ibid), D.V.M. (ibid), M.S. (ibid); *Associate Professor of Veterinary Anatomy, Pathology and Pharmacology; Diplomate (American College of Poultry Veterinarians)*; 1991.
- NANCY S. VAN WINKLE, B.A. (Pennsylvania State Univ.), M.A. (Univ. of New Mexico), Ph.D. (Univ. of Kentucky); *Assistant Professor of Sociology*; 1997, 1991.
- KAREN VARGAS, D.V.M. (O.S.U.), M.S. (Texas A&M University); *Associate Professor of Anatomy, Pathology, and Pharmacology; Diplomate (American College of Laboratory Animal Medicine)*; 1998.
- JEANMARIE VERCHOT, B.S. (Cook Coll. Rutgers), Ph.D. (Texas A&M); *Assistant Professor of Entomology and Plant Pathology*; 1998.
- DAVID A. WAITS, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Texas Tech Univ.); *Assistant Professor of Geography*; 1992.
- DANIEL WALDNER, B.S. (California Polytechnic State Univ., San Luis Obispo), M.S. (Kansas State Univ.), Ph.D. (Univ. of Kentucky); *Assistant Professor of Animal Science*; 1996.
- WILLIAM THOMAS WALKER, B.M. (Univ. of Southern Mississippi), M.M. (Univ. of North Texas), M.M. (Univ. of Northern Colorado); *Associate Professor of Music*; 1981.
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- MARK WEISER, B.S. (Pennsylvania State Univ.), Ph.D. (Univ. of Iowa); *Assistant Professor of Management*; 1995.
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- JEFFREY K. WILLIAMS, B.Arch.St. (O.S.U.), M.Arch. (ibid); *Professor of Architecture*; 1988, 1986.
- ELAINE WILSON, B.S. (Univ. of Southwestern Louisiana), M.S. (Univ. of Alabama), Ph.D. (O.S.U.); *Associate Professor of Family Relations and Child Development*; 1988, 1973.
- CARRIE L. WINTEROWD, B.A. (Univ. of Missouri), M.S. (Univ. of Kansas), Ph.D. (ibid); *Assistant Professor of Applied Health and Educational Psychology*; 1994.
- J. PAUL WOODS, D.V.M. (University of Guelph), M.S. (Univ. of Wisconsin, Madison); *Assistant Professor of Veterinary Medicine and Surgery*; 1994.
- DONALD L. YATES, B.A. (Bishop College), M.A. (Univ. of Indiana), M.S. (Univ. of Texas, Tyler), Ph.D. (Univ. of Texas, Tyler); *Assistant Professor of Sociology*; 1995.
- BJONG W. YEIGH, A.B. (Dartmouth College), M.S. (Stanford Univ.), Ph.D. (Princeton Univ.); *Assistant Professor of Civil and Environmental Engineering*; 1995.
- GARY G. YEN, B.S. (National Taipei Inst. of Tech., Taiwan), M.S. (Marquette Univ.), Ph.D. (Univ. of Notre Dame); *Assistant Professor of Electrical and Computer Engineering*; 1996.
- SUSAN YUAN, B.S. (Ferris State Univ.), M.S. (Clemson Univ.), Ph.D. (Univ. of Illinois); *Assistant Professor of Applied Health and Educational Psychology*; 1997.
- MICHAEL TERRANCE ZAVY, B.S. (Cornell Univ.), M.S. (Univ. of Florida), Ph.D. (ibid); *Assistant Professor of Animal Science*; 1983.
- HAILIN ZHANG, B.S. (Nanjing Agricultural Univ. China), M.S. (Iowa State Univ.), Ph.D. (Univ. of Minnesota); *Assistant Professor of Plant and Soil Sciences*; 1996.
- ARMOND DUDLEY BAREFOOT, B.S. (O.S.U.), M.S. (ibid); *Associate Professor Emeritus of Agricultural Engineering*; 1986, 1953.
- PAUL B. BARTO, D.V.M. (Univ. of Pennsylvania), M.S. (Oregon State Univ.), Ph.D. (ibid); *Professor Emeritus of Veterinary Infectious Diseases and Physiology*; 1986, 1955.
- LOUIS OTTO BASS, B.A. (O.S.U.), B.A.E. (ibid), M.A.E. (ibid); P.E.; *Professor Emeritus of Architecture*; 1993, 1963.
- GEORGE W. BAUMILLER, Diploma in Interior Architecture (State C. of Building, Warsaw, Poland) M.S. (Warsaw Inst. of Technology); *Associate Professor Emeritus of Architecture*; 1988, 1972.
- JOHN GILBERT BAYLESS, B.S. (Phillips Univ.), M.Ed. (ibid), Ed.D. (O.S.U.); *Professor Emeritus of Health, Physical Education and Leisure, and Coordinator Emeritus, Physical Education*; 1994, 1966.
- FREDERICK M. BLACK, B.S. (O.S.U.), M.S. (ibid); *Assistant Professor Emeritus of Business Administration*; 1979, 1953.
- GEORGE BAKER BOKORNEY, B.S. (O.S.U.), M.S. (ibid), Ed.D. (Univ. of Oregon); *Professor Emeritus of Hotel and Restaurant Administration*; 1995, 1971.
- JOHN RICHARD BOSWORTH, B.A. (Univ. of Illinois), M.A. (ibid); *Assistant Professor Emeritus of Philosophy*; 1986, 1962.
- WENDELL BOWERS, B.S. (Univ. of Illinois), M.S. (ibid); *Professor Emeritus of Agricultural Engineering*; 1985, 1967.
- JULIAN H. BRADSHAW, A.B. (Univ. of South Carolina), M.A. (Univ. of Colorado), Ph.D. (Univ. of California); *Professor Emeritus of Economics*; 1977, 1948.
- RALPH A. BRANN, B.S. (Bethel College), M.S. (O.S.U.), Ed.D. (ibid); *Professor Emeritus of Educational Administration and Higher Education*; 1979, 1964.
- L. HERBERT BRUNEAU, B.S. (McGill Univ.), M.A. (Univ. of Texas), Ph.D. (ibid); *Professor Emeritus of Zoology*; 1995, 1955.
- MARILYN M. BURNS, B.S. (Univ. of Colorado, Boulder), M.A. (Univ. of Northern Colorado, Greeley), Ph.D. (O.S.U.); *Associate Professor Emeritus of Design, Housing and Merchandising*; 1995, 1983.
- LORA BELLE CACY, B.S. (O.S.U.), M.S. (ibid), Ed.D. (ibid); *Professor Emeritus of Home Economics Education*; 1984, 1963.
- MARGARET S. CALLEN, B.A. (Concordia College), M.S. (Univ. of Wisconsin), Ph.D. (Kansas State Univ.); *Associate Professor Emeritus of Family Relations and Child Development*; 1993, 1973.
- RAYMOND E. CAMPBELL, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Kansas State Univ.); *Professor Emeritus of Horticulture and Landscape Architecture*; 1986, 1974.
- RAYMOND E. CHAPEL, B.S. (O.S.U.), M.S. (ibid); *Professor Emeritus of Mechanical and Aerospace Engineering and Director Emeritus of Engineering Research and Budget*; 1978, 1947.
- GEOFFREY PHILIP COLLINS, B.S.A. (Univ. of Toronto), M.S. (Univ. of Illinois); *Professor Emeritus of Agricultural Economics*; 1970, 1939.
- GEORGE EARL COOK, B.S. (O.S.U.), M.S. (ibid); *Associate Professor Emeritus of Agricultural Engineering*; 1986, 1952.
- JERRY D. CROFT, B.A. (O.S.U.), M.A. (Kansas State Univ.), Ed.D. (Univ. of Tulsa); *Associate Professor Emeritus of Geography*; 1991, 1966.

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- MARIAN F. ABBOTT, B.M.E. (Central Methodist College), M.M. (Wichita State Univ.); *Associate Professor Emeritus of Music*; 1990, 1970.
- JEANNE L. AGNEW, B.A. (Queen's Univ.), M.A. (ibid), Ph.D. (Radcliffe College); *Professor Emeritus of Mathematics*; 1984, 1953.
- JOHN LAWRENCE BAIRD, B.S. (Washburn Univ.), M.S. (Kansas State Univ.), Ed.D. (O.S.U.); *Associate Professor Emeritus of Technical Education*; 1992, 1977.
- JAMES E. BAKER, B.S. (U.S. Naval Academy), B.S.E.E. (O.S.U.), M.S.E.E. (ibid), Ph.D. (ibid); *Professor Emeritus and Head Emeritus of the School of Electrical and Computer Engineering*; 1993, 1984.

- RICHARD LEE CUMMINS, B.S. (Univ. of Illinois), M.S. (ibid), Ph.D. (ibid); *Associate Professor Emeritus of Electrical and Computer Engineering*; 1992, 1963.
- JERRY L. DAVIS, B.S. (Kansas State College, Pittsburg), M.A. (Univ. of Kansas), Ph.D. (ibid); *Professor Emeritus and Head Emeritus of the Department of Theater and Technical Director Emeritus of the University Theater*; 1997, 1971.
- CHARLES E. DENMAN, B.S. (O.S.U.), M.S. (Utah State Univ.); *Associate Professor Emeritus of Agronomy*; 1985, 1949.
- HOOVER PAGE FISHER, B.M.E. (O.S.U.), M.S. (ibid), D.M.E. (Univ. of Oklahoma); *Professor Emeritus of Music*; 1987, 1965.
- MARY L. FRYE, B.A. (Univ. of Hamline), M.S. (O.S.U.), Ed.D. (ibid); *Assistant Professor Emeritus of Health, Physical Education and Leisure*; 1988, 1968.
- BETTYE J. GAFFNEY, B.S. (Langston Univ.), M.S. (O.S.U.), Ed.D. (ibid); *Associate Professor Emeritus of Family Relations and Child Development*; 1991, 1973.
- GERALD KENNETH GOFF, B.A. (Phillips Univ.), Ed.M. (ibid), Ed.D. (O.S.U.); *Professor Emeritus of Mathematics*; 1990, 1965.
- HOWARD A. L. GREER, B.S. (Berea College), M.S. (Univ. of Kentucky), Ph.D. (Iowa State Univ.); *Professor Emeritus of Agronomy*; 1992, 1965.
- PAUL D. HARPER, B.S. (Kansas State Univ.), M.A. (ibid), Ph.D. (Univ. of Kansas); *Associate Professor Emeritus of Speech Communication*; 1989, 1974.
- JOHN EDWARD HOFFMAN, B.S. (Univ. of Oklahoma), M.A. (ibid); *Associate Professor Emeritus of Mathematics*; 1987, 1956.
- DONALD D. HOLMES, M.S. (O.S.U.), D.V.M. (ibid); *Professor Emeritus of Veterinary Pathology*; 1986, 1979.
- JOHN TERRY HOMER, B.A. (Thiel College), M.A. (California State Univ., Sacramento), Ph.D. (Univ. of Oklahoma); *Associate Professor Emeritus of Veterinary Parasitology, Microbiology and Public Health*; 1992, 1974.
- JAMES A. JACKSON, B.A. (Southwestern College), M.S. (O.S.U.), Ph.D. (ibid); *Assistant Professor Emeritus of Veterinary Parasitology, Microbiology and Public Health*; 1986, 1968.
- WILLIAM L. JOHNSTON, B.S. (Illinois State Univ.), M.S. (Univ. of Illinois), Ed.D. (ibid); *Professor Emeritus of Housing, Interior Design and Consumer Studies*; 1987, 1977.
- RALEIGH A. JOBES, B.S. (O.S.U.), M.S. (Univ. of Arizona), Ph.D. (O.S.U.); *Professor Emeritus of Agricultural Economics*; 1995, 1975.
- EUGENE M. JONES, D.V.M. (Cornell Univ.); *Professor Emeritus of Veterinary Medicine and Surgery*; 1986, 1965.
- WILLIAM M. KINCAID, B.S. (Univ. of Colorado), M.S. (ibid), Ph.D. (Univ. of Texas); *Professor Emeritus of Marketing*; 1986, 1969.
- JAMES F. KNIGHT, B.Arch. (O.S.U.), M.Arch. (Univ. of Illinois); *Associate Professor Emeritus of Architecture*; 1990, 1979.
- NORMA SUE KNIGHT, B.S. (O.S.U.), M.S. (ibid), Ph.D. (ibid); *Associate Professor Emeritus of Nutritional Sciences*; 1987, 1980.
- PAULINE W. KOPECKY, B.B.A. (Southwestern Univ.), M.Ed. (Univ. of Texas), Ph.D. (Univ. of Houston); *Associate Professor Emeritus of Economics*; 1994, 1967.
- BERNICE H. KOPEL, B.S. (Univ. of Minnesota), M.S. (Northern Colorado Univ.), Ed.D. (O.S.U.); *Associate Professor Emeritus of Nutritional Sciences*; 1996, 1970.
- DANIEL RONALD KROLL, A.B. (Michigan State Normal College), A.M. (Univ. of Michigan), Ph.D. (Columbia Univ.); *Professor Emeritus of English and Director Emeritus of General Studies*; 1975, 1946.
- IMOGENE L. LAND, B.S.E. (Arkansas State Univ.), M.S.E. (ibid), Ed.D. (O.S.U.); *Associate Professor Emeritus of Applied Behavioral Studies*; 1993, 1977.
- MARY E. LEIDIGH, B.S. (Texas Tech College), M.S. (Univ. of Texas); *Professor Emeritus of Food, Nutrition and Institution Administration*; 1977, 1945.
- PAUL Y. LIN, M.A. (Univ. of Texas, Austin), Ph.D. (ibid); *Associate Professor Emeritus of Foreign Languages and Literatures*; 1987, 1973.
- GEORGE W. A. MAHONEY, B.S. (Univ. of Illinois), M.S. (O.S.U.), Ph.D. (ibid); *Associate Professor Emeritus of Agricultural Engineering*; 1986; 1949.
- GLADYS BOBECK MARSHALL, B.S. (O.S.U.), M.S. (ibid); *Assistant Professor Emeritus of Family Relations and Child Development*; 1971, 1947.
- EVANGIE McGLON, B.S. (Central State Univ., Oklahoma), M.T. (ibid), M.Ed. (ibid), Ph.D. (Univ. of Oklahoma); *Associate Professor Emeritus of Applied Behavioral Studies*; 1989, 1978.
- WILLIAM M. McMURTRY, B.M.E. (O.S.U.), M.M.E. (Univ. of Oklahoma), Ph.D. (North Texas State Univ.); *Associate Professor Emeritus of Music*; 1990, 1968.
- GERTRUDE McALLISTER MEANS, B.A. (Park College), B.S. (Northeast Missouri State Teachers College), M.S. (Virginia Polytechnic Inst.); *Assistant Professor Emeritus of Home Management, Equipment and Family Economics*; 1971, 1950.
- HELEN C. MILLER, A.B. (Butler College), M.A. (Cornell Univ.), Ph.D. (ibid); *Associate Professor Emeritus of Zoology*; 1990, 1972.
- LOU S. MORRISON, B.S. (O.S.U.), M.S. (ibid); *Assistant Professor Emeritus of Entomology and Plant Pathology*; 1971, 1948.
- KAY R. MURPHY, B.S. (State Univ. College, Buffalo, NY), M.S. (O.S.U.), Ph.D. (ibid); *Assistant Professor Emeritus of Family Relations and Child Development*; 1985, 1973.
- MARGARET F. NELSON, B.A. (Northwestern Oklahoma State Univ.), M.A. (O.S.U.), Ph.D. (ibid); *Associate Professor Emeritus of English*; 1990, 1970.
- MARLAN DEE NELSON, B.A. (O.S.U.), M.A. (Stanford Univ.), Ed.D. (O.S.U.); *Professor Emeritus and Director Emeritus of the School of Journalism and Broadcasting*; 1996, 1977.
- JAMES D. NETHERTON, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Chicago); *Professor Emeritus of Agricultural Education*; 1994, 1970.
- ROBERT LEE NOBLE, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Kansas State Univ.); *Professor Emeritus of Animal Science*; 1985, 1949.
- GEORGE H. OBERLE, B.S. (Earlham College), M.S. (Butler Univ.), Ed.D. (Indiana Univ.); *Professor Emeritus of Health, Physical Education and Leisure*; 1993, 1974.
- FAYNE H. OBERST, D.V.M. (Kansas State Univ.), M.S. (Cornell Univ.), Diplomate (The American College Theriogenologist Specialty Board in Veterinary Medicine); *Professor Emeritus of Veterinary Medicine and Surgery*; 1984, 1974.
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- ROBERT FRED REISBECK, B.S. (Colorado State Univ.), M.S. (O.S.U.), Ed.D. (ibid); *Associate Professor Emeritus of Agricultural Education*; 1997, 1966.
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- DELBERT LEROY RUTLEDGE, B.S. (Univ. of New Mexico), M.S. (O.S.U.), Ed.D. (ibid); *Professor Emeritus of Physics*; 1986, 1957.
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- EMIL EDWARD SEBESTA, B.S. (South Dakota A & M College), M.S. (O.S.U.), Ph.D. (Cornell Univ.); *Professor Emeritus of Agronomy*; 1987, 1951.
- CHARLES L. SMITH, B.M. (Central Methodist College), M.A. (Univ. of Colorado), M.A. (Univ. of Northern Colorado), Ed.D. (ibid); *Associate Professor Emeritus of Curriculum and Instruction*; 1986, 1972.
- THOMAS J. SMITH, B.S. Ed. (East Central Oklahoma State Univ.), M.S. (O.S.U.), Ed.D. (ibid); *Professor Emeritus of Educational Administration and Higher Education*; 1988, 1979.
- LOUIE G. STRATTON, D.V.M. (O.S.U.) Ph.D. (ibid); *Professor Emeritus of Veterinary Medicine and Surgery, and Assistant Dean Emeritus of the College of Veterinary Medicine*; 1987, 1973.
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Course Listings

This *Catalog* offers information about the academic programs and support services of the University. This *Catalog* is as accurate as possible, but the information may not remain current for all of the academic year. Circumstances may prompt changes in courses, course content, credit, fees, regulations, semester calendar, curriculum, degrees offered, and other University matters. Such changes authorized by the University apply both to prospective students and to those previously enrolled, unless the latter are specifically exempted.

Not all courses are offered each semester or session. Students should consult the current class schedule book and the departmental office for specific details regarding frequency of offerings in specific courses.

Course descriptions are listed alphabetically by fields. (See the *College of Osteopathic Medicine of OSU College Catalog* for osteopathic medicine course descriptions.)

Explanation of Course Listings

A course listing is comprised of the following elements, in order:

Course Number. All courses are identified by numbers composed of four digits. The first digit indicates the class year in which the subject is ordinarily taken, although enrollment is not exclusive as to student classification, the second and third digits identify the course within the field and the last digit identifies the number of semester credit hours the course carries. A course number beginning with 0 indicates that the course does not carry University credit. A course number ending in 0 indicates that the course carries variable credit. An asterisk (*) following the four-digit number indicates the course is approved for graduate credit.

Those numbered 5000 and above are primarily for graduate students, and only graduate students and selected seniors with consent of the instructor may enroll in them. Courses numbered 3000 and 4000 may be taken for graduate credit if the course number is labeled with an asterisk. Extra work may be required of a graduate student in a 3000- or 4000-level course.

General Education Requirement

Codes. The capital letters in parentheses preceding some course titles designate courses fulfilling various undergraduate general education requirements. (See "Academic Regulations.")

Course Title. The title of the course is printed in boldface letters.

Statement of Variable Credit. Each course number ending in zero is followed by a statement of the credit that may be earned. Typical entries are *1-6 credits, maximum 6* and *1-3 credits, maximum 12*, the first part of the entry indicating the permissible credit per enrollment, followed by a statement of the maximum credit which may be earned in the course through repeated enrollment.

Laboratory Hours. If a course contains a laboratory, the number per week of laboratory hours are stated, e.g., *Lab 3*.

Prerequisite(s). Prerequisites from the same department as the course being described are listed first, with no departmental abbreviation and in increasing numerical order. If from another department, that departmental abbreviation must precede the number of the prerequisite course. Those courses having prerequisites from both within and from outside the department bear combination entries such as *3303 and STAT 2012*. Prerequisites are listed in the following manner:

Prerequisites: A, B or C

A or B or C is acceptable

Prerequisites: A, B and C

A and B and C are required

Prerequisites: A, and B or C

A and either B or C

Prerequisites: A and B, or C

Both A and B, *or C* required

Prerequisites: A, or B and C

Either A *or* both B *and* C required

Prerequisites: A or equivalent and B

Both A, or the equivalent of A, *and* B are required

Prerequisites: A, and B or equivalent

Both A *and* B, or the equivalent of B, are required

Prerequisites: A and B, or equivalents

Equivalents of both A and B are acceptable.

Where no prerequisites are listed for courses numbered 3000 or 4000 level, it is understood that the prerequisite is 60

credit hours of work completed, or 45 credit hours completed with an overall grade-point average of 3.25. The prerequisite for courses numbered 5000 or 6000 level is graduate standing in addition to any other prerequisites listed. Instructors may waive prerequisites when student background justifies. Prior approval of instructor may be required in problems courses, independent study, internships, thesis and dissertation courses, and courses taught in a professional school.

Description of Course Content. The content of the course and its major emphases are described. Courses which are taught under another name and number are indicated by the statement *Same course as 0000*. Credit may not be earned in *both* courses so cross-referenced.

Abbreviations Used

A&S	Arts and Sciences	GENE	Genetics	TCED	Technology Education
ABSE	Applied Behavioral Studies in Education	GENG	General Engineering	TCOM	Telecommunications Management
ACCT	Accounting	GENT	General Technology	TE	Technology Education
AERO	Aerospace Studies--Air Force	GEOG	Geography	TH	Theater
AG	Agriculture	GEOL	Geology	TIED	Technical and Industrial Education
AGCM	Agricultural Communications	GRAD	Graduate	UNIV	University
AGEC	Agricultural Economics	GREK	Greek	VAPP	Veterinary Anatomy, Pathology and Pharmacology
AGED	Agricultural Education	GRMN	German	VIDP	Veterinary Infectious Diseases and Physiology
ANSI	Animal Science	HES	Human Environmental Sciences	VMED	Veterinary Medicine
ANTH	Anthropology	HHP	Health and Human Performance	VMS	Veterinary Medicine and Surgery
ARCH	Architecture	HIST	History	ZOOL	Zoology
ART	Art	HONR	Honors		
ASTR	Astronomy	HORT	Horticulture		
AVED	Aviation Education	HRAD	Hotel and Restaurant Administration		
BADM	Business Administration	HRAE	Human Resources and Adult Education		
BAE	Biosystems Engineering	IEM	Industrial Engineering and Management		
BCOM	Business Communications	IS	International Studies		
BHON	Business Honors	JAPN	Japanese		
BIOC	Biochemistry	JB	Journalism and Broadcasting		
BIOL	Biological Science	LA	Landscape Architecture		
BIOM	Biomedical Sciences	LATN	Latin		
BOT	Botany	LEIS	Leisure		
BSPR	Business Professions	LBSC	Library Science		
BUSE	Business Education	LSB	Legal Studies in Business		
CDIS	Communication Sciences and Disorders	MAE	Mechanical and Aerospace Engineering		
CHE	Chemical Engineering	MATH	Mathematics		
CHEM	Chemistry	MBA	Master of Business Administration		
CIED	Curriculum and Instruction Education	MC	Mass Communications		
CIVE	Civil Engineering	MCAG	Mechanized Agriculture		
CLML	Cell and Molecular Biology	MET	Mechanical Engineering Technology		
CMT	Construction Management Technology	MGMT	Management		
CPSY	Counseling Psychology	MICR	Microbiology		
CS	Computer Science	MKTG	Marketing		
DHM	Design, Housing and Merchandising	MLSC	Military Science		
ECEN	Electrical and Computer Engineering	MSIS	Management Science and Information Systems		
ECON	Economics	MTCL	Medical Technology		
EDLE	Educational Leadership	MUSI	Music		
EDTC	Educational Technology	NATS	Natural Science		
EDUC	Education	NSCI	Nutritional Sciences		
EET	Electrical Engineering Technology	OCED	Occupational Education		
ENGL	English	PET	Petroleum Technology		
ENGR	Engineering	PHIL	Philosophy		
ENSC	Engineering Science	PHYS	Physics		
ENTO	Entomology	PLNT	Plant Science		
ENVR	Environmental Science	PLP	Plant Pathology		
EPSY	Educational Psychology	POLS	Political Science		
ETM	Engineering and Technology Management	PSYC	Psychology		
FIN	Finance	REL	Religious Studies		
FLL	Foreign Languages and Literatures	REMS	Research, Evaluation, Measurement, and Statistics		
FOR	Forestry	RLEM	Rangeland Ecology and Management		
FPST	Fire Protection and Safety Technology	RUSS	Russian		
FRCD	Family Relations and Child Development	SCFD	Social Foundations		
FREN	French	SDEV	Student Development		
		SOC	Sociology		
		SPAN	Spanish		
		SPCH	Speech Communication		
		SPED	Special Education		
		STAT	Statistics		

Accounting (ACCT)

2103

Financial Accounting. Prerequisite: 24 semester credit hours, including ENGL 1113 and MATH 1483 or equivalent. Financial accounting concepts and the use of financial accounting information in decision making.

2203

Managerial Accounting. Prerequisite: 2103. Managerial accounting concepts and objectives, planning and control of sales and costs, analysis of costs and profits.

3013

Federal Income Taxation. Prerequisite: 2203. Federal income tax and its relationship to business decision-making; primary emphasis on recognition of the important tax consequences that attach to business transactions and the impact on business decision making.

3203

Cost Accounting. Prerequisites: 2203 with a grade of "C" or better and STAT 2023. Cost accumulation systems, allocating product costs, planning and controlling costs, standard costing, and profitability analysis.

3303

Financial Accounting I. Prerequisite: 2203. Financial accounting theory and problems.

3403

Financial Accounting II. Prerequisite: 3303 with grade of "C" or better. Continuation of financial accounting theory and problems.

3603

Accounting Information Systems. Prerequisite: 2203. Accounting system design and installation.

4010

Accounting Projects. 1-6 credits, maximum 6. Prerequisites: consent of instructor and 3203 and 3403. Special topics, projects and independent study in accounting.

4013*

Advanced Federal Income Taxation. Prerequisite: 3013 with a grade of "B" or better. Federal income tax law applicable to individuals, corporations, partnerships, trusts and estates, and other specialized topics.

4203*

Topics in Management Accounting. Prerequisites: 2203 with grade of "C" or better and MGMT 3223. Integrative course in cost and management accounting; use of accounting information for internal decision making.

4303*

Non-business, Fiduciary and Institutional Accounting. Prerequisite: 3403 with grade of "C" or better. Fund and governmental accounting, bankruptcies, receiverships, estates and trusts.

4403*

Financial Accounting III. Prerequisite: 3403 with grade of "C" or better. Consolidated statements and other financial accounting topics.

4453*

EDP Auditing. Prerequisite: 4503 or consent of instructor. EDP auditing as it applies to the business environment. Impact of computer-based systems on control and auditing, total systems control analysis, and specific EDP auditing techniques as they apply to computer-based systems.

4503*

Auditing. Prerequisite: 3403, 3603. Auditing theory, procedures and practices.

5000*

Thesis. 1-6 credits, maximum 6. For students writing reports and theses in accounting.

5013*

Seminar in Tax Research. Prerequisite: 4013 or consent of instructor. Development and administration of federal tax law with emphasis on the development of tax research skills.

5023*

Seminar in Estate and Gift Taxation. Prerequisite: 5013 or consent of instructor. Federal tax law applicable to estate and gift taxation and income taxation of estates and trusts.

5033*

Seminar in Oil and Gas Taxation. Prerequisite: 5013 or consent of instructor. Federal income tax laws applicable to the petroleum and other extractive industries.

5043*

Seminar in Partnership Taxation. Prerequisite: 5013 or consent of instructor. Federal income tax laws applicable to partners and partnerships.

5053*

Seminar in Corporate Taxation. Prerequisites: graduate standing and 5013 or consent of instructor. Federal income tax law applicable to corporations and to other entities in their capacity as corporate shareholders.

5103*

Financial Accounting and Analysis. Prerequisites: admission to MBA program or consent of MBA director. Development of the ability to read and to analyze financial statements and to use this information along with other types of information in decision making.

5110*

Special Topics and Individual Work in Accounting. 1-10 credits, maximum 10. Prerequisite: consent of instructor. Individual work on special topics, projects or readings selected to acquaint students with significant accounting literature.

5113*

Managerial Accounting. Prerequisite: 5103. Interpretation of accounting data in planning, controlling and decision making.

5133*

International Oil and Gas Accounting. Prerequisite: graduate standing. Financial accounting and reporting for U.S. and international oil and gas operations. Domestic and international joint venture accounting. Accounting for international concession and profit sharing agreements.

5203*

Seminar in Contemporary Accounting Theory I. Prerequisite: 3403. Origin and development of accounting and a critical study of modern accounting theory.

5303*

Seminar in Contemporary Accounting Theory II. Prerequisite: 3403. Critical study of contemporary accounting theory.

5313*

Financial Statement Analysis. Prerequisite: consent of graduate coordinator. A study of the demand and supply of financial data, properties of numbers derived from financial statements, the role of financial information in investment decisions, and features of the decision-making environment.

5400*

Practicum in Professional Accounting. 1-6 credits, maximum 6. Prerequisite: 30 semester credit hours of accounting. An accounting policy course studying auditing, tax, systems, internal and external reporting and international aspects of business cases.

5503*

Advanced Auditing. Prerequisite: 4503. Emphasis on auditing aspects of EDP, use of statistical sampling techniques in connection with audits of financial data, filings with the SEC and other regulatory agencies and other public accounting related topics.

5603*

Accounting-based Information Systems. Prerequisite: 18 credit hours of accounting including 4203. Concepts underlying the design and use of an effective accounting information system.

5713*

Seminar in International Accounting. Prerequisites: 3403 and consent of graduate coordinator. Accounting issues faced by multinational enterprises and internationally listed companies, including diversity in financial reporting and harmonization.

5803*

Seminar in Cost-Managerial Accounting. Prerequisite: 18 credit hours of accounting. Intensive study of cost managerial accounting theory relating to problems of an advanced nature.

5900*

Graduate Internship in Accounting. 1-3 credits, maximum 3. Prerequisites: admission to master's program; consent of graduate coordinator. Supervised internship in public accounting, industry, or not-for-profit organizations. May be counted as elective hours only.

5902*

Research Report. Prerequisite: consent of supervising professor and coordinator of graduate programs in accounting. Methods used in research and report writing in accounting. Independent investigation and writing of an acceptable report on a topic approved by the student's supervising professor. Restricted to candidates seeking the M.S. in accounting degree and not available to students who have credit in 5000.

6000*

Research and Thesis. 1-18 credits, maximum 36. Prerequisite: approval of advisory committee. For students working on the doctoral degree.

6110*

Graduate Readings and Special Topics in Accounting. 1-3 credits, maximum 20. Prerequisite: consent of supervising professor and coordinator of graduate programs in accounting. Supervised reading of significant literature and study of special topics not covered in regularly scheduled accounting courses.

6703*

Seminar in Accounting Research. Prerequisites: Doctoral student status and consent of coordinator of graduate programs in accounting. The theoretical literature and research methodology in accounting.

Aerospace Studies--Air Force (AERO)

1111

The Air Force Today I. Lab 1. Doctrine, mission and organization of the United States Air Force through a study of the total force structure, strategic offensive and defensive forces, general purpose forces, and aerospace support forces.

1211

The Air Force Today II. Lab 1. Continuation of the doctrine, mission and organization of the United States Air Force; review of Army, Navy, and Marine general purpose forces.

2111
The Development of Air Power I. Lab 1. Growth and development of aerospace power through history beginning with first manned flights and continuing through World War II.

2211
The Development of Air Power II. Lab 1. Development and growth of aerospace power from the period following World War II through the Vietnam conflict; concepts of peaceful deployment of US air power.

3103
Air Force Leadership and Management I. Lab 1. The study of the fundamental leadership, management, and communication skills required of an Air Force junior officer. Basic managerial processes, management of forces in changing environments, organizational power, politics and managerial strategy and tactics.

3203
Air Force Leadership and Management II. Lab 1. The application of leadership, management, and communication skills required of an Air Force junior officer. The individual as a leader in the Air Force environment, individual motivational and behavioral processes, group dynamics, leader and management ethics, counseling and evaluating are discussed.

3504
Summer Training Unit. Prerequisite: consent of PAS. Practical training on an Air Force base. Junior officer training, familiarization training in most functional aspects of a typical Air Force base. Includes career orientation, small arms firing, flight orientation rides, and survival training.

4103
(S)National Security Forces in Contemporary American Society I. Lab 1. The formulation, organization and context of national security; civil-military interaction and the evolution of strategy. Review of the military profession and officership.

4203
(S)National Security Forces in Contemporary American Society II. Lab 1. Strategy and management of conflict; implementation of national security and regional world issues. Review of societal issues in the military profession and the military justice system.

4402
Applied Officership Practicum. Prerequisite: consent of PAS. Students spend from two to three weeks on an Air Force base working in their intended specialty under supervision of experienced officer. Leadership and management principles applied to day-to-day experiences.

Agricultural Communications (AGCM)

2103
Communications in Agriculture. Lab 2. Prerequisite: ENGL 1113. Fundamentals of agricultural news writing and other communication methods. Careers in and the role of the media in agriculture and related fields.

3103
Communicating Agriculture to the Public. Lab 2. Prerequisite: junior standing in the College of Agricultural Sciences and Natural Resources or consent of the instructor. Understanding and application of writing principles and communications theory as related to public issues in agriculture and the environment. Practice in writing for a variety of media and preparation of other communications as part of a communications campaign strategy.

4203*
Nonformal Educational Methods in Agriculture. Prerequisite: junior standing. Preparation of professionals in agriculture and related areas who have career goals directed toward service, management, communications, production and education outside the public school setting. Personal and employment skills essential for success in supervised internships in related career areas. Public relations, presentation skills in a nonformal education setting, community involvement, personal finance, development of the resume, interviewing and functioning as a professional in a supervised internship environment. Same course as AGED 4203.

4300
Internships in Agricultural Communications. 1-6 credits, maximum 6. Prerequisites: consent of internship coordinator and adviser. Supervised work experience with approved employers in agricultural communications including agricultural publications, radio stations, television stations, public relations offices, advertising firms, government offices, and other related opportunities. Presentation required following the internship.

4413
Agricultural Communications Product Development. Lab 4. Prerequisites: JB 2393; senior standing and consent of instructor. The development of agricultural communications projects with focus in either broadcast or print media. Practical application of writing, editing and design skills as well as software applications.

4990
Problems in Agricultural Communications. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Small group and individual study and research in problems relating to communications within the agricultural sector and from the agricultural sector to other constituencies.

Agricultural Economics (AGEC)

1114
(S)Introduction to Agricultural Economics. Economic theory of production, marketing and consumption of agricultural products. The role and structure of agriculture in the American economy. Policies to achieve efficiency and welfare goals in agriculture. No general education credit for students also taking ECON 1113 or ECON 2013.

3010
Internship in Agricultural Economics. 1-6 credits, maximum 6. Prerequisite: approval of internship committee and adviser. Supervised work experience with approved public and private employers in agricultural economics including banks, farm credit services, agriculture chemical firms, Soil Conservation Service, congressional offices and other opportunities. Credit will not substitute for required courses. Graded on pass-fail basis.

3203*
Agricultural Price Analysis. Prerequisites: 1114, 3213 or AG 2112, MATH 1513. Economic theory, statistics and data combined to describe, understand and forecast agricultural price relationships and variation. Quantitative techniques developed to determine the factors causing price variation and to measure trend, cyclical, seasonal and random price variation.

3213
(A)Quantitative Methods in Agricultural Economics. Lab 2. Prerequisites: 1114, MATH 1513, and MSIS 2103, AG 2112 or equivalent. Indices, graphics, budgeting, discounting, basic statistical measures, use of microcomputers, and price analysis. Basic background methods for some courses involving analysis.

3303*
(S)Agricultural Marketing. Prerequisites: 1114, MATH 1513. The agricultural marketing system, its importance to the economy and the role of the individual firm manager. Futures markets, hedging, and the use of decision aids.

3313*
Agribusiness Management. Prerequisites: 1114, ACCTG 2103. Managerial functions and applications to nonfarm agribusiness firms. Alternative forms of ownership and principles of agricultural cooperatives. Acquisition, organization and management of human, financial, and physical assets for nonfarm agribusiness firms.

3403
Agricultural Business Records and Analysis. Lab 2. Prerequisites: 3413 and ACCTG 2103. Financial accounts, production and statistical records and their practical application to the successful management of the farm or ranch and other agricultural businesses.

3413
Farm and Ranch Management I. Lab 2. Prerequisites: 1114, MATH 1513, and MSIS 2103, AG 2112 or equivalent. Production planning with budgeting, financial records and income tax management for the individual farm-ranch business.

3503*
(S)Natural Resource Economics. Prerequisite: 1114 or ECON 2123. Framework for analyzing natural resource management decisions. Applications of microeconomic theory to the management of soil, water and other resources, with special emphasis on the institutions having an impact on management opportunities. Supply of and demand for natural resources, resource allocation over time, rights of ownership, and public issues of taxation, police power and eminent domain.

3603*
Agricultural Finance. Prerequisites: 3313 or 3413, ACCTG 2103. Farm financial management; preparation and analysis of net worth, cash flow and income statements, including microcomputer applications; financial intermediaries; serving agriculture; procedures for evaluating investments; alternative means of acquiring control of farm resources.

3990
Special Problems in Agricultural Economics. 1-3 credits, maximum 3. Directed study of selected agricultural economics topics.

4313*
Agricultural Marketing and Prices. Prerequisites: 3203, 3213 and 3303. Agricultural marketing, with emphasis on system-wide approaches. Economic tools and techniques for making decisions.

4323*
Applied Agribusiness Management. Prerequisites: 3313 or 3413; 3603 or FIN 3113; 3303 or MKTG 3213; 4413 or BUSL 3213; ECON 3023 or 3113. Applications of modern decision theory in the uncertain operating environment of agricultural firms including cooperatives. Planning, organizing, implementing, coordinating, and controlling problems associated with establishing an agribusiness, achieving firm growth, and operating the firm through time. Partial budgeting, regression, linear programming, and simulation as used by managers to analyze the interaction of resources, prices, and production alternatives in determining the optimal business plan.

4333*

Commodity Futures Markets. Prerequisite: 3203. The nature of commodity futures markets and the mechanics of trading. Fundamentals and technical aspects of commodity prices. Basis and basis trading. Hedging and hedging strategies. Regulating commodity trading. Tax aspects. Appreciation of principles via computer game.

4343*

International Agricultural Markets, Trade and Development. Prerequisites: introductory economics and junior standing. International trade of agricultural products with emphasis on theory of trade and monetary flows, national trade policies and world market structures for agricultural products. Impacts of trade on the domestic agricultural sector and the role of trade in agricultural economics.

4403*

Farm and Ranch Management II. Prerequisites: 3603 and MATH 1513. Production planning with linear programming and other tools and methods of planning under uncertainty; acquisition of resources and the use of information systems in managing the individual farm-ranch business.

4413*

Agricultural Law. Prerequisites: 1114 and junior standing. Survey of law with emphasis on agricultural problems and applications. Contract law, tort law, property law, real estate transactions, oil and gas leases, business organization, estate planning and credit.

4503*

Environmental Economics and Resource Development. Prerequisite: 3503 or ECON 3113 or consent of instructor. Economic, social and political factors relating to conservation, natural resource development and environmental quality. Valuation of priced and non-priced natural and environmental resources. Analysis of environmental and natural resource policy and the role of public and private agencies in conservation and development.

4513*

Farm Appraisal. Lab 2. Prerequisite: 3413. Estimating the market value of agricultural real estate using the three approaches to value. Determining the feasibility and profitability of land purchases.

4703*

(S)American Agricultural Policy. Prerequisites: 1114 and upper-division standing. Economic characteristics and problems of agriculture; evolution and significance of programs and policies.

4723*

(S)Rural Economic Development. Prerequisite: 1114. Concepts and theories of regional and community economics, including input-output, economic base, simulation, budget location, and routing. Oklahoma applications.

4902*

Agricultural Economics Seminar. Prerequisite: senior standing in agricultural economics. Contemporary problems in agricultural economics; career exploration; agriculture in the economics of the nation and the world.

4911*

Agricultural Economics Seminar. Prerequisite: senior standing in agricultural economics. Contemporary problems in agricultural economics; agriculture in the economics of the nation and the world. Individual seminar reports and group discussion of reports.

4990*

Problems of Agricultural Economics. 1-6 credits, maximum 6. Open to students with consent of instructor only. Research on special problems in agricultural economics.

5000*

Thesis or Report in Agricultural Economics. 1-6 credits, maximum 6. For students working for a M.S. degree in agricultural economics. Independent research and thesis under the direction and supervision of a major professor.

5010*

Professional Experience in Agricultural Economics. 1-6 credits, maximum 6. Prerequisites: approval of internship committee and adviser. Supervised professional experience with approved public and private employers in agricultural economics including banks, production credit associations, federal land banks, soil conservation service, and other agricultural related firms. Credit will not substitute for required courses. Designed for Master of Agriculture program.

5101*

Research Methodology. Prerequisites: selection of a thesis adviser and a thesis topic. Using the scientific method to solve problems in agricultural economics. Written ten-page thesis proposal.

5103*

Mathematical Economics. Prerequisites: differential calculus and ECON 3113. Mathematical tools necessary for formulation and application of economic theory and economic models.

5113*

Applications of Mathematical Programming. The application of concepts and principles of existing linear and nonlinear programming techniques to agricultural problems.

5203*

Advanced Agricultural Prices. Prerequisite: 5103, STAT 4043. Demand and price structures, price discovery, time series and agricultural price research methods.

5213*

Econometric Methods. Prerequisites: 5103 and ECON 4213 or STAT 4043. Application of econometric techniques to agricultural economic problems, theory and estimation of structural economic parameters.

5303*

Agricultural Market Policy and Organization. Marketing firm decisions; structure, conduct and performance of agricultural industries; interregional trade theory; and government policies that influence decisions.

5403*

Production Economics. Prerequisite: 5103. Analysis of micro static production economics problems; factor-product, factor-factor and product-product relationships; functional forms for technical unit and aggregate production functions; maximizing and minimizing choice rules; firm cost structure; scale relationships.

5503*

Economics of Natural and Environmental Resource Policy. Prerequisites: 4503 or ECON 3313 and MATH 2103. Economics of long term resource use with particular emphasis on agricultural and forestry problems. Methods for estimation of nonmarket prices. Cost benefit analysis of long term natural resource use and environmental policy. Elementary computer simulation of long term resource use and environmental policy.

5603*

Advanced Agricultural Finance. Prerequisite: 3603. Financial structure of agriculture, firm financial planning and management, financial intermediation in agriculture and agricultural finance in developing countries.

5703*

Economics of Agriculture and Food Policy. Prerequisites: 4703 and 5103. Application of welfare criteria and economic analysis to agricultural, food and rural development problems and policies.

5713*

Rural Regional Analysis. Prerequisite: 5103. Concepts of market and nonmarket based rural welfare; theories of regional growth as applied to rural areas; methods of regional analysis including computable general equilibrium; analysis of policies and programs for improving welfare of rural population groups.

5723*

Rural Development Planning. Economics of market based planning for developing and developed countries; methods of incentive planning with emphasis on agricultural and rural project analysis; methods of agricultural and rural sector incentive planning with emphasis on general equilibrium results.

5733*

International Agricultural Policy and Development. Review and evaluation of agricultural trade and development policies emphasizing developing countries. Objectives, constraints and instruments of national food and agricultural trade policy in an interdependent world. Efficiency, stability, distribution, equity and market structure in commodity trade.

5990*

Advanced Studies. 1-6 credits, maximum 6. Open to graduate students with consent of instructor only. Investigation in designated areas of agricultural economics.

6000*

Research Problems. 1-15 credits, maximum 24. Open to students pursuing graduate study in agricultural economics beyond the requirements for a master's degree. Independent research and thesis under the direction and supervision of a major professor.

6102*

Teaching Practicum in Agricultural Economics. Lab 4. Prerequisites: two semesters of graduate study in agricultural economics. Philosophies of resident and nonresident teaching, general tasks performed, review, evaluation and lecture organization, preparation and presentation.

6103*

Advanced Applications of Mathematical Programming. Prerequisites: 5103, 5113. General presentation of nonlinear optimization theory and methods followed by applications of nonlinear programming. Use of GAMS/MINOS optimization software package.

6113*

Systems Analysis for Agriculture. Prerequisites: 5103, STAT 4043, knowledge of BASIC or FORTRAN. Methodology of systems modeling developed. Problem definition, design of abstract models and the simulation of dynamic agricultural systems with time delays, storage, feedback and stochastic variation. Theory and application of modeling with differential equations and optimal control procedures.

6213*

Advanced Econometrics. Prerequisites: 5213 or ECON 5243; STAT 4203 and 4213 recommended. Using advanced econometric techniques in applied research. Linear and nonlinear hypothesis testing, non-nested hypothesis tests, Monte Carlo hypothesis testing, stochastic simulation, ARIMA models, and multivariate time series modeling. Extensive use of SAS and SHAZAM statistical software packages.

6300*
Agricultural Marketing Seminar. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Current developments in theory, techniques for evaluating marketing behavior, market legislation and market development.

6303*
Advanced Agricultural Marketing. Prerequisite: 5303. Marketing theory, market structure and performance, governmental regulation and policy, and bargaining in agricultural markets.

6400*
Seminar in Farm Management and Production Economics. 1-6 credits, maximum 6. Prerequisite: 5403 or consent of instructor. Scientific research methodology applied to problems of resource efficiency.

6403*
Advanced Production Economics. Prerequisite: 5403. Micro dynamic production economic problems under risky conditions; recent developments in agricultural risk management, measuring utility, stochastic efficiency and decision theory; potential application of inventory, replacement, simulation, game theoretic, Bayesian and nonlinear programming models in production economics research.

6700*
Agricultural Policy and Rural Resource Development Seminar. 1-2 credits, maximum 2. Frontier issues in agricultural policy, natural resources and rural development.

Agricultural Education (AGED)

3101
Laboratory and Clinical Experiences in Agricultural Education. Preprofessional clinical experiences in agricultural education career areas. Requirements for admission to teacher education, student teaching and internships. Planning courses and experiences to enhance technical skills.

3103
Foundations and Philosophies of Teaching Agricultural Education. Lab 2. Prerequisite: 21 semester credit hours of agriculture with a 2.50 GPA. Roles and responsibilities of the agricultural education teacher; types of program offerings; steps of the teaching-learning process; place of agricultural education in relation to other educational programs in school systems.

3203*
Planning the Community Program in Agricultural Education. Lab 2. Prerequisite: 3103. Determining resources and trends of local communities with respect to agricultural production and agribusiness. Emphasis on agricultural education program policies, FFA chapter advisement, planning and managing the instructional program, identification and completion of records and reports required of a teacher of agricultural education in Oklahoma.

3303*
Leadership Skills for Agricultural Organizations. Identification of styles and roles of leadership; development of leadership techniques and skills required in working with organizations and youth groups; dynamics of group action, methods of resolving conflict, of communicating, of guiding, and of evaluating; ethical considerations for leaders.

3403
Programs and Personnel of the Cooperative Extension Service. Enabling legislation, program areas, teaching methods used, staffing patterns, funding and program administration. Special emphasis on entry-level positions and responsibilities of each.

4103*
Methods and Skills of Teaching and Management in Agricultural Education. Lab 2. Prerequisites: 3203, junior standing in the College of Agriculture, full admission to the University Teacher Education program and concurrent enrollment in 4200. Facets of the teaching-learning process including teaching methods, basic teaching skills, proper classroom management techniques and motivational techniques and ideas. Preparation for student teaching which is to be completed during the same semester.

4200
Student Teaching in Agricultural Education. 10 credits. Lab 30. Prerequisites: 3203, junior standing in the College of Agriculture, full admission to the University Teacher Education program and concurrent enrollment in 4103. Full-time directed experience in an approved agricultural education department. Applications of methods and skills in agricultural education as related to selecting, adapting, utilizing, evaluating curriculum materials and experiences to meet educational goals and facilitate learning for individual students. Roles, responsibilities, interactions, of school personnel and parents. Study of professional education groups and organization and operation of school systems. Graded on a pass-fail basis.

4203*
Nonformal Educational Methods in Agriculture. Prerequisite: junior standing. Preparation of professionals in agriculture and related areas who have career goals directed toward service, management, communications, production and education outside the public school setting. Personal and employment skills essential for success in supervised internships in related career areas. Public relations, presentation skills in a nonformal education setting, community involvement, personal finance, development of the resume, interviewing and functioning as a professional in a supervised internship environment. Same course as AGCOM 4203.

4300
Agricultural Education Internship. 3-6 credits, maximum 6. Prerequisites: professional course sequence and consent of adviser/internship coordinator. Supervised full-time internships in approved county extension offices, agribusinesses or government agencies, for students preparing career paths in agricultural education. Not intended for teacher certification. Maximum credit requires a 12-week internship in addition to a report and final seminar.

4713*
(I)International Programs in Agricultural Education and Extension. World hunger and its root causes. The function of international agencies, organizations, foundation and churches in improving the quality of life for people of the developing nations. Roles of agricultural education and extension at all levels for enhancing the effectiveness of indigenous programs of rural development and adult education.

4990*
Seminar and Problems in Agricultural Education. 1-3 credits, maximum 6. Small group and/or individual study and research in problems relating to programs of occupational education in agriculture.

5000*
Research and Seminar. 1-6 credits, maximum 6. Independent research and thesis under the direction and supervision of a major professor.

5100*
Organizing Curriculum and Programs of Agricultural Education. 1-3 credits, maximum 6. Studies of student and community agricultural needs as bases for localizing, personalizing and utilizing a basic core curriculum and other components essential to effective local agricultural education programs.

5123*
Adult Programs in Agricultural and Extension Education. Determining adult needs, priorities, participation in educational activities and adoption of new ideas and practices. Designing, organizing, conducting, and evaluating adult education programs in agricultural and extension education.

5500*
Directing Programs of Supervised Experience. 1-3 credits, maximum 6. Prerequisite: consent of instructor. Determining the supervised training needs and opportunities of individual students. Planning for supervision of agricultural education training programs and 4-H club projects. Analysis of training opportunities in production agriculture, agricultural businesses and individual career development.

5752*
Leadership in Agriculture. Lab 2. Concepts, principles and philosophies of leadership applied to agricultural contexts. Importance of traits, perceptions and behaviors to success of agricultural professionals in leadership roles. Dimensions and style of leadership for varying situations.

5823*
Advanced Methods of Teaching Agriculture. Advanced concepts and methods relevant for both formal and informal presentations. Effects methods may have on individuals involved in the learning experience. Demonstrations of proficiency in use of various advanced methodologies, technologies and concepts.

5863*
Methods of Technological Change. Processes by which professional change agents influence the introduction, adoption, and diffusion of technological change. Applicable to persons who work closely with people in formal and non-formal educational settings.

5940*
Styles of Leadership for Agricultural Education. 1-3 credits, maximum 8. Study of what leadership is and how current leadership styles have an impact on the success of present day agricultural organizations. Utilization of extensive bank of videotapes of current leaders as reference base for study.

5980*
Research Design in Occupational Education. 1-3 credits, maximum 6. Research tools as aids in decision making. Literature, logic, survey techniques, research design, statistics and the computer are emphasized. Studies in vocational and technical education are reviewed and proposals for graduate research papers prepared.

5990*
Problems in Agricultural and Extension Education. 1-3 credits, maximum 8. Securing and analyzing data related to special problems or investigation in designated areas of agricultural education.

6000*
Research in Agricultural Education. 1-16 credits, maximum 16. Prerequisite: approval of major adviser. Open to students pursuing graduate study beyond the requirements for a master's degree. Independent research and thesis under the direction and supervision of a major professor.

6100*
Developments in Agriculture and Extension Education. 1-3 credits, maximum 6. Developing trends in agricultural and extension education. Pending and anticipated organizational and structural changes and changing emphases in goals and objectives. Functional relationships with other agencies.

6103*
History and Philosophical Foundations of Agricultural and Extension Education. Prerequisite: graduate standing. History and philosophical foundations of agricultural and extension education. Philosophy and its role in life, rise of education in America, philosophical foundations of education in America, legislation having an impact on agricultural and extension education, education in agriculture, and current issues in agricultural extension education.

6120*
Teaching Agriculture in Higher Education. 1-3 credits, maximum 6. The teaching-learning matrix functioning in both undergraduate and advanced study in the field of agriculture. Discriminate review and assessment of recently developed instructional methods and trends.

6200*
County Extension Program Development. 1-3 credits, maximum 6. A systematic study and use of methods of developing county extension programs, giving attention to sources of essential basic information, determination of problems and needs of people, functions of lay people and the various groups of extension workers. Uses of committees, step-by-step procedures, coordinated county and state plans and characteristics of effective programs.

6223*
Educational Program Planning and Evaluation. Prerequisite: graduate standing. Planning and development of educational programs including needs assessment, objectives, development and content and materials selection. Evaluation of instructional extension and other educational programs; formative for program improvement and summative for outcomes accountability.

Agriculture (AG)

1011
Orientation. Required of all freshman in the College of Agricultural Sciences and Natural Resources. Methods of study, advisement system, organization of curriculum and discussion of requirements and career opportunities in various fields of agriculture. Graded on pass-fail basis.

2003
(N)Agriculture and the Environment. A study of agricultural ecosystems for the non-agriculture major. Discussion of contemporary issues related to agriculture and the environment including conservation of natural resources, water quality, use of fertilizer and chemicals, intensive animal production, animal well-being, land utilization, and use of genetically engineered plants and animals.

2112
Microcomputer Techniques in Agriculture. Lab 2. Operation and capabilities of microcomputers in agricultural applications. Simple programming, data analysis, graphical display, spread sheets, word processing.

3010
Internships in Agriculture. 1-3 credits, maximum 12. Supervised internships with business, industry or governmental agencies including cooperating veterinarians. Graded on pass-fail basis.

3090
Study Abroad. 12-18 credits, maximum 36. Prerequisites: consent of the Office of International Programs, major adviser, and assistant or associate dean of the College. Participation in a formal study abroad program spending a semester or year in full-time enrollment at a university outside of the U.S.

4010
Honors Seminar. 1-6 credits, maximum 6. Role of agriculture in society and adjustments to change in the economy.

Animal Science (ANSI)

1124
Introduction to the Animal Sciences. Lab 2. Species adaptability, product standards and requirements, areas and types of production, processing and distribution of products, includes meat animals, dairy and poultry.

1133
Fundamentals of Food Science. Food industry from producer to consumer and the current U.S. and world food situations.

1223
Exploring the Science of Animal Agriculture. Lab 2. An introductory course describing the principles, methods, applications and value of biological research with farm animals. Course also offered for honors credit.

2112
Live Animal Evaluation. Lab 4. Prerequisite: 1124. Using tools for selection including performance records, pedigree information and visual appraisal, in the evaluation of cattle, swine, sheep, horses and poultry.

2123
Livestock Feeding. Lab 2. Nutrients and their functions, nutrient requirements of the various classes of livestock: composition and classification of feed stuffs and ration formulation. Not required of animal science majors.

2253
Meat Animal and Carcass Evaluation. Lab 2. Prerequisite: 1124. Evaluation of carcasses and wholesale cuts of beef, pork and lamb. Factors influencing grades, yields and values in cattle, swine and sheep.

3012
Beef Production. Lab 2. Prerequisites: 1124 and 2123. Modern production and management practices for beef cattle operations. No credit for animal science students with credit in 4612, 4621, 4631 or 4641.

3021
Sheep Production. Lab 2. Prerequisites: 1124 and 2123. Modern production and management practices for sheep operations. No credit for animal science students with credit in 4542.

3031
Swine Production. Lab 2. Prerequisites: 1124 and 2123. Modern production and management practices for swine operations. No credit for animal science students with credit in 4643.

3033
Meat Technology. Lab 3. The basic characteristics of meat and meat products as they relate to quality. Product identification, economy, nutritive value, preservation and utilization. No credit for students with credit in ANSI 2253 or 3333.

3101
Undergraduate Seminar. Prerequisites: 60 credit hours and animal science major status. An in-depth consideration of the various areas of specialization in the field of animal science and their associated career opportunities and obligations.

3113*
Quality Control. Lab 2. Prerequisites: organic chemistry and MICRO 2124 or equivalent. Application of the principles of quality control in food processing operations to maintain the desired level of quality.

3154*
Food Microbiology. Lab 2. Prerequisites: MICRO 2124 and organic chemistry. Relationship of microorganisms to food manufacture and preservation, to food spoilage and microbial food poisoning and to various aspects of primary food production. Same course as MICRO 3154.

3182
Meat Grading and Selection. Lab 4. Prerequisite: 2253. Classifying and grading carcasses and wholesale cuts of beef, pork and lamb; factors influencing quality and value.

3210
Animal and Product Evaluation. 1-2 credits, maximum 4. Prerequisite: consent of instructor. Advanced instruction in evaluating slaughter and breeding animals, and grading and evaluating meat, poultry and dairy products.

3242
Advanced Live Animal Evaluation. Lab 4. Prerequisite: 2112. Visual and objective appraisal of beef cattle, sheep, swine and horses.

3301
Food Sanitation Laboratory. Lab 2. Prerequisites: 3302 or concurrent enrollment, and MICRO 2124. Exercises to illustrate qualitative or quantitative methods for monitoring foods, food ingredients or processing procedures and equipment for proper attainment of sanitation.

3302
Food Sanitation. Prerequisite: organic chemistry. Principles of sanitation in food processing, distribution, preparation and service. Emphasis on control of food spoilage and food-borne illnesses.

3333*
Meat Science. Lab 3. Prerequisites: 2253, CHEM 1215 or equivalent. Anatomical and basic chemical and physical characteristics of meat animals studied. The application of scientific principles to the processing and economical utilization of meat animals, as well as in the manufacture of meat products, emphasized in the laboratory.

3373
Food Chemistry. Lab 2. Prerequisite: 3543 or organic chemistry. Basic composition, structure and properties of foods and the chemical changes or interactions that occur during processing and handling.

3422
Horse Management and Production. Nutrition, feeding, reproduction and physical conditioning of horses. Current management concepts as they apply to the health and well being of horses.

3423*
(N) Animal Genetics. Prerequisite: introductory biology. The basic principles of heredity including: kinds of gene action, random segregation, independent assortment, physical and chemical basis of heredity, mutations, sex-linkage, chromosome mapping, multiple alleles and chromosomal abnormalities. Also a brief introduction to quantitative inheritance and population genetics.

3433*
Animal Breeding. Lab 2. Prerequisite: 3423. The application of genetic principles to livestock improvement; study of the genetic basis of selection and systems of mating; and the development of breeding programs based on principles of population genetics.

3443*

Animal Reproduction. Lab 2. Prerequisite: Introductory biology. Physiological processes of reproduction in farm animals, gonadal function, endocrine relationships, fertility and factors affecting reproduction efficiency. Emphasis on principles of artificial insemination in the laboratory.

3493*

Marketing and Utilization of Milk. Lab 2. Prerequisites: 1124 and AGEC 1114. Marketing and utilization of milk, pricing, quality controls, procurement, processing and utilization, product distribution and factors affecting consumption.

3523

Pet and Companion Animal Management. Current concepts and management principles related to pet and companion animal species and their roles in society. Discussion of the human-animal bond, service animals, kennel and cattery management, anatomy, internal and external parasites, toxins, restraint and handling, training, reproduction, nutrition, genetics and breeding.

3543

(N) Principles of Animal Nutrition. Prerequisite: CHEM 1215 or equivalent. Basic principles of animal nutrition including digestion, absorption and metabolism of the various food nutrients; characteristics of the nutrients; measure of body needs; ration formulation.

3603*

Processing Dairy Foods. Lab 3. Prerequisites: MICRO 2124 and organic chemistry. Theory and practice in formulation and processing: butter and margarine, cottage cheese, blue and processed cheeses; evaporated and sweetened condensed milk; ice cream; ice milk and other frozen desserts.

3612*

Rangeland and Pasture Utilization. Lab 2. Prerequisite: AGRON 3213 or 3913. Integration of livestock production with rangeland and pasture management practices.

3653*

Applied Animal Nutrition. Lab 2. Prerequisite: 3543. Composition, characteristics and nutritive value of feeds and ration additives; qualitative and quantitative nutrient requirements of each of the classes of livestock; formulation of rations for each of the classes of livestock.

3753

Basic Nutrition for Pets. Nutrients, nutrient requirements, feeding practices, food sources and diet management for pets and companion animals as well as exotic animals and birds.

3763*

Analysis of Food Products. Lab 2. Prerequisite: organic chemistry. Application of quantitative chemical and physical methods of analysis to the examination of foods.

3903

(I)Agricultural Animals of the World. The production and utilization of agricultural animals by human societies.

4023

Poultry Science. Lab 2. Prerequisites: 1124, and 2123 or 3543. The relationship of the biological concepts and functions of poultry to management practices, incubation procedures, and economic factors utilized by poultrymen in the commercial production of table and hatching eggs, broilers, turkeys and other poultry meat.

4333*

Processed Meat. Lab 3. Prerequisite: 3033 or 3333. Meat and meat product composition. Techniques in the molding and forming of meat; sausage formulation; curing; quality control; and cost analysis.

4423

Horse Science. Lab 2. Prerequisites: 3433, 3443 and 3653. Current concepts and production principles related to the horse industry including nutrition, reproduction, herd health, functional anatomy and implications, social behavior, and applying principles of psychology in horse management and training.

4543*

Dairy Cattle Science. Lab 2. Prerequisites: 3433, 3443 and 3653. Organization and managerial efficiency in dairy farm businesses. Principles related to current and future systems of milk production, feeding and waste disposal and other involved systems.

4553*

Sheep Science. Lab 2. Prerequisites: 3433, 3443 and 3653. Breeding, feeding, management and marketing of commercial and purebred sheep.

4613*

Cow-Calf and Purebred Beef Cattle Management. Lab 2. Prerequisites: 3433, 3443, and 3653. Application of scientific knowledge, management principles and research advances to modern commercial cow-calf and purebred beef cattle production.

4632*

Stocker and Feedlot Cattle Management. Lab 2. Prerequisites: 3612, 3653. Application of scientific knowledge, management principles and research advances to modern stocker and feedlot cattle operations.

4643*

Swine Science. Lab 2. Prerequisites: 3433, 3443 and 3653. Application of genetic, physiological, microbiological, nutritional and engineering principles to the efficient production of swine.

4712

Livestock Sales Management. Lab 2. Prerequisite: 3433. Advertising of purebred livestock; performance data and breeding values in the merchandising of purebred livestock; photography and ad copy layout; conduct of an actual livestock auction, including animal selection, advertising, catalog and animal preparation, clerking, receipt of payments, sales budgets and transfer of registration papers.

4803*

Animal Growth and Performance. Prerequisite: an upper-division course in animal science. Physiological and endocrine factors affecting growth and performance of domestic animals.

4843

Applications of Biotechnology in Animal Science. Lab 3. Prerequisites: 3423 and BIOCH 3653. Training in current biotechniques used in protein, hormone and molecular genetic research in food and animal science. Theory and applications of the various techniques.

4863

Capstone for Animal Agriculture. Lab 2. Prerequisite: senior standing. Examination of the role of animal agriculture in society, the importance of research and current issues. Oral and written reports.

4900

Special Problems. 1-6 credits, maximum 6. Prerequisite: consent of instructor. A detailed study of an assigned problem by a student wishing additional information on a special topic.

4910*

Animal or Food Industry Internship. 3-12 credits, maximum 12. Prerequisite: consent of instructor. Full-time internship at an approved production, processing or agribusiness unit or other agency serving animal agriculture. Maximum credit requires a six-month internship in addition to a report and final examination. Graded on a pass-fail basis.

4973

Rangeland Resources Planning. Lab 3. Prerequisites: 3612 and AGRON 4954. Inventory or ranch resources, survey and evaluation of ranch practices, and economic analysis. Development of a comprehensive ranch management plan. Managing rangeland and ranch resources in a social context. Written and oral reports. Field trips required. Same course as AGRON 4973.

5000*

Research and Thesis. 1-6 credits, maximum 6. Independent research planned, conducted and reported in consultation with a major professor.

5010*

Special Problems. 1-3 credits, maximum 6. Special problems in areas of animal science other than those covered by the individual graduate student as a part of his research and thesis program.

5110*

Seminar. 1 credit, maximum 3. A critical review and study of the literature; written and oral reports and discussion on select subjects.

5113*

Basic Reproductive Physiology. Prerequisite: ZOO 3204. Female and male reproductive processes, the influences of environmental factors upon these processes and the application of reproductive physiology to animal production. Same course as VIDP 5413.

5120*

Special Topics in Food Science. 1-4 credits, maximum 4. Prerequisites: graduate standing and/or consent of instructor. Advanced topics and new developments in food science especially with reference to foods of animal origin.

5213*

Advances in Meat Science. Prerequisites: BIOCH 4113 and ZOO 3204 or equivalent. Development of muscle and its transformation to meat. Properties of meat and their influence on water-binding, pigment formation, texture and fiber characteristics.

5303*

Advanced Animal Breeding. Prerequisites: 3433 or equivalent and STAT 4013. Basic concepts of population genetics as related to theoretical animal breeding including heritability, genetic correlations, selection methods, inbreeding and heterosis.

5733*

Advanced Ruminant Nutrition. Lab 2. Prerequisite: 3653. Factors influencing nutrient requirements of ruminants for maintenance, growth, reproduction, and lactation, and their implications with regard to husbandry practices and nutritional management of livestock; application of current concepts of ruminant livestock nutrition; use of microcomputer programs in diet evaluation and formulation, beef gain simulation, and problem solving.

5742*

Rumenology. Prerequisite: 3653 or equivalent. Physiology of development of the ruminant digestive tract; the nature of, and factors controlling, digestion and absorption from the tract to include the relative nature and roles of the rumen bacteria and protozoa.

5751*

Rumenology Laboratory. Lab 3. Prerequisite: 5742 or concurrent enrollment. Demonstrations and practice of basic techniques used in nutritional and physiological research investigations with the ruminant animal including cannulations, passage measurements, microbiology and in vitro rumen fermentation.

5763*

Advanced Nonruminant Nutrition. Prerequisite: BIOCH 3653. An in-depth study of the digestion, absorption and metabolism of nutrients in nonruminant domesticated farm animals. Unique metabolic characteristics of nonruminant species contrasted with ruminant animals. Fundamentals of energetics as related to animal performance.

5772*

Protein Nutrition. Prerequisite: BIOCH 5753. Nutritional, biochemical and clinical aspects of protein metabolism as it relates to nutritional status.

5782*

Vitamin and Mineral Nutrition. Prerequisite: BIOCH 5753. Development of the concept of dietary essential minerals and vitamins. Individual minerals and vitamins discussed for animal species from the standpoint of chemical form, availability, requirements, biochemical systems, deficiencies and excesses, and estimation in foods and feed.

6000*

Research and Thesis. 1-10 credits, maximum 30. Prerequisite: M.S. degree. Open only to students continuing beyond the level of the M.S. degree. Independent research, planned, conducted and reported in consultation with and under the direction of a major professor.

6003*

Population Genetics. Prerequisites: 5303 or equivalent and STAT 4023. Population concept of genetics with emphasis on qualitatively inherited traits and statistical techniques utilized in population genetics. Gene and genotypic frequencies, estimation of genetic parameters within a population and the forces which can alter the magnitude of these genetic parameters and inbreeding.

6010*

Special Topics in Animal Breeding. 1-3 credits. Prerequisite: consent of instructor. Advanced topics and new developments in animal breeding and population genetics.

6110*

Seminar. 1 credit, maximum 3. A critical analysis of the objectives and methods of research in the area of animal science. Review of the literature, written and oral reports and discussion on select topics.

Anthropology (ANTH)

2353

General Anthropology. Anthropology, emphasizing the study of human physical evolution (physical anthropology) and cultural evolution (archaeology).

3353*

(S)Cultural Anthropology. Introduction to culture, various subdisciplines of cultural anthropology, anthropological concepts and capsule ethnographies of assorted ethnic groups.

3823

(S)North American Indian Cultures. Pre-contact and traditional subsistence patterns, social organization and ideology with emphasis on specific groups in each culture area.

4123*

Archaeology of North America. Factors influencing the initial peopling of North America, the spread and diversification of hunting and gathering economies, the rise of agricultural systems and emergence of extensive and complex political units.

4633*

(S)Racial and Cultural Minorities. Ethnic and racial groups in contemporary pluralistic society, including a cultural-historical perspective on their origins, social relations, value systems and goals.

4823*

Contemporary Native Americans. Cultural adaptations of North American Indians within both contemporary 'traditional' communities and urban settings. Federal programs and current problems as they relate to the adaptational processes.

4883*

(S)Comparative Cultures. Compares environments, economies, social and political organizations and other aspects of culture among selected literate and preliterate societies.

4990*

Special Topics in Anthropology. 1-3 credits, maximum 6. Prerequisite: consent of instructor. Directed readings or research on significant topics in anthropology.

Applied Behavioral Studies in Education (ABSE)

3013

Leadership Concepts. Prerequisite: 12 hours completed course work. Increases undergraduate student competence through the study of leadership concepts. Stresses communications, decision-making, leadership styles and theories and group dynamics. Attempts integration of theoretical concept with reality of application within the university community.

3092

Student Development Training for Resident Assistants. Theories of student development. Topics include helping skills, community building, communication skills, and multicultural sensitivity. Application of theory to living groups.

5793*

Intellectual Assessment of Children and Youth. Prerequisites: 5783 or consent of instructor; admission to the psychometry or school psychology program, counseling psychology program, or clinical psychology program. Intensive study of the Wechsler Scales, the Stanford-Binet and other selected tests of mental ability. Emphasis and practice in administration, scoring and interpretation. Issues related to report writing and non-discriminator assessment.

6610*

Doctoral Internship in School Psychology. 3-6 credits, maximum 6. Prerequisites: admission to school psychology doctoral program, completion of all course work, completed readiness for internship form, and approved by school psychology faculty. Supervised experience of doctoral school psychologists for final preparation to enter the profession of school psychology.

Architecture (ARCH)

1111

Introduction to Architecture. Lab 2. An introduction to the School of Architecture and OSU resources and how to use them. Introduction to the professions of architecture and architectural engineering and the issues facing these professions in the next century. Introduction to the educational processes and objectives required for becoming a professional architect or architectural engineer.

1216

Architectural Design Studio I. Lab 16. Architectural graphics and design fundamentals.

2003

(H,I)Architecture and Society. Design, planning and building considered in their social and aesthetic contexts.

2024

Statics and Strength of Materials. Lab 2. Prerequisites: grade of "C" or better in PHYSC 1114 or PHYSC 2014 and MATH 2145. Resultants of force systems, static equilibrium of rigid bodies and statics of structures. Shear and bending moments, deformation and displacements in deformable bodies.

2100

Architectural Studies. 2-4 credits, maximum 4. Lab 6-12. Beginning studies in graphics and design in architecture.

2116

Architectural Design Studio II. Lab 16. Prerequisite: grade of "C" or better in 1216. Problems in architectural design.

2216

Architectural Design Studio III. Lab 16. Prerequisite: grade of "C" or better in 2116. Problems in architectural design.

2263

Building Systems and Materials. Prerequisite: grade of "C" or better in 2116. Architectural, structural, environmental control systems and materials in architecture.

3073

(H)History and Theory of Greek and Roman Architecture. Prerequisite: 2003. History and theory of the ancient greek and roman periods of architecture.

3083

(H)History and Theory of Baroque Architecture. Prerequisite: 2003. History and theory of renaissance architecture in the western world particularly the later, baroque period.

3100

Special Topics. 2-6 credits, maximum 6. Subjects to be selected by the faculty in architecture from advances in state-of-the-art areas.

3116

Architectural Design Studio IV. Lab 16. Prerequisites: grade of "C" or better in 2216 and admission to third year. Problems in architectural design.

3134

Environmental Control: Thermal Systems and Life Safety. Lab 2. Prerequisite: MATH 1715 or MATH 1513. A survey of the fundamentals of thermal comfort, energy concerns and mechanical systems for buildings as well as the basic principles of life safety.

3216

Architectural Design Studio V. Lab 16. Prerequisite: grade of "C" or better in 3116. Problems in architectural design.

3223

Structures: Timbers. Lab 2. Prerequisite: grade of "C" or better in 3323. Analysis and design of timber structures used in architecture.

3243

Structures: Analysis I. Prerequisite: grade of "C" or better in ENGSC 2143. Structural theory for applications in architecture.

3253

Computer Applications in Architecture I. Prerequisite: concurrent enrollment in ARCH 3216. Introduction to 2-D and 3-D AUTOCAD and plotting and their application in the design process.

3323

Structures: Steel I. Lab 2. Prerequisite: grade of "C" or better in 2113. Analysis and design of steel structures used in architecture.

3433*

Environmental Control: Acoustics and Lighting. Prerequisite: MATH 1513 or 1715. A survey of architectural acoustics, electrical and lighting systems for buildings.

- 3453**
Computer Applications in Architectural Engineering. Prerequisite: admission to the professional school or consent of instructor. Computer applications in architectural engineering introducing AUTOCAD; computer programming; and the use of commercial analytical software.
- 4033***
Advanced Architectural Acoustics Design. Prerequisite: 3433. The analysis and design of acoustically-critical spaces including open-plan offices, music facilities, studios, theaters, etc. The course includes a design project of the student's choice.
- 4073***
(H)History and Theory of Early Modern Architecture. Prerequisite: 2003. History and theory of modern architecture in the western world from the industrial revolution to the early twentieth century.
- 4083**
(H)History and Theory of English and Early American Architecture. Prerequisite: 2003. English renaissance architecture from 1483 to 1837 and its importance to developments in early American architecture.
- 4117**
Architectural Design Studio VI. Lab 20. Prerequisite: grade of "C" or better in 3216. Problems in architectural design.
- 4123***
Structures: Concrete I. Lab 2. Prerequisite: grade of "C" or better in 3223. Analysis and design applications in architectural problems using concrete structures.
- 4144***
Structures: Steel II. Lab 2. Prerequisite: grades of "C" or better in 3323 and 3243. Design and analysis of multi-story steel frames, trusses, arches and other architectural structure components.
- 4183***
History and Theory of Architecture: Cities. Prerequisite: 2003. The development of cities as an aspect of architecture from ancient times to the twentieth century.
- 4193***
Marketing Professional Services. Prerequisite: 3116. Business development aspects of design firm management, including: marketing plan development; marketing organization; strategies and tools; selling techniques and contract negotiating.
- 4217***
Architectural Design Studio VII. Lab 20. Prerequisite: grade of "C" or better in 4117. Problems in architectural design.
- 4243***
Structures: Foundations for Buildings. Prerequisite: 4123 or concurrent enrollment. Interaction of frames and supports for structures used in architecture. Subsurface conditions and design of foundation systems and retaining walls for buildings.
- 4373***
Field Study in Europe I. Prerequisite: senior standing in architecture or consent of instructor. On-site analysis and study of European architecture, culture and urban design.
- 4443***
Structures: Analysis II. Lab 2. Prerequisite: grades of "C" or better in 3243 and 3453. Mathematical formulation of architectural structural behavior. Matrix applications, finite element, finite differences, stability considerations and three-dimensional structural modeling.
- 5000***
Special Problems. 1-6 credits, maximum 6. Lab 3-18. Prerequisite: consent of instructor and head of the School. Theory, research or design in related disciplines. Plan of study to be determined jointly by student and graduate faculty.
- 5023***
Masonry Design and Analysis. Prerequisite: grade of "C" or better in 4123. Analysis and design of low-rise masonry structures and multi-story masonry shear walls including, code requirements, analysis techniques, design of components and detailing of architectural engineering contract documents, conforming to the relevant codes.
- 5073***
History and Theory of the Architecture of Frank Lloyd Wright and His Contemporaries. Prerequisite: 4073. A study of the architecture of Frank Lloyd Wright and his contemporaries in the late 19th and early 20th centuries.
- 5083***
History and Theory of Japanese Architecture. Prerequisite: admission to the professional school or consent of instructor. Historical Japanese architecture from 200 BC to 1980; Shinto, Buddhist, Zen Sukiya, Zukuri, Minka and contemporary subjects.
- 5100***
Special Topics. 3-6 credits, maximum 15. Subjects to be selected by the graduate faculty in architecture to cover state-of-the-art advances.
- 5119***
Architectural Design and Development. Lab 24. Prerequisites: for architecture majors: grade of "C" or better in 3134, 3433, 4123, 4217; for architectural engineering majors: grade of "C" or better in 3116, 3134, 3433, 4123. Design and detailed development of a major architectural project integrating all aspects of architecture and related disciplines in a professional manner and milieu.
- 5133***
Advanced Energy Issues in Architecture. Prerequisite: 3134. Design-oriented passive energy control strategies for use in contemporary architecture. Energy issues and theoretical concepts interspersed with practical design exercises.
- 5173***
History and Theory of Architecture: Medieval. Prerequisite: 2003. Architecture of Western Europe from the Dark Ages to the beginning of the Renaissance including Romanesque and Gothic.
- 5193***
Management of Architectural Practice. Prerequisite: fifth-year standing in architecture or architectural engineering or consent of instructor. Principles of management as applied to the private practice of architecture and architectural engineering.
- 5216***
Architectural Design Studio: Competitions. Lab 18. Prerequisite: grade of "C" or better in 5119 or consent of instructor. Problems in architectural design through national and international student design competitions.
- 5233***
Advanced Architectural Lighting Design. Prerequisite: 3433. Lighting applications in contemporary architectural design, including offices, schools, churches and health care facilities. Applications of the principles learned to a design of the student's choice.
- 5243***
Structures: Special Loadings. Prerequisites: MATH 3013 and grade of "C" or better in 4443 and ENGSC 2123. Mathematical formulations and modeling in architectural structures. Human response to vibrations. Seismic design in building. Design for extreme winds on buildings. Approximate methods for preliminary design of architectural structures.
- 5244***
Structures: Concrete II. Lab 2. Prerequisite: grades of "C" or better in 4123 and 4144. Design and analysis of multi-story reinforced concrete frames and prestressed and post-stressed concrete structural components used in architecture applications.
- 5293***
Architectural Project Management. Prerequisite: fifth-year standing in architecture or consent of instructor. Principles of management as applied to architectural and architectural engineering projects.
- 5373***
Field Study in Europe II. Prerequisite: senior standing in architecture or consent of instructor. On-site analysis and study of European architecture, culture and urban design.
- 6000***
Special Problems. 1-15 credits, maximum 15. Lab 3-18. Prerequisite: consent of instructor and head of School. Theory, research or design investigation in specific areas of study in the field of architecture and its related disciplines. Plan of study determined jointly by student and graduate faculty.
- 6053***
Computer Applications in Architecture. Lab 3. Prerequisite: MECDT 4013 or equivalent or consent of instructor. State-of-the-art applications of computers to the practice of architecture and architectural engineering.
- 6073***
History and Theory of Non-Western Architecture. Prerequisite: graduate standing or consent of instructor. Architecture in the non-Western and pre-Columbian world.
- 6083***
History and Theory of Contemporary Architecture. Prerequisite: graduate standing or consent of instructor. American architecture beginning in the 16th century through the 20th century.
- 6100***
Special Topics. 3-6 credits, maximum 15. Subjects selected by the graduate faculty in architecture to cover state-of-the-art advances.
- 6113***
Creative Component Research. Prerequisite: admission to graduate program. Data gathering, analysis and program formulation related to creative component.
- 6117***
Graduate Design Studio I. Lab 20. Prerequisite: admission to graduate program. Problems in architectural design.
- 6183***
Architecture Seminar I. Prerequisite: admission to graduate program or consent of instructor. Architectural criticism.
- 6193***
Financial Management for Architects and Engineers. Prerequisite: 3116. Financial aspects of design firm management, including fundamentals of finance, profit planning and control, cash management and analysis of financial statements.

6206*
Creative Component in Architectural Engineering. Lab 18. A design project based on a program previously developed by the student, to include a written report and supporting documents when appropriate. Must be approved by the project adviser and completed in the final semester of the graduate program.

6207*
Creative Component in Architecture. Lab 20. Prerequisite: 6117. A design project based on a program previously developed by the student to include a written report and supportive documents when appropriate. Must be approved by the project adviser and completed in the final semester of the graduate program.

6214*
Graduate Design Studio. Lab 12. Prerequisite: 6117. Independent projects or competitions. May be combined with 6206 with approval of adviser.

6244*
Structures: Analysis III. Prerequisite: grade of "C" or better in 4443. Analysis techniques for architectural structures including stability, space frames, computer applications, guyed towers and project research.

6283*
Architecture Seminar II. Seminar for graduate students only. Architectural criticism.

6343*
Structures: Steel III. Prerequisite: grade of "C" or better in 4144. Plastic analysis and design of structural steel frames utilizing load and resistance factor design.

6543*
Structures: Concrete III. Prerequisite: grade of "C" or better in 5244. Design of prestressed concrete structures, including pre- and post-tensioning.

Art (ART)

1103
Drawing I. Lab 6. A freehand drawing experience designed to build basic skills and awareness of visual relationships. A sequence of problems dealing with composition, shape, volume, value, line, gesture, texture and perspective. A variety of media explored.

1113
Drawing II. Lab 6. Prerequisite: 1103. Objective and subjective approaches to visual problem solving in a variety of black and white and color media. The analysis and manipulation of form, light, space, volume, and the formal aspects of perspective.

1203
Color and Design. Lab 6. Introduction to visual problem-solving. Organization of the two-dimensional plane; line, shape, value, texture, and color theory dealing with its visual and psychological aspects.

1803
(H)Introduction to Art. An introduction to the analysis and interpretation of visual arts. Visual, emotional and intellectual aspects of art in painting, sculpture, printmaking and architecture.

2113
Life Drawing. Lab 6. Prerequisites: 1113, 1203. Introduction to life drawing with emphasis on preliminary linear construction and structural aspects of the figure, including the study of general body proportions, rapid visualization and figure-ground relationships.

2203
Three-dimensional Design. Lab 6. Prerequisites: 1103 and 1203. Exploration of three-dimensional form and space stressing organization of design elements, development of concepts and manipulation of materials. Investigation of linear space, modular ordering, mass/volume and color through projects of a conceptual and applied nature.

2213
Color Theory. Lab 6. Prerequisites: 1103, 1203. Intensive, structured investigation into the nature and properties of color. Hue, value, chroma, and additive color mixing theory as well as the expressive qualities, symbolic potential, and psychological impact of pigment color.

2403
Illustration I. Lab 6. Prerequisite: 2113. Introduction to historic and contemporary illustration and consideration of a wide range of illustrative styles. Required experiments with media and consideration of alternate ways of illustrating a message through conceptual and compositional variations.

2413
Typography I. Lab 6. Prerequisites: 1113, 1803. An investigation of letter forms and their characteristics and a study of spacing, leading, type selection, layout alternatives, type specification and copy fitting. Preliminary introduction to typography as a communication medium. An understanding of typographic terminology and measuring systems while developing hand skills and introducing computer technology.

2423
Graphic Design I. Lab 6. Prerequisite: 1113, 1803. Exploration of basic design principles—line, form and color, as visual communication. Problem solving, generation of ideas, development of concepts and the integration of word and image. Technical and presentation skills.

2603
(H) Art History Survey I. A study of the arts, artists, and their cultures from prehistoric times through the Early Renaissance.

2613
(H) Art History Survey II. A study of the arts, artists, and their cultures from the Early Renaissance to the present.

3110
Life Drawing Studio. 3 credits, maximum 9. Lab 6. Prerequisite: 2113. The development of formal and expressive aspects of drawing by direct observation of the figure and its environment. Emphasis on media experimentation, aesthetic considerations, personal concepts, and anatomy.

3123
Oil Painting. Lab 6. Prerequisites: 1103, 1113, 1203, 1803, 2203, 2213, or consent of instructor. The development of skills in oil painting stressing form and content, visual perception and individual expression. Technical instruction applicable to individual problems and needs.

3133
Watercolor Painting. Lab 6. Prerequisites: 1103, 1113, 1203, 1803, 2203, 2213 or consent of instructor. The development of skills in watercolor painting stressing form and content, visual perception and individual expression. Structured assignments in color mixing, wet-on-dry techniques, wet-into-wet techniques, brush handling, paper supports and surface manipulation.

3323
Sculpture I. Lab 6. Prerequisites: 1103, 1113, 1203, 1803, 2203, 2213 or consent of instructor. Studies in clay and plaster. Subtractive and additive processes. Emphasis on sculptural ideas, methods and materials.

3333
Sculpture II. Lab 6. Prerequisite: 3323. Non-ferrous metal casting. Basic welding techniques using oxy-acetylene, electric arc and T.I.G. methods. Emphasis on concepts, form, methods, and materials.

3343
Jewelry and Metals. Lab 6. Prerequisites: 1103, 1113, 1203, 1803, 2203, 2213 or consent of instructor. Fabrication and forming techniques for non-ferrous metals. Cold joinery, silver soldering, surface treatment and elementary stone setting. Applications toward either wearable or small scale sculptural format.

3403
Illustration II. Lab 6. Prerequisite: 2403. Exploration of illustrative solutions to maximize visual interest via varied viewpoints, concepts and altered reality. Projects involving different career areas within the field of illustration. Requirements and advantages of each area.

3413
Typography II. Lab 6. Prerequisite: 3423. Exploration of typographic communication through a variety of problems. Type as the visual solution with emphasis on its functional, decorative and creative applications. Solution of more complex typographic problems, dealing with a large body of information via the development of grid systems.

3423
Graphic Design II. Lab 6. Prerequisites: 2413, 2423. Use of computer and traditional methods to enhance production skills and solution of design projects from concept to the comprehensive. Evaluation and design of symbols and logos and their various applications, leading to an understanding of system design. Introduction to graphic design production and the preparation of art for reproduction.

3433
Applied Graphic Design. Lab 6. Prerequisite: 3423. Design problems with special attention to signage, exhibition design, packaging, display, and point of purchase. Use of model-building tools and study of structure and form to introduce the student to problem-solving and finishing techniques. Development of concepts into models.

3503
Ceramics. Lab 6. Prerequisites: 1103, 1113, 1203, 1803, 2203, 2213 or consent of instructor. Methods of clay preparation, hand building, wheel forming methods, methods of decoration and glazing, firing and kiln construction. Involvement with ceramic materials and processes.

3603
(H) History of Classical Art. Stylistic, philosophical and formal qualities of art in the Classical world. The creation of the Greek Ideal and its dissemination in the Roman world through architecture, sculpture, and painting.

3613
(H) History of Medieval Art. Architecture, sculpture, painting and mosaic in the Christian world, c. 400-1400. Early Christian and Byzantine periods in Southern Europe and concurrent developments in the North, including Carolingian, Romanesque and Gothic.

3623
(H) History of Italian Renaissance Art. Architecture, sculpture and painting in Italy, c.1300-1580. Major artists in their local contexts (e.g. Leonardo in Milan, Michelangelo in Florence, and Titian in Venice).

- 3633**
(H) History of Baroque Art. Art in 17th century Europe. Architecture, sculpture and painting of the Catholic Reformation (e.g. Caravaggio and Bernini in Italy, Velasquez in Spain, Rubens in Flanders), concluding with painting in non-sectarian, Protestant Netherlands (Rembrandt and Vermeer).
- 3643**
History of Graphic Design. Evolution of graphic communication from prehistoric times to the present. Investigation of the origins of printing and typography in Europe leading to the design of the printed page, the impact of industrial technology upon visual communication and the study of the growth and development of modern graphic design.
- 3653**
(H) History of 19th Century Art. Art of 19th century Europe—Ideals, conflicts, escapes and triumphs, beginning with the French Revolution and ending in 1900.
- 3663**
(H)History of American Art. Visual arts in America from the Colonial period to the present. Major styles, ideas and uses of material in architecture, painting, sculpture and design.
- 3673**
(H)History of Northern Renaissance Art. Art in Northern Europe, c. 1200-1550. Panel painting in the Netherlands (e.g. Van Eyck, Bosch), and book illustration in Germany (Dürer).
- 3683**
(H,I)History of 20th Century Art. Beginning with the birth of "modernism" in the late 19th century, exploration of the fast-changing artistic styles of the 20th century: abstraction, expressionism, fantasy, realism, surrealism, and social protest. Emphasis on the relationship of art and 20th century society.
- 3693**
(H,I)Survey of Asian Art. Arts of India, China, Japan and related countries in their historical and cultural settings. Traditions of painting, sculpture and architecture from their beginnings to the modern period.
- 3700**
Printmaking: Relief. 3 credits, maximum 9. Lab 6. Prerequisites: 1103, 1113, 1203, 1803, 2203, 2213, or consent of instructor. Understanding and control of carving, processing and creating prints from wood, linoleum and plastic. Development of images utilizing both traditional and contemporary approaches to relief printmaking.
- 3720**
Printmaking: Intaglio. 3 credits, maximum 9. Lab 6. Prerequisites: 1103, 1113, 1203, 1803, 2203, 2213 or consent of instructor. Understanding and control of intaglio techniques; preparation, processing, and editioning of images from metal plates. Development of concepts and images through traditional and contemporary approaches to the intaglio process.
- 3730**
Printmaking: Lithography. 3 credits, maximum 9. Lab 6. Prerequisites: 1103, 1113, 1203, 1803, 2203, 2213 or consent of instructor. Understanding and control of the procedures of drawing, processing and printing editions from stones and metal plates. Development of concepts and images through the medium of lithography.
- 4100**
Advanced Drawing. 3 credits, maximum 9. Lab 6. Prerequisite: 3110. Investigation of drawing stressing thematic development, abstract ideas and individual imagery.
- 4120**
Oil Painting Studio. 3 credits, maximum 9. Lab 6. Prerequisite: 3123. Oil painting with emphasis on personal development of visual ideas and technique.
- 4130**
Watercolor Studio. 3 credits, maximum 6. Lab 6. Prerequisite: 3133. Structured assignments with exploration of individual concepts, ideas and imagery to reinforce growth of technical skills and personal painting style in watercolor.
- 4330**
Sculpture Studio. 3 credits, maximum 9. Lab 6. Prerequisite: 3333. A broad-based course which allows students to pursue individual interests using a variety of materials and processes. Emphasis on further development of concepts, skills and techniques.
- 4340**
Jewelry and Metals Studio. 3 credits, maximum 9. Lab 6. Prerequisite: 3343 or consent of instructor. Metalworking processes including casting, rubber modeling, and advanced stone setting. Consideration of non-metal media. Emphasis on development of materials and ideas through conceptual problems.
- 4413**
Computer Graphics and Image Enhancement. Lab 6. Prerequisites: 3403 or 3423; graphic design major or consent of instructor. Use of computer software to capture, create and alter electronic images for use in graphic design and illustration applications with an emphasis on concept and thematic development. Skillful production of portfolio pieces via learned software.
- 4420**
Graphic Design Studio. 3 credits, maximum 9. Lab 6. Prerequisite: 4413. Design and production of projects suited to the professional portfolio. Discussion of practical issues including career options, resume and portfolio preparation, and interview techniques.
- 4430**
Illustration Studio. 3 credits, maximum 9. Lab 6. Prerequisites: 3403, 4413. Conceptual development and production of illustrations in series. Development of individual style and assembly of a professional and consistent portfolio.
- 4453**
Computer Graphics, Three-dimensional Modeling and Animation. Lab 6. Prerequisites: 4420 or 4430 and consent of instructor. Use of computer software to create three-dimensional objects in an artificial three-dimensional space leading to storyboard design, animation scripts and the production of animation sequences to video.
- 4493**
Portfolio Capstone. Lab 6. Prerequisites: 4420 or 4430 and consent of instructor. Final preparation of a professional portfolio, culminating in an extensive design project and the design, organization and production of an exhibition of work. Professional study on setting fees, writing contracts, working with an agent and other business practices.
- 4500**
Ceramics Studio. 3 credits, maximum 9. Lab 6. Prerequisite: 3503. Continued explorations of ceramic arts: glazes, clay bodies, methods of forming, decorating and firing. Continued emphasis on the relation between visual unity and individual expressive concepts as these apply to both utilitarian and conceptual forms.
- 4603**
(H)History of Ancient Egyptian Art. Broad survey of ancient Egyptian art and architecture from Pre-dynastic to the beginning of the Christian Era under Roman rule (4000 B.C.-320 A.D.) Discussion within the context of religious meaning and overall cultural development of ancient Egypt.
- 4613**
(H)Art Since 1945. Art and art theory from 1945 to the present. Major trends of abstract expressionism, pop art, minimalism, photorealism and conceptual art. Theories and intellectual bases of each movement as well as major critical responses.
- 4623**
(H)History of Prints and Printmaking. A survey of graphic art in Europe and the United States, c. 1450-1950. Woodcut, intaglio and lithography by major masters (e.g. Dürer, Rembrandt, Goya, Picasso). Print as a document of social history in the West.
- 4653**
(H,I)History of Indian Art. The history and culture of South Asia (India and Pakistan) are explored through its arts—architecture, sculpture, painting and design.
- 4663**
(H,I)History of Chinese Art. The arts of China in their historical, cultural, religious and social context. Painting, sculpture, architecture, porcelain, furniture and decorative arts.
- 4673**
(H,I)History of Japanese Art. The arts of Japan from the beginning to the modern period in their historical and cultural setting. Cross-cultural contacts with China and the West. Architecture, sculpture, painting, landscape architecture, prints and decorative arts.
- 4800**
Special Studies in Art. 1-3 credits, maximum 9. Prerequisites: junior standing and consent of instructor. Courses in media exploration, special subjects and current issues. Offered on campus or through extension workshops.
- 4900***
Directed Study in Art. 1-3 credits, maximum 9. Lab 1-6. Prerequisites: junior standing and written permission of department head. Self-designed special topics in studio art or graphic design. By contract only.
- 4910***
Directed Study in Art History. 1-3 credits, maximum 9. Lab 1-6. Prerequisites: junior standing and written consent of department head. Self-designed special topics in art history. By contract only.
- 4933**
Art in Context. Prerequisites: senior standing. Capstone course studying the role of visual arts in their historical, social and cultural context and in comparison to other disciplines of creative or performing arts, humanities and science.
- 4993**
Senior Honors Project. Prerequisites: departmental invitation, senior standing, Honors Program participation. A guided reading and research program ending with an honors thesis or project under the direction of a faculty member. Required for graduation with departmental honors in art.
- 5900***
Graduate Studies in Art. 1-6 credits, maximum 12. Prerequisite: B.A., B.F.A., or 15 upper-division hours in a discipline; consent of instructor. Projects in art with emphasis on portfolio preparation.

5910*

Graduate Studies in Art History. 1-6 credits, maximum 12. Prerequisite: B.A., B.F.A., or 15 upper-division hours in art history; consent of instructor. Advanced research in art history.

Arts and Sciences (A&S)

1100

An Introduction to the Arts. 1-3 credits, maximum 36. Prerequisites: participation in the Oklahoma Summer Arts Institute and consent of department head. Workshop experience in creative writing, dramatic performance, studio arts or music performance. Enrollment restricted to Oklahoma Summer Arts Institute participants.

1111

Freshman Orientation. Orientation for freshmen. Study techniques, evaluation of one's abilities and the making of proper educational and vocational choices.

1221

Honors Freshman Orientation. Prerequisite: Honors Program participation. Orientation for freshmen to Arts and Sciences Honors program, introduction to University academic expectations, techniques for achieving academic success, and substantive introduction to material in selected academic disciplines. No credit for students with credit in A&S 1111.

2000

Special Topics. 1-3 credits, maximum 6. Selected interdisciplinary topics presented in lecture or seminar format.

3003

Arts and Sciences Honors Supervised Research. Prerequisites: Honors Program participation, consent of instructor and A&S Honors program director. Introduction to research or other creative activity in student's major field through participation in professor's research or creative activities.

3090

Study Abroad. 12-18 credits, maximum 36. Prerequisites: consent of the Office of International Programs and the student's college. Participation in a formal study abroad program spending a semester or year in full-time enrollment at a university outside of the U.S.

3603

Colloquium in Area Studies. Interdisciplinary studies in one area: African, Asian, Latin American, Russian and East European, Native American, Ancient and Medieval, or Women's studies. Individual undergraduate research projects.

3710

A&S Internship. 1-3 credits, maximum 6. Prerequisite: junior standing. Practicum or internship experiences not included in departmental offerings. Before enrolling, students must have an individual contract approved by the sponsoring Arts and Sciences professor and the dean of Arts and Sciences (or administrative officer). For use in special circumstances by Arts and Sciences departments that do not have an internship course.

4000

Special Topics. 1-3 credits, maximum 6. Selected interdisciplinary topics presented in lecture or seminar format.

4110

Arts and Sciences Upper-division Honors Independent Study. 1-3 credit, maximum 3. Prerequisite: participation in the Arts and Sciences Honors Program. Independent study by individual contract only. Before enrolling, student must have contract approved by the sponsoring professor and the director of Arts and Sciences Honors program.

4990

Honors Senior Thesis or Creative Activity. 1-3 credits, maximum 6. Undergraduate honors thesis, research and report, or other creative activity undertaken to satisfy the requirements for Departmental Honors in the College of Arts and Sciences. Restricted to Arts and Sciences Honors students.

5710*

Developmental Workshop in Selected Academic Fields. 1-3 credits, maximum 9. Arts and Sciences discipline-based material. Study groups, lectures and seminars.

6000*

Research for Ed.D. Dissertation. 1-15 credits, maximum 15. Prerequisite: candidacy for Ed.D. degree. Ed.D dissertation.

Astronomy (ASTR)

1014

(N)The Solar System. Recent discoveries about the sun, planets, moons, asteroids, meteoroids, and comets; formation and future of the solar system; interplanetary travel, colonization, terraforming, and the search for extraterrestrial life. Offered in the fall semester.

1024

(N)Stars, Galaxies and the Universe. Recent discoveries about the structure and life cycles of stars, galaxies and the universe; the search for extraterrestrial intelligence; interstellar travel, black holes, wormholes, and tachyons. Offered in the spring semester.

3023

Astrophysics. Prerequisite: PHYS 2114 or consent of instructor; ASTR 1024 recommended. Analysis and interpretation of astronomical phenomena in terms of the laws of physics; e.g. stellar structure, the interstellar medium, galaxies and cosmology.

Aviation and Space Education (AVED)

1113

Theory of Flight. A ground school course covering Federal Aviation Regulations, theory of flight, power plant operation, service of aircraft, principles of navigation and meteorology. Fulfills the ground school training needed for a Private Pilot Certificate.

1222

Primary Flight Laboratory. Lab 4. Meets the flight requirements for the FAA Private Pilot Certificate. Flight instruction conducted under FAR Part 141. Special fee required. Graded on a pass-fail basis.

1403

Advanced Theory of Flight. Prerequisites: 1113 and passed FAA Private Pilot Examination. Advanced navigation, aircraft performance and meteorology, and introduction to crew resource management.

1503

History of Manned Space Flight. Significant historical concepts and events leading to the current status of space exploration.

2113

History of Aviation. History of aviation from its early developments to the present. Historic events and the role of government as they relate to the evolution of the regulatory infrastructure of the aviation industry.

2122

Commercial Flight Laboratory I. Lab 4. Prerequisites: 1221 and 1231 or private pilot certificate, FAA Third-class Medical Certificate. First of three flight laboratories required for FAA commercial flight certificate with instrument rating. Flight instruction conducted under FAR Part 141. Special fee required.

2132

Commercial Flight Laboratory II. Lab 4. Prerequisites: 2122 and FAA Third-class Medical Certificate. Dual instrument flight instruction to meet requirements for FAA instrument rating. Flight instruction conducted under FAR Part 141. Special fee required.

2142

Commercial Flight Laboratory III. Lab 4. Prerequisites: 2132; FAA Second-class Medical Certificate, and 18 years of age. Final flight lab to meet requirements for the FAA commercial pilot certificate. Flight instruction conducted under FAR Part 141. Special fee required.

2152

Instrument Flight. Lab 4. Dual flight training in preparation for the instrument flight examination. Unusual attitudes, emergencies, instrument approaches, and IFR cross-country flight. Special fee required.

2203

Impact of Aviation and Space Exploration on Society. Survey of significant events and ideas and their economic and social impact on society.

2213

Theory of Instrument Flight. Prerequisite: 1113 or FAA Private Pilot computer-based knowledge examination. Instrument flight rules, the air traffic system and procedures, the elements of forecasting weather trends. Preparation for FAA instrument computer-based knowledge exam.

2313

Theory of Commercial Flight. Prerequisite: passed FAA Private Pilot Written Examination. Advanced aircraft systems, aerodynamics, federal aviation regulations, airports and airspace, navigation, and performance. Preparation for FAA Commercial Pilot Written Examination. Special fee required.

2633

Air Traffic Control and the National Airspace System. Prerequisite: 1113. In-depth knowledge in the subject of air traffic control and the national airspace system facilities, equipment and associated development. Enroute and terminal control areas, computerization and automation, flight service systems, ground-to-air systems and integrated telecommunications networks.

3231

Theory of Multi-engine Flight. Prerequisite: Private Pilot Certificate. Aeronautical theory and information required for operating the multi-engine airplane safely, efficiently and within its specified limitations. Emphasis on aerodynamics and multi-engine emergencies.

3243

Human Factors in Aviation. Prerequisite: PSYCH 1113 or equivalent. The study of people interacting with the aviation environment. Individual and group performance, equipment design, physical environment, and procedure development.

3333

Advanced Aircraft Systems. Prerequisites: 1113, 1221, 1231, 2122, 2132, or consent of instructor. Study of complex aircraft systems. Electronic flight instruments, inertial navigation, and aircraft monitoring systems.

- 3341 Multi-engine Flight Laboratory.** Lab 2. Prerequisites: Private Pilot Certificate and FAA Third-class Medical Certificate. Dual flight instruction to meet requirements for the FAA multi-engine rating. Flight instruction conducted under FAR Part 141. Special fee required.
- 3441 Aerobatic Flight.** Lab 2. A minimum of ten hours dual flight training. Basic, intermediate and advanced aerobatic flight maneuvers including sequencing and dimensional box spacing. Special fee required.
- 3443* Aviation Law.** Prerequisite: BUSL 3213. Insight pertinent to federal governing bodies in addition to local and international laws forming the present structure of aviation law. Practices and pitfalls in aviation activities and a basic legal research capability.
- 3513 Aviation Management.** Prerequisite: 50 credit hours. Managing the major elements of the aviation industry including aircraft manufacturing and air transportation system.
- 3523 Airport Planning and Management.** Prerequisite: 50 credit hours. Overview of the major functions of airport management including master planning. Study of the socio-economic effects of airports on the communities they serve.
- 3553* General Aviation Management.** Prerequisite: 50 credit hours. Functions of management in general aviation and airport operations including information systems, maintenance, regulatory impact, physical facilities, flight operations, political forces and administration.
- 3563 Aviation Marketing.** Prerequisite: 50 credit hours. Marketing aviation products for the major elements of the aviation industry.
- 3573 Aviation Finance.** Prerequisite: 50 credit hours. Financing the major elements of the aviation industry including general aviation, aircraft manufacturing and airports.
- 3663* Air Transportation: The Industry.** Prerequisite: 50 credit hours. Broad understanding of the air transportation industry and an in-depth knowledge of the organizational structures, managerial functions and operational aspects of today's major, national, and regional air carriers. Historical perspectives, regulators and associations, economic characteristics, labor relations and marketing of modern air carriers.
- 4100 Specialized Studies in Aviation.** 1-3 credits, maximum 6. Prerequisites: junior or senior standing and six credit hours in AVED courses. Independent studies, seminars, and training within selected areas of aviation.
- 4113* Aviation Safety.** Prerequisite: senior standing or consent of instructor. Overview of flight safety including studies in human factors, weather, aircraft crashworthiness, accident investigation, and aviation safety programs. Students will be introduced to elements of aviation safety in ground and flight operations.
- 4133 Principles of Flight Instruction.** Prerequisites: FAA Commercial Pilot Certificate with Instrument Rating, and at least 18 years of age. Development of flight training lesson plans and syllabi. Application of learning theory and teaching fundamentals to flight maneuvers and performance evaluation. Preparation for the FAA Fundamentals of Instructing and Flight Instructor-Airplane Written Examinations.
- 4200* Internship in Aviation.** 1-12 credits, maximum 12. Prerequisites: junior or senior standing and consent of instructor. Individually supervised internship in aviation career areas. Directed field experience related to the participant's area of concentration.
- 4213* Current Trends and Issues in Aviation.** Prerequisites: 3663 and senior standing or consent of instructor. Analysis of current issues facing management in various segments of the aviation industry. Specific areas include issues affecting the airline industry and general aviation. Application of previously learned concepts to case studies of practical problems to develop deeper understanding of the subject.
- 4231 Flight Instructor: Airplane Flight Laboratory.** Lab 2. Prerequisites: 4133, commercial pilot and instrument rating, FAA Second-class Medical Certificate and 18 years old. Dual flight instruction to meet the requirements for the FAA flight instructor: airplane certificate. Flight instruction conducted under FAR Part 141. Special fee required.
- 4303* Aviation Weather.** Prerequisite: GEOG 3033 or equivalent. Familiarization with weather products needed to enhance flight safety.
- 4331 Flight Instructor: Instrument Flight Laboratory.** Lab 2. Prerequisites: Flight Instructor Certificate and FAA Second-class Medical Certificate. Dual flight instruction to meet the requirements of adding an instrument flight instructor rating to the flight instructor certificate. Flight instruction conducted under FAR Part 141. Special fee required.
- 4643* Aviation Navigation Global Positioning Systems.** Prerequisite: 50 credit hours. Overview of the theory and operation of the GPS in the private and public sector.
- 4703* Cockpit Resource Management.** Prerequisite: 3243, Commercial Pilot Certificate/Instrument Rating or consent of instructor. Decision making and communication to improve effective cockpit management. Ten hours in a dual flight control multi-engine simulator. Special fee required.
- 4771 Flight Instructor: Multi-engine Flight Laboratory.** Lab 2. Prerequisites: Flight Instructor Certificate and FAA Second-class Medical Certificate. Dual flight instruction to meet the requirement for adding a multi-engine flight instructor rating to the flight instructor certificate. Flight instruction conducted under FAR Part 141. Special fee required.
- 4990 Pilot Proficiency Flight.** 1-2 credits, maximum 4. Lab 32. Required for students entering the aviation education program who possess all FAA certificates/ratings required for the aviation sciences degree.
- 5000* Master's Report or Thesis.** 1-3 credits, maximum 3. Master's degree enrollment for a total of two credit hours if writing a report or three hours if writing a thesis.
- 5020* Seminar in Aerospace Education.** 1-3 credits, maximum 6. Prerequisite: consent of instructor. Individual research problems in aerospace education.
- 5103* Aviation Career Development.** Aviation career development in private and public aviation organizations.
- 5113* Aviation Safety Program Development.** Prerequisite: 4113 or equivalent, or consent of instructor. A detailed examination of risk management and accident prevention in the aviation industry. Organization and operation of safety programs including OSHA requirements, performance measurements, cost analysis, and systems safety analysis.
- 5203* Aeromedical Factors.** Prerequisite: 3243 or equivalent. The study of aeromedical factors that influence pilot performance. The study of life support equipment designed to increase aviation safety.
- 5702* Simulation in Aviation.** Prerequisites: FAA Commercial and Multi-engine ratings. Preparation for the practical skills required for a career as a professional pilot. Skill areas comparable to those required for the FAA Airline Transport Pilot rating.
- 5711* Airline Transport Pilot.** Prerequisites: FAA Commercial and Multi-engine ratings. Designed for the professional pilot. Completion of the course assists in preparation for the FAA Airline Transport Pilot written examination.
- 5720* Current Issues in Aerospace Education.** 1-3 credits, maximum 6. Prerequisite: consent of instructor. Current issues in aerospace education.
- 5813* Earth Observation Systems.** Study of earth orbiting systems that collect data on the earth's water, land and atmosphere.
- 5823* Space Science.** A study of the solar system in relation to stars and galaxies.
- 5850* Directed Readings in Aerospace Education.** 1-3 credits, maximum 6. Prerequisite: consent of instructor. Directed studies in aerospace education.
- 5910* Practicum in Aerospace Education.** 1-3 credits, maximum 6. Prerequisite: consent of instructor. Directed observation and supervised clinical experiences in aerospace education.
- 6000* Doctoral Thesis.** 1-15 credits, maximum 15. Required of all candidates for the Ed.D. in applied educational studies. Credit awarded upon completion of the thesis.
- 6203* Aviation Physiology.** Prerequisite: 5203 or equivalent. The study of the complexities of pilot performance as it relates to human physiology, human factors and aviation safety.
- 6313* Administration of Aviation Institutions.** A study of the organization and administration of public and private aviation institutions. Study of the impact of economic and governmental system on these institutions.
- 6613* Aviation Executive Development.** A study of the styles of aviation executives in private and public aviation organizations.

Biochemistry (BIOC)

2344

Chemistry and Applications of Biomolecules. Lab 3. Prerequisite: CHEM 1225. A descriptive survey of organic functional groups and biomolecules. Mode of formation and function of these molecules in microorganisms, plants and animals as they relate to biotechnology, environmental sciences and health related issues. A terminal course for students in applied biological science education. Not recommended for preprofessional students or students planning graduate study in biological sciences.

3653*

Survey of Biochemistry. Prerequisite: CHEM 3015 or 3053. An introduction to the chemistry of living systems. Chemical properties of the constituents of living organisms. Modes of formation, reactions and function of these compounds in microorganisms, plants and animals.

3723

Biochemical Laboratory. Lab 6. Prerequisite: 3653 or concurrent enrollment. Qualitative and quantitative examination of biochemical and molecular biology materials and reactions. Hands-on experience with contemporary aspects of biochemical and molecular biology techniques. Designed for biochemistry majors and others desiring an extensive biochemical laboratory experience.

4113*

Biochemistry. Prerequisite: 3653. An extension and expansion of 3653 emphasizing applications of biochemistry, molecular biology and genetic engineering to studies on protein structure and function, regulation of cell function, metabolism and disease processes.

4224*

Biophysical Chemistry. Prerequisites: CHEM 1515, MATH 2373. Classical and statistical thermodynamics, transport processes, electrochemistry, and kinetics, with emphasis on biological applications.

4990*

Special Problems. 1-6 credits, maximum 10. Training in independent work, study of relevant literature and experimental investigation of an assigned problem.

5000*

Research. 1-6 credits, maximum 6. For M.S. thesis.

5753*

Biochemical Principles. Prerequisite: CHEM 3153 or equivalent. Chemistry of cellular constituents: introduction to the chemical processes in living systems. The first in a series of courses for graduate students in biochemistry and related fields.

5824*

Biochemical Laboratory Methods. Lab 6. Prerequisites: 4113 or 5753, or concurrent enrollment in either, and CHEM 2113 and 2122, or 3324. Lecture and laboratory course in basic biochemistry and molecular biology methods for separation and analysis of biological materials, including chromatography, electrophoresis, centrifugation, use of radioisotopes, molecular cloning, and DNA sequencing.

5853*

Metabolism. Prerequisite: 5753 or 4113. Reaction sequences and cycles in the enzymatic transformations of fats, proteins and carbohydrates; energy transfer, biosynthesis and integration in the metabolic pathways.

5930*

Advanced Biochemical Techniques. 1-4 credits, maximum 10. Prerequisites: 5753, 5824 or concurrent registration, and consent of instructor. Lecture and laboratory course in advanced research techniques, designed to supplement 5824. In subsequent semesters, individual research problems pursued in laboratories of department faculty for six weeks and one credit hour each.

6000*

Research. 1-15 credits, maximum 60. For Ph.D. dissertation.

6110*

Seminar. 1-2 credits, maximum 2 for Ph.D. candidates or 1 for M.S. candidates. Prerequisite: 5853. Graded on pass-fail basis.

6740*

Physical Biochemistry. 1-2 credits, maximum 2. Prerequisites: one semester each of biochemistry, calculus and physical chemistry. Two independent modules dealing with applications of physical chemistry and math to biological phenomena: 1) numerical analyses and selected spectroscopic methods, and 2) thermodynamics and transport properties. Modules may be taken together as two credits or individually for one credit.

6763*

Nucleic Acids and Protein Synthesis. Prerequisite: 4113 or 5753. Structure and biological function of nucleic acid containing structures with emphasis on recombinant DNA methodologies, information content, nucleic acid-protein interaction, regulation and rearrangement.

6773*

Protein Structure and Enzyme Function. Prerequisite: 4113 or 5753. Theory of and methods for studying the physical and chemical basis of protein structure and function; and the enzyme catalysis, including kinetics, chemical modification and model studies. Examples from current literature.

6783*

Biomembranes and Bioenergetics. Prerequisite: 5853 or consent of instructor. Components, organization and biosynthesis of plasma, mitochondrial and photosynthetic membranes, emphasizing structure-function relationships. Mechanism of metabolites, protons and electrons transport. Energy conservation in bioenergetic apparatus such as mitochondria, chloroplasts or bacterial chromatophores.

6792*

Plant Biochemistry. Prerequisite: 4113 or 5753. Biochemistry of processes and structures of special importance to plants, such as photosynthesis, cell walls, nitrogen fixation, secondary metabolites and storage proteins.

6820*

Selected Topics in Biochemistry. 1-3 credits, maximum 15. Prerequisite: 5853. Recent developments in biochemistry. Subject matter varies from semester to semester; students should inquire at the department office before enrolling.

Biological Science (BIOL)

1114

(L,N)Introductory Biology. Lab 3. Introduction to the integration between structure and function among all levels of biological organization. Application of principles of evolution, genetics, physiology and ecology to understanding the integrated and interdependent nature of living systems through discussions emphasizing the process of science. Current issues and local research and observation and investigation in both lecture and lab. Recommended for non-science and science majors.

1404

(N)Plant Biology. Lab 3. Prerequisite: 1304. Morphology and anatomy of plants. Plant functioning: photosynthesis, water relations, translocation, hormonal regulation, photoperiodism. Survey of the plant divisions, algae and fungi.

1604

(N)Animal Biology. Lab 2. Prerequisite: 1114. Morphology, physiology, ecology, embryological development behavior, life histories and importance to man of representatives of major groups. Evolution of systems and mechanisms which have allowed animals to survive and adapt to diverse habitats.

2220

Current Topics in Biology. 2 credits, maximum 8. Prerequisite: 1114 or 1304 or equivalent. Topics of current interest especially designed for nonbiology majors.

3014*

Cell and Molecular Biology. Lab 3. Prerequisites: 1403, or 1604, or equivalent; and organic chemistry. The cell concept and cell morphology, cell macromolecules, organelles, enzymes, energetics, movement of water and materials across membranes, influence of external environment, cellular synthesis, growth and maintenance, control and integration of function, replication, differentiation, origin and evolution of cells.

3024*

General Genetics. Prerequisite: 1403, or 1604, or equivalent. Inheritance in plants, animals and microorganisms; molecular and classical aspects.

3034*

General Ecology. Lab 4. Prerequisites: 1403, 1604 or equivalent; MATH 1513 or 1715. Physical and biotic environment, responses of organisms to the environment, community ecology, natural ecosystems, and man's interaction with ecosystems.

3223

(N)Survey of Human Diseases. Prerequisite: 1114 or 1304 or equivalent. Types of diseases, such as metabolic, genetic, infectious. Biological processes involved in disease. Impact of disease on human activity and of human activity on disease patterns. For the nonbiology major.

3232

(N)Human Reproduction. Prerequisite: 1114 or 1304 or equivalent. Human reproduction is dealt with in terms of anatomy, physiology, embryology, genetics and evolution. Birth control, and teratogenic substances as well as pregnancy and childbirth. For the nonbiology major.

3253

(N)Environment and Society. Prerequisite: 1114 or 1304 or equivalent. The impact of human activities and population growth on the natural world. Analysis of the potential of technological and societal changes to have an impact on the environment. For the nonbiology major.

3263

(N)Plants and People. Prerequisite: 1114 or 1304 or equivalent. Types of plants, form and function, history of uses of plants and plant products for food and beverages, fiber, medicinal purposes, and in people's surroundings. For the nonbiology major.

3604

Biological Principles for Teachers. Lab 2. Prerequisites: 1304, CHEM 1314, ZOOL 3204. Capstone course in biology for potential science teachers. Review of biological phenomena and principles as related to the curriculum.

4100
Problems and Special Study. 1-4 credits, maximum 4. Prerequisite: approval of instructor. Participation in research problems involving library, laboratory or field studies.

5100*
Current Topics in Biology for Teachers. 1-4 credits, maximum 4. Prerequisite: approval of instructor. Acquaints the primary or secondary teacher with recent advances in biology. May include lecture, laboratory or field work.

Biomedical Sciences (BIOM)

5013*
Medical Biostatistics. Prerequisite: graduate standing. Fundamentals of biostatistics including parametric and non-parametric statistical methods with applications to biomedical research, clinical epidemiology and clinical medicine.

5020*
Biomedical Sciences Seminar. Prerequisite: graduate standing. Literature and research problems in biomedical sciences.

5117*
Gross and Developmental Anatomy. Lab 3. Prerequisite: graduate standing in the biomedical sciences program. General and specific concepts of regional morphology through didactic presentations and laboratory dissections. Emphasis on the range of normal for the various organ systems and their interrelationships. Application of anatomical knowledge in clinical situations.

5124*
Histology. Lab 4. Normal microscopic tissue architecture. Lecture and laboratory presentation for the histologic concepts of the basic tissues and organ systems. Basis for pathological and physiological principles.

5132*
Neuroanatomy. Lab 1. Prerequisite: graduate standing in the biomedical sciences program. A continuation of gross anatomy to include anatomy of the head region. Emphasis on neuroanatomy. Laboratory sessions on head and brain dissection and special demonstrations. The relation of basic principles with osteopathic medicine and neurology in clinical correlation sessions.

5215*
Medical Biochemistry. Broad survey of the chemical classes and metabolic processes that are consistent with the normal functions of biosystems. Functions and interrelationships of these processes in human metabolism to provide a foundation for understanding the chemistry of disease states when discussed in the second-year program.

5316*
Medical Microbiology and Immunology. Lab 2. Prerequisite: 5215. Similarities and differences among pathogenic microorganisms. Characteristics, pathogenesis and control of medically important microorganisms and disorders of the immune system. Laboratory exercises on the basic serological and microbiological procedures used in the diagnosis of infectious diseases.

5415*
General Pathology I. Prerequisites: graduate standing. The reaction of the body to diseases and the description and identification of basic disease processes in terms of morphology, physiology and chemistry. Major processes such as cell injury, cell death, healing, neoplasia, inflammation, and diseases of development and aging. Basic disease processes and ability to recognize and describe basic disease processes from gross and microscopic specimens.

5425*
General Pathology II. Prerequisite: graduate standing. Continuation of General Pathology I.

5513*
Pharmacology I. Prerequisite: 5215, 5616. General principles of drug action, drugs acting on the autonomic nervous system, and drugs used in treating infectious diseases and cancer. The mode of action, pharmacogenetics, physiologic effects, therapeutic indications, and adverse reactions to these drugs.

5523*
Pharmacology II. Prerequisite: 5513. Continuation of Pharmacology I.

5616*
Medical Physiology. Prerequisite: 5215. The integration of structure and function of the human body with a functional analysis of the organ systems. Comprehension of the physiologic principles and control mechanisms that maintain homeostasis. Discussion of all systems of the body, and analysis of various interrelationships. The fundamental dynamic view of physiology upon which subsequent clinical learning is dependent. Problem-solving techniques utilized to develop and examine student understanding.

6000*
Research and Dissertation. 1-15, credits, maximum 15. Lab 1-15. Prerequisite: consent of major adviser. Research in biomedical sciences for Ph.D. degree.

6010*
Topics in Biomedical Sciences. Prerequisite: consent of instructor. Tutorials in areas of biomedical sciences not addressed in other courses.

6113*
Human Embryology. Lab 2. Prerequisite: graduate standing. Formation of the fetus from conception through development of the organs and organ systems with discussions of congenital malformations.

6124*
Advanced Histology. Lab 4. Prerequisite: 5124. Histochemical techniques used in the identification of cells or tissues based on the localization of cell organelles or cell products using electron microscopy, immunofluorescence, cryosectioning, and immunoperoxidase labeling.

6214*
Advanced Topics in Medical Biochemistry. Prerequisite: 5215 or concurrent enrollment. Chemical basis of protein, carbohydrate, lipid, nucleic acid, steroid and porphyrin structure, function and metabolism as related to health and disease.

6223*
Medical Genetics. Prerequisite: 5215. Developments in genetic principles including biochemical, molecular cytological, clinical, diagnostic, prevention and inheritance of genetic disorders in humans.

6233*
Enzyme Analysis. Lab 2. Prerequisite: 6214. Characteristics, separation, detection, assays, kinetics, mechanisms of catalysis, inhibition or inactivation, and clinical applications of enzyme analysis.

6243*
Human Nutrition. Lab 2. Prerequisite: 5215. Role of vitamins and minerals in maintaining normal metabolism, role of nutrients in providing athletic and immune system performance, and pathophysiology associated with nutrient deficits and nutrient excesses. Role of drugs in inducing cancer and increasing nutrient requirements.

6253*
Biochemistry of Hormone Action. Prerequisite: 6233. Biochemical mechanisms behind peptide and steroid hormone action.

6313*
Diagnostic Parasitology. Lab 2. Prerequisite: 5316. Animal parasites of humans with a focus on the laboratory identification of the medically important protozoan and helminthic diseases.

6323*
Diagnostic Virology. Lab 4. Prerequisites: 5215, 5316. Viruses causing disease in humans with emphasis on the laboratory diagnosis, prevention, and treatment of viral diseases.

6333*
Immunology. Prerequisites: 5215, 5316. The experimental basis of immunology and immunopathology.

6343*
Microbial Physiology. Lab 2. Prerequisites: 5215, 5316. The chemical composition, growth and metabolism of prokaryotic organisms including regulation and control of metabolic pathways with emphasis on metabolism unique to microbes.

6413*
Graduate General Pathology and Laboratory Medicine. Lab 2. Prerequisite: graduate standing. An introduction to the structural and functional abnormalities at the tissue level that manifest as disease states in organ systems, with emphasis on a patho-physiologic approach to etiology and pathogenesis of disease.

6513*
Neuropharmacology. Prerequisites: 5513, 5523. The pharmacology of agents affecting central nervous system (CNS) function, the interaction of drugs with receptors, and the action of endogenous neuromodulators at CNS sites of action.

6523*
Cardiovascular Physiology and Pharmacology. Prerequisites: 5513, 5523. Physiologic and pharmacologic mechanisms of cardiac and vascular smooth muscle function and control at the molecular, cellular, tissue and organ system levels.

6533*
Principles of Drug Action. Prerequisites: 5513, 5523. The molecular basis of drug uptake, distribution, physiologic action, and elimination from the body including pharmacogenetics, drug allergy, drug resistance, drug tolerance and physical dependence, and chemical mutagenesis, carcinogenesis, and teratogenesis.

6613*
Environmental Physiology. Prerequisite: 5616. Environmental parameters, including barometric pressure, temperature, light, gravity, noise, and crowding, having an impact on homeostatic mechanisms in the normal human with special emphasis on acute and chronic adaptations in response to changes in environmental parameters.

6623*
Membrane Transport and Electrophysiology. Prerequisite: 5616. Transport processes across biological membranes and various electrophysiological methods related to membrane transport.

6643*
Neurophysiology. Prerequisite: 5616. Fundamental concepts of the motor and sensory components of the nervous system with emphasis on integrative mechanisms.

Biosystems Engineering (BAE)

1012

Engineering Software. Lab 2. Prerequisite: ENGR 1311 (or concurrent enrollment); engineering major. Introduction to microcomputer software packages useful in engineering analysis and report preparation. Elementary CAD applications.

2022

Introduction to Engineering Design. Lab 4. Prerequisite: sophomore standing in the College of Engineering, Architecture and Technology. Implementation of creativity and the design process to solve engineering problems. Evaluation of the role and the integration of user considerations, specifications, materials selection, human and legal factors, economic factors, and feasibility in the design process.

3023*

Instruments and Controls. Lab 2. Prerequisites: ENGR 1412, ENSC 2613. Transducers, signal conditioning, read-out instruments, and electrical controllers. Assembly language programming, interfacing and applications of micro-computers in agriculture.

3113

Quantitative Biology for Engineers. Prerequisites: ENSC 2213, 3233. Engineering quantification of biological systems from microscopic to macroscopic including cellular, microbial, individual plants and animals, and ecosystems. System processes such as transport phenomena, bioenergetics, thermodynamics, enzyme kinetics, metabolism, bioregulation, and agroeco-system modelling.

3213

Machinery for Production and Processing. Lab 2. Prerequisites: 1012, 2012 and ENGSC 2112. Function, design, operation and application of machine elements used in the production and processing of biological materials.

3323

Soil and Water Resource Engineering. Prerequisite: ENSC 3233. Engineering analysis applied to soil and water resources. Design principles and practice for engineering systems including pumping plants, irrigation and drainage systems, and erodible channels.

3423

Physical Properties of Biological Materials. Lab 2. Prerequisites: BIOL 1304; ENSC 2142 and 3233. Basic engineering fundamentals applied to characterization and determination of physical properties of biological materials. Physical characteristics; water relations; and rheological, thermal, aerodynamic, and electromagnetic properties of biological materials, including soils. Flow properties of non-Newtonian fluids and granular solids. Principles and techniques for measurement and determination of properties.

4001

Seminar. Prerequisite: senior standing. Preparation for professional practice through case studies about ethics, legal liability, safety, and societal issues. Practical professional communications experience.

4012

Senior Engineering Design Project I. Lab 6. Prerequisites: 2022; senior standing. First of two-semester sequence senior design courses. Student teams work on professional level design projects, using design procedures to develop specifications, propose alternative solutions, consider external constraints, develop drawings or plans, construct, test and evaluate designs.

4022

Senior Engineering Design Project II. Lab 6. Prerequisites: 2022, 4012. Second of two-semester sequence of senior design courses.

4213*

Precision Agriculture. Lab 2. Prerequisites: MATH 1513, senior standing. Introduction to the concepts of precision agriculture including analysis of spatial variability, relationships of fertility and crop response, geographical information systems, variable rate technology, optical sensing, global positioning systems, and yield monitoring. Case studies included for detailed analyses. Same course as SOIL 4213.

4223*

Power for Production and Processing. Lab 2. Prerequisites: 3213, ENSC 2122, 2213, 2613. Mobile and stationary power units used for crop production and processing. Engine performance, chassis stability and traction. Electric motor selection and control. Design of power systems for agricultural production and processing applications.

4313*

Hydrology I. Prerequisites: CHEM 1515, PHYS 2014, ENSC 3233. Basic principles of surface and groundwater hydrology and their application in engineering problems. The hydrologic cycle, weather and hydrology, precipitation, evaporation, transpiration, subsurface waters, stream flow hydrographs, hydrologic and hydraulic stream routing, probability of hydrologic events, application of hydrologic models. Same course as CIVE 3843.

4353

Mechanical Design II. Prerequisites: ENGSC 2013, ENSC 2122, MAE 3323. Design of power transmission systems, including belts, chains and gears. Selection and application of hydraulic and pneumatic components in machine design applications. Selection of electric motors, actuators, encoders, and related electromechanical components. Design practice in the form of short projects integrating the various segments covered in the course. Same course as MAE 4353.

4400*

Special Problems. 1-4 credits, maximum 4. Investigations in specialized areas of agricultural engineering.

4413*

Processing Biological Materials. Prerequisites: 3423; ENSC 3233, course in heat transfer. Materials handling. Size reduction and agglomeration of biological materials. Fan characteristics. Dehydration. Special emphasis on design of systems and equipment for materials handling, grain drying and storage.

4423*

Food Engineering. Prerequisites: 4413, ENSC 2213; senior standing. Design thermal processes. Drying processes. Separation processes. Microbial and quality changes during processing. Processing non-Newtonian fluids.

5000*

Thesis and Research. 1-6 credits, maximum 6. Prerequisite: consent of major professor.

5030*

Engineering Practice. 1-12 credits, maximum 12. Prerequisite: B.S. degree in agricultural engineering. The identification, analysis and synthesis of an authentic problem in agricultural and biological engineering. Solution of the problem will involve making engineering decisions tempered by real-time restraints, economic realities, and limited data with due consideration for environmental and social implications.

5413*

Instrumentation in Biological Process Control System. Prerequisite: 3023 or equivalent. Analysis of transducers for on-line measurement and control of biological processes. Emphasis on selection of measurement techniques and transducers to sense physical properties of biological materials. Application to agricultural and food processing industries.

5501*

Seminar. Discussion of current literature with special emphasis on research and experimental techniques.

5513*

Experimental Engineering Analysis. Prerequisite: STAT 4023. Design and analysis of engineering experiments, error sources and prediction equations using statistical theory.

6000*

Research and Thesis. 1-10 credits, maximum 30. Prerequisite: approval by the student's advisory committee. Independent research and doctoral thesis preparation under the cognizance of a graduate faculty member in the student's field of specialization.

6313*

Stochastic Methods in Hydrology. Prerequisites: 4313 or CIVE 5843 and STAT 4053 or equivalent. Stochastic and statistical hydrologic analyses of surface water and groundwater systems. Analysis of urban and rural drainage and detention systems. Same as CIVEN 6843.

6323*

Advanced Irrigation Engineering. Prerequisite: 3323 or equivalent. Hydraulic theory and design and operation of surface, sprinkler, and trickle irrigation systems. Management of water and energy in irrigated agriculture.

6333*

Fluvial Hydraulics. Prerequisite: 3013 or equivalent. Principles of sediment detachment and transport in fluvial systems. Design of stable channels and flow resistance relationships for sediment-laden flows.

6343*

Ground Water Contaminant Transport. Prerequisite: AGRON 5583 or CIVE 5913 or GEOL 5453. Principles of solute and multiphase transport in soils and ground water. Effects of advection, diffusion, dispersion, degradation, volatilization and adsorption. Relationships between laboratory and field scale transport. Contamination by nonaqueous phase liquids.

6503*

Similitude in Research. Prerequisite: MATH 2233. Theory of similitude and its use in planning, conducting and analyzing experiments in engineering and biological sciences.

6520*

Problems in Soil and Water Engineering. 2-6 credits, maximum 6. Prerequisite: consent of instructor. Problems associated with erosion control, drainage, flood protection and irrigation.

6540*

Problems in Farm Power and Machinery. 2-6 credits, maximum 6. Prerequisite: consent of instructor. Literature review and analytical studies of selected farm power and machinery problems. Written report required.

6580*

Problems in Transport Processes. 2-6 credits, maximum 6. Prerequisite: consent of instructor. Literature review and analysis of heat and mass transport and interval diffusion in biological materials. Transport phenomena at interfaces, thermal and cryogenic processing, drying, packed and fluidized bed systems. Thermal and moisture control processing affecting quality of food products. Written report required.

6610*

Advanced Research and Study. 1-10 credits, maximum 20. Prerequisite: approval by the student's advisory committee. Research and study at the doctoral level on the topic related to the student's doctoral program and field of interest.

Botany (BOT)

3005

(N)Field Botany. Lab 6. Prerequisite: BIOL 1114 or 1304 or equivalent. Botanical field techniques, the vegetation of North America, and the flora of Oklahoma. Terminology of description, use of taxonomic keys, techniques of specimen preservation, field recognition of plant taxa and communities and controlling ecological factors, economic and wildlife significance of dominant taxa, principles of classification and nomenclature. Four weekend field trips required.

3013*

Biological Microtechnique. Lab 3. Prerequisite: BIOL 1403 or 1603. Techniques for preparation of biological materials for microscopic examination. Same course as ZOOL 3013.

3024*

Plant Diversity. Lab 4. Prerequisite: BIOL 1403. Forms and life histories of selected plants with emphasis on some of the less familiar forms. The diversity of plant forms as well as basic similarities in life histories; importance of each form to man and his environment. Field trips required.

3114*

Plant Taxonomy. Lab 4. Prerequisite: BIOL 1403 or equivalent. Vocabulary and concepts of plant taxonomy: terminology, keys, nomenclature, documentation, classification and biosystematics. Emphasis on angiosperm flora of Oklahoma. Field trips required.

3233*

Plant Anatomy. Lab 3. Prerequisite: BIOL 1403. Structure of cells, tissues and organs of plants. Consideration of structure as related to ontogeny, phylogeny and function.

3460*

Plant Physiology Laboratory. 1-2 credits, maximum 2. Lab 2-4. Prerequisite: 3463 or concurrent enrollment. Skills in techniques for working with plants, experiments involving nutrition, respiration, photosynthesis, water relations, translocation, hormones, growth and development. Students having credit in BIOL 3014 should enroll for one hour; all others enroll for 2 hours credit.

3463*

Plant Physiology. Prerequisite: BIOL 1403. Plant subcellular structure, water relations, water absorption and ascent of sap, translocation, gaseous exchange, nutrition, enzymes, respiration, photosynthesis, growth, development, reproduction, tropisms, hormones, dormancy and seed germination.

3693*

Plant Geography. Prerequisite: BIOL 1403. Discussion of the natural geography of the world's plants and the factors controlling it, especially environmental and biological, with emphasis on evolutionary trends and events.

4023*

Community Ecology. Prerequisite: BIOL 3034 or equivalent. Plant and animal communities, community theory, the role of competition, predation, and demography in structuring plant and animal communities, succession, current controversies in ecology, with emphasis on the primary literature.

4123*

Ethnobotany. Prerequisite: one course from AGRON 1213, BIOL 1403 or 1604, HORT 1013, BOT 3024, or consent of instructor. Uses of plants by past and present cultures for food, fiber and medicinal purposes. The role of plants in traditional rituals and religious practice.

4374*

Agrostology. Lab 4. Prerequisite: BIOL 1403. Grasses and the principles involved in their classification. Field trips required.

4400

Undergraduate Research. 1-2 credits, maximum 5. Prerequisite: consent of instructor. Undergraduate research problems in botany.

4993

Senior Honors Thesis. Prerequisites: departmental invitation, senior standing, Honors Program participation. A research project under the direction of a faculty member resulting in a written report to be judged by a second faculty member as well. An oral presentation made at a departmental seminar. Required for graduation with departmental honors in botany.

5000*

Research. 1-6 credits, maximum 6. Research for the M.S. degree.

5104*

Mycology. Lab 4. Prerequisite: graduate standing. A systematic study of the fungi, with emphasis on taxonomy, comparative morphology and fungal biology. Taught in the Department of Plant Pathology. Same course as PLP 5104.

5110*

Problems in Botany. 1-5 credits, maximum 8. Prerequisite: consent of instructor. Special studies in any area of botany.

5153*

Ecosystem Analysis. Prerequisite: BIOL 3034; CHEM 3015 or equivalent. Theory and principles of ecosystem ecology focusing on metabolism and biogeochemical cycles in terrestrial and aquatic systems. Application of principles to current issues of environmental change and management. Same course as ZOOL 5153.

5213*

Botanical Limnology. Lab 3. Prerequisite: BIOL 1403. Taxonomy, ecology, and physiology of freshwater algae and vascular aquatic plants, with special reference to their role in overall limnological dynamics. Field trips required.

5232*

Cytogenetics Laboratory. Lab 4. Prerequisite: AGRON 5342 or concurrent enrollment. Cytogenetic research techniques, especially karyotyping; observation and interpretation of cytogenetic phenomena including mitosis, meiosis and chromosomal aberrations.

5423*

Plant Mineral Nutrition. Prerequisite: 3463 or equivalent. Uptake, translocation, metabolism, and biochemical function of mineral nutrients in higher plants.

5533*

Advanced Ecology. Lab 3. Prerequisite: 4023 or BIOL 3034. Physiological and evolutionary aspects of plant ecology as revealed by recent research. Spring recess field trip required.

5753*

Physiology of Plant Growth and Development. Prerequisite: 3463 or equivalent. Molecular mechanisms of growth and development, subcellular organization and function, plant hormones, photomorphogenesis, germination and dormancy, senescence and abscission, plant rhythms. Application of physiological principles to agriculture.

5763*

Plant Tissue Culture. Lab 3. Prerequisite: 3463 or BIOL 3014. Skills in sterile technique, media preparation, embryogenesis and organogenesis. Survey of the major types of tissue culture and their application to crop and horticultural species. Introduction to general principles of genetic engineering of plant cells.

5813*

Plant Developmental Genetics. Prerequisites: 3463 and BIOL 3024 or equivalent. Discussion of morphogenesis, embryogenesis, gametogenesis, and the regulation of gene expression during plant development. Emphasis on recent genetic, experimental, and molecular studies of development in higher plants.

5823*

Plant Morphology. Lab 3. Prerequisite: 3024. Comparative study of the form and life cycle of representative genera of the major taxa of vascular plants. Field trips required.

5850*

Botany Seminar. 1 credit, maximum 6. Required of senior and graduate majors.

5923*

Environmental Plant Physiology. Prerequisite: 3463 or equivalent. Effects of light, temperature, water, soil and other environmental factors on physiological responses of plants; photosynthesis, water relations, water and temperature stress, flowering, dormancy and germination.

6000*

Research. 1-15 credits, maximum 36. Independent research for the doctoral dissertation.

Business Administration (BADM)

1111

Business Freshman Orientation. Prerequisite: freshman standing only. Required of all first semester freshmen in the College of Business Administration. An orientation to the CBA and OSU; survival skills; and a study of the career opportunities and curriculum in the various business departments.

2010

Special Topics. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Special topics and independent study in business.

3090

Study Abroad. 12-18 credits, maximum 36. Prerequisites: consent of the Office of International Programs and associate dean of student's college. Participation in a formal study abroad program spending a semester or year in full-time enrollment at a university outside of the U.S.

3513*
Strategy and Integration in Organizations. Prerequisites: FIN 3113, MGMT 3123, MKTG 3213. Integration of concepts from the business core courses using tools such as simulation and case analysis. Planning model, policy models, and strategy development.

3713
(I)International Business. Prerequisites: ECON 2013, FIN 3113, MGMT 3013, MKTG 3213. Development of international business strategy based on the integration of economic, accounting, financial, management and marketing concepts.

4010
Business Projects. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Special advanced topics, projects and independent study in business.

4050*
Business Colloquium. 3-9 credits, maximum 9. Prerequisites: junior standing and consent of the instructor and the dean. Study of an interdepartmental and interdisciplinary nature of various important issues and aspects of the business and economic environment. Provides an intellectual challenge for the able student with a strong interest in scholarship.

4113*
New Venture Creation. Prerequisite: business core courses or consent of instructor. Steps involved in starting a new business. Development of a business plan for a venture of student's choosing. Examination of franchising or acquisition of an existing business as alternative steps to business ownership.

5003*
Computer Applications in Business. Prerequisites: admission to MBA program or consent of MBA director; demonstrated personal computer usage proficiency. Introduction to management information systems, statistical and optimization packages, financial modeling languages and micro-computers. Algorithmic programming in FORTRAN/BASIC/COBAL.

5013*
Research Methods for Business. Prerequisite: STAT 2023, admission to MBA program or approval from MBA director. Role of Bayesian and inferential statistics in business research and management decision making. Measurement, scaling, survey methods, and forecasting. Applications to marketing; managerial, human resource; financial, and production planning; and other related business topics. Use of computers in statistical analysis.

5113*
Entrepreneurship and Venture Management. Prerequisite: admission to MBA program or consent of MBA director. Enterprise creation and problems faced by entrepreneurs in early growth stages of business ventures. An interdisciplinary problem-solving approach with emphasis on "live" case studies and plans for new business ventures. Emphasis is on entrepreneurship rather than problems faced by going concerns.

5200*
Selected Master of Business Administration Topics. 3-6 credits, maximum 6. Prerequisite: admission to the Master of Business Administration program. Selected topics dealing with business decision making and contemporary business issues.

5613*
The External Environment of Business. Prerequisite: admission to MBA program or approval from MBA director. Social, ethical, regulatory and political forces as they impact on the organization. Attention to organizational response to these forces through management policies and strategies.

5713*
Analysis of the Multinational Firm. Prerequisite: admission to MBA program or consent of MBA director. Identification and analysis of the managerial, financial and market problems facing the multinational firm. Focus is empirical, and stressing application of ecological and quantitative tools to the study of the multidimensional nature of the international business environment.

6000*
Research and Thesis. 1-9 credits, maximum 30. Prerequisite: approval of advisory committee.

6100*
Seminar in Business Administration. 3-6 credits, maximum 6. Prerequisite: consent of instructor. Interdisciplinary in nature; focused on research methodology.

Business Communications (BCOM)

3113
Written Communication. Prerequisite: 50 semester credit hours. Analysis of business communication problems in terms of generally accepted communication principles. Practice in written messages; specifically, special goodwill letters, neutral and good-news, disappointing, persuasive and employment messages.

3223
Organizational Communication. Prerequisite: 50 credit hours. Communication theory and process; common and special problems associated with interpersonal and organizational communication affecting business decisions and operations. Principles and methods of basic and applied research in business and communication; practice in administrative report writing. Analysis of selected business cases.

3333
Business Report Writing. Prerequisite: six hours of English. Fundamentals of writing business reports, including coverage of mechanics, content, and structure of business reports. Practice in writing business reports as well as oral presentations of reports.

5113*
Seminar in Administrative Communication. Understanding and application of valid and relevant communication principles and theories. Designed to develop management-level personnel who can effectively and efficiently use oral and written communications as administrative tools to organizational functioning.

5210*
Business Communication Applications. 1-3 credits, maximum 3. Application of communication techniques to the business setting. Interpersonal communication skills necessary for the manager in a business organization. Problems and applications within the modern business setting.

Business Education (BUSE)

6000*
Doctoral Thesis. 1-10 credits, maximum 10. Prerequisites: advanced graduate standing and approval of department head. Independent research for the doctoral thesis. Credit is given upon completion of the thesis.

Business Honors (BHON)

4053
Critical Issues in Global Business. Prerequisites: junior standing, admission to the Honors Program. Current critical issues facing business in a global environment. Social, political, economic and technological sectors of the environment. Framework of study on geographical and political regions.

4063
Topics in Contemporary Business. Prerequisites: junior standing, admission to the Honors Program. Topics of interest in the contemporary business and economic environment. The social role of the corporation; U.S. competitiveness and business and environmental issues.

4073
Literature in Business. Prerequisites: junior standing, admission to the Honors Program. Foundations of American business through selected literary masterpieces.

4083
Applied Research Processes. Prerequisites: junior standing, admission to the Honors Program. The relevant aspects of the philosophical, historical and ethical issues in scientific inquiry and business research methods. Preparation for completion of senior honors thesis.

4990
Business Honors Thesis. 1-5 credits, maximum 5. Prerequisites: Honors Program participation, senior standing, college approval. A guided reading and research program ending with an honors thesis under the direction of a faculty member, with second faculty reader and oral examination. Required for graduation with college honors in business.

Business Professions (BSPR)

2313
Production Keyboarding. Lab 2. Continued skill development in correct techniques, speed and accuracy with major emphasis on the application of skill.

2630
Automated Office Applications. 1-3 credits, maximum 3. Lab 4. Prerequisites: 2313 or equivalent and 24 semester credit hours. Application of automated office equipment to work processes in the office. Operation and use of word-processing equipment for text editing, operation and use of the microcomputer in text editing and other office information systems, and transcription of office communications.

3523
Office Problems in Keyboarding. Lab 2. Prerequisite: 2313 or equivalent. Problems in office situations requiring application of keyboarding knowledge and skills. Emphasis on quality work at high speeds.

3863
Office Procedures. Prerequisite: 2630. Theory of and applied practice in performing secretarial and managerial operations. Human relations in business as well as decision-making and problem-solving.

4213
Computers and Multimedia for Workplace Education. Lab 2. Prerequisite: basic knowledge of MS-DOS or consent of instructor. Overview of MS-DOS microcomputer applications in workplace education, including selection of hardware and software, databases, spreadsheets, authoring systems, Internet and other on-line databases, and multimedia applications. Same course as OCED 4213.

4363

Teaching Bookkeeping and Accounting. Prerequisites: ACCT 2203, EPSY 3213, skill in secretarial business subjects, and full admission to Professional Education. Teaching bookkeeping and accounting including development of objectives; organization, assessment and preparation of instructional resources and materials. Administration and interpretation of assessment techniques; design and use of diagnostic and achievement examinations; interaction patterns and instructional modifications.

4473

Teaching Business Education Skill Courses. Prerequisite: full admission to Teacher Education. Instructional methods in the teaching of skill development courses, including classroom interaction patterns, instructional modification, and evaluation techniques.

4653

Data Processing Instructional Methods and Procedures. Prerequisite: MSIS 2103. Instructional methods in the teaching of data-processing courses including the development of an understanding of computer hardware and software concepts and terminology. Problems, methods, and techniques in using and teaching concepts about the computer and computer programming languages. Hands-on programming experience integral part of course. Lab required.

4813

Instructional Strategies for Vocational Business Professions. Prerequisite: full admission to Teacher Education. Preparation, utilization, and interpretation of instructional and evaluation materials for vocational business education courses.

5110*

Problems in Business Professions. 1-3 credits, maximum 6. Current problems in business education, based upon the interests and needs of the students.

5330*

Field Study. 1-6 credits, maximum 6. Prerequisite: consent of department head. Individual investigations conducted in absentia and internships; periodic conferences and reports during the progress of the study.

5770*

Current Issues in Vocational Business Programs. 1-3 credits, maximum 6. Problems, materials, methods, history and current theory and philosophy of vocational business programs.

Cell and Molecular Biology (CLML)

3112

Cytology. Prerequisites: BIOL 1304 and BIOL 1403 or 1604; CHEM 1314 and 1515. Structures found within living cells, the dynamics of these structures and the functions which they perform.

3254*

Immunology. Lab 1. Prerequisite: MICR 2124. Vertebrate host's ability to defend itself against foreign intrusion. Chemistry and biology of the acquired immune response. Same course as MICR 3254.

4001

Professional Transitions in Microbiology and Cell and Molecular Biology. Prerequisites: declared microbiology or cell and molecular biology major with minimum 70 hours earned and consent of instructor. Understanding major areas and employment activities in microbiology, cell biology and molecular biology fields. Evaluating and understanding scientific and professional literature, and making the transition from undergraduate education to postgraduate education or employment. Same course as MICR 4001.

4123*

Virology. Prerequisite: BIOL 3014 or one course in biochemistry. Corequisite: 3224. Virus-host interactions including structure-function of animal, plant, and bacterial viruses. Discussion of the molecular biology of virus infection and development. Same course as MICR 4123.

4264*

Cell Physiology. Lab 3. Prerequisite: BIOC 3653 or BIOL 3014. Cellular activities and fundamental physiological processes. Same course as ZOO 4264.

4273*

Developmental Biology. Prerequisites: BIOL 3024 and corequisite BIOL 3014 or one course in biochemistry. The molecular biology and molecular genetics of developmental processes such as cell division, differentiation, migration, cell-cell communication, and gene expression in a wide variety of organisms.

4323*

Bioenergetics. Prerequisites: BIOC 3653 or BIOL 3014. Bioenergetic reactions and mechanisms involved in energy production in plants, animals and microbial systems. Same course as MICR 4323.

4990

Special Problems. 2-4 credits, maximum 8. Prerequisite: consent of instructor. Minor investigations in the field of cell and molecular biology.

4993

Senior Honors Project. Prerequisites: departmental invitation, senior standing, Honors Program participation. A research project under the direction of a faculty member resulting in a written report to be judged by a second faculty member. Required for graduation with departmental honors in CLML.

Chemical Engineering (CHE)

2033

Introduction to Chemical Process Engineering. Lab 3. Prerequisite: CHEM 1515. Application of mathematics and scientific principles to solving chemical engineering problems. Simple material and energy balances applied to process design. The nature and application of unit operations and unit processes to the development of chemical processes.

3013

Rate Operations I. Lab 3. Prerequisites: 2033 and ENSC 3233. Basic rate equations for heat, mass and momentum transport; the transport analogies, solutions and correlations for predicting transport rates for practical applications; utilization in design and analysis of process equipment.

3113

Rate Operations II. Prerequisites: 3013, 3473. Continuation of CHE 3013.

3473

Chemical Engineering Thermodynamics. Lab 3. Prerequisites: ENSC 2213; concurrent enrollment in 2033 and CHEM 3434. Application of thermodynamics to chemical process calculations. Behavior of fluids, including estimation of properties by generalized methods. Study of chemical thermodynamics, including heats of reaction, chemical reaction and phase equilibria.

4002*

Chemical Engineering Laboratory I. Lab 6. Prerequisites: 3013 and 3473. Applications of heat, mass, and momentum transfer, unit processes, and unit operations principles to the analysis of bench and pilot-scale equipment. Interpretation of experimental data and the presentation of results are emphasized.

4112*

Chemical Engineering Laboratory II. Lab 6. Prerequisite: 4002. A continuation of 4002.

4124*

Chemical Engineering Design I. Prerequisites: 3113, concurrent enrollment in 4002. Economic analysis of process plants and systems of equipment; methods for estimating plant investment requirements and operating costs; economic evaluation and optimal design of chemical process systems; basic equipment and process design calculations.

4224*

Chemical Engineering Design II. Prerequisite: 4124. A continuation of CHE 4124. Economic analysis of process plants and equipment. Design of chemical processing equipment and chemical plants. Application of computer techniques to chemical engineering design.

4333

Transport Phenomena. Prerequisite: 3013. Physical and mathematical similarities and differences of momentum, heat and mass transfer. Molecular theories of viscosity, thermal conductivity and diffusion. Shell balance techniques, Navier-Stokes equations, differential equations of energy and continuity in multi-component, reactive and nonreactive systems used to solve simple transport phenomena problems. Transport phenomena in turbulent flow systems with convective heat and mass transfer complemented with unsteady state transport.

4343

Environmental Engineering. Prerequisites: 3013, 3473. Application of science and engineering principles to minimize the adverse effects of human activities on the environment. National and state environmental regulations; predictive movement and fate of chemicals in the geospheres; multi-media pollution assessment, analysis and control.

4473*

Chemical Reaction Engineering. Lab 3. Prerequisite: senior standing. Principles of chemical kinetics rate concepts and data treatment. Elements of reactor design principles for homogeneous systems; introduction to heterogeneous systems.

4581*

Seminar. Prerequisite: senior standing; Recent developments in chemical engineering and the process industries.

4840*

Process Control Laboratory. 2-5 credits, maximum 5. Lab 4-8. Prerequisites: 3013 and MATH 2233. Experimental study of control loop performance including: process dynamics, sensors, feedback controllers, and control valves. Analog and digital techniques including: pneumatic and electronic components, programmable controllers, and computer simulation with colorgraphics.

- 4843***
Chemical Process Instrumentation and Control. Prerequisites: 3013 and MATH 2233. Instruments for measuring temperature, pressure, composition and other process variables; different modes of control and their influence on process stability. System analysis and design through linearization technique.
- 4990**
Special Problems. 1-5 credits, maximum 5. Lab 3-15. Prerequisite: senior standing. Training in independent work, study of relevant literature and experimental investigation of an assigned problem.
- 5000***
Master's Thesis. 1-6 credits, maximum 6. Prerequisite: approval of major professor. Methods used in research and thesis writing.
- 5030***
Professional Practice. 2-6 credits, maximum 8. Prerequisites: senior standing and consent of instructor. Application of chemical engineering principles to the solution of real-life engineering problems in an actual or simulated industrial environment. Includes application of design and testing procedures, economic evaluation and reporting on one or more assigned projects.
- 5110***
Special Topics In Chemical Engineering. 2-3 credits, maximum 6. Lab 2-6. Prerequisite: consent of instructor. Small group and individual projects in unit operations, unit processes, chemical kinetics, computer applications, process modeling or any of a wide range of chemical engineering topics. May be repeated for credit if subject matter varies.
- 5123***
Advanced Chemical Reaction Engineering. Prerequisite: 4473. Advanced principles and applications of chemical kinetics in catalysis, heterogeneous systems, non-ideal reactions, polymerization and biological reactions.
- 5213***
Selected Diffusional Unit Operations. Mass transfer in fluids. Diffusion in liquids and gases. Equilibrium stage and transfer unit concepts. Mass transfer concepts of diffusional unit operations such as absorption, adsorption, crystallization, drying, humidification and liquid extraction.
- 5283***
Bioengineering. Prerequisite: consent of instructor. Application of fundamental chemical engineering principles to biochemical, biomedical and physiological processes. Fermentation technology, biological mass transfer and kinetics, bioreactor design and scale-up, artificial organs, drug delivery formulations, pharmacokinetics, biomaterials, and human physiology.
- 5413***
Fundamentals of Polymer Engineering. Fundamental principles in the engineering of macromolecules. Various aspects of polymer engineering including definitions and nomenclature, polymer physical chemistry, mass-transfer, rheological and mechanical properties, industrial production and applications.
- 5423***
Process Heat Transfer. Application of fundamental principles of single- and two-phase fluid dynamics and heat transfer to the design and analysis of process heat transfer equipment.
- 5633***
Stagewise Operations. Stagewise separation in binary and multicomponent systems. Development of theoretical techniques with application to typical situations in vapor-liquid, liquid-liquid and solid-liquid systems. Use of digital and analog techniques.
- 5703***
Optimization Applications. Prerequisite: graduate standing. A survey of various methods of unconstrained and constrained linear and non-linear optimization. Applications of these methodologies using hand-worked examples and available software packages. Intended for engineering and science students. Same course as ECEN 5703, IEM 5023 and MAE 5703.
- 5733***
Neural Networks. Prerequisite: graduate standing. Introduction to mathematical analysis of networks and learning rules, and on the application of neural networks to certain engineering problems image and signal processing and control systems. Same course as ECEN 5733 and MAE 5733.
- 5743***
Chemical Engineering Process Modeling. 3 credits, maximum 6. Chemical engineering systems and process models. Analytical and numerical methods of solution of resulting equations or systems of equations, with computer methods in a chemical engineering context.
- 5793***
Advanced-process Design and Economics. Prerequisites: 4124, 4224. Application of chemical engineering principles to the design and analysis of process equipment and plants; prediction and extrapolation of thermal and physical properties; methods for design and synthesis of process units and equipment.
- 5843***
Principles of Chemical Engineering Thermodynamics. Principles of thermodynamics. Properties of fluids and prediction of thermodynamic properties. Phase and chemical equilibrium. Thermodynamics in unit operations.
- 5853***
Advanced Chemical Process Control. Prerequisite: 4843 or equivalent. General concepts and approaches of model-based control. Studies in the application of process-model-based control and model-predictive control on multivariable, nonlinear, nonstationary, noisy processes.
- 5873***
Air Pollution Control Engineering. Causes, effects and control of atmosphere pollution. Same course as CIVE 5873.
- 5990***
Special Problems. 2-4 credits, maximum 9. Prerequisite: consent of instructor. Individual report topics in chemical engineering involving operations, processes, equipment, experiments, literature search, theory, computer use or combinations of these.
- 6000***
Doctoral Thesis. 2-15 credits, maximum 30. Prerequisite: approval of major professor. The doctoral candidate will register for a minimum of 3 semester credit hours to a maximum of 15 semester credit hours in each semester during which laboratory work is in progress. Methods used in research and thesis writing. An original investigation of a problem in chemical engineering and its report in a dissertation.
- 6010***
Chemical Engineering Seminar. 1-3 credits, maximum 3. Advanced research and development topics.
- 6023***
Chemical Engineering Science I. Prerequisites: 5213 and 5423. Theoretical aspects of fluid dynamics, heat transfer and mass transfer. Boundary layer theory, multiphase flow theory of diffusion and interphase mass transfer. Analogies between heat, mass and momentum transfer.
- 6113***
Chemical Engineering Science II. Prerequisite: 6023. Continuation of 6023. Theoretical aspects of fluid dynamics, heat transfer and mass transfer. Boundary layer theory, multiphase flow. Theory of diffusion and interphase mass transfer. Analogies between heat, mass and momentum transfer.
- 6223***
Advanced Chemical Engineering Thermodynamics. Prerequisite: 5843. Phase equilibrium in multicomponent systems. Irreversible processes. Properties of fluids and the prediction of properties by statistical methods. Application of thermodynamics to unit operations.
- 6440***
Advanced Topics in Chemical Engineering. 3-6 credits, maximum 9. Topics in chemical engineering unit operations in design. Advanced mathematical techniques in chemical engineering problems. May be repeated for credit if subject matter varies.
- 6543***
Chemical Engineering Kinetics. Prerequisite: 6223. Kinetics of chemical reaction. Reaction rates in homogeneous systems. Design of batch and fluid reactors. Catalysis and the design of gas-solid catalytic reactors.

Chemistry (CHEM)

- 1014**
(L,N)Chemistry in Civilization. Lab 2. Symbols, methods and contributions to society of the chemical sciences. Includes polymers, pollution, energy, consumer chemicals, drugs, nuclear science and other topics. No credit for students with credit in 1215, 1314.
- 1215**
(L,N)General Chemistry. Lab 2. Prerequisite: MATH 0123 or high school equivalent. The beginning chemistry course recommended for students in the applied biological sciences. No credit for students with credit in 1014, 1314.
- 1225**
(N)General Chemistry. Lab 2. Prerequisite: 1215 or advanced placement. A continuation of general chemistry, recommended for students in the applied biological sciences. No credit for students with credit in 1515.
- 1314**
(L,N)General Chemistry. Lab 2. Prerequisite: MATH 1513 or concurrent enrollment in 1613, 1715 or a higher level math course. The beginning chemistry course recommended for students in basic biological sciences (including premedical science and pre-veterinary science), physical sciences and engineering. No credit for students with credit in 1014, 1215.
- 1413**
(L,N)Inquiry-based Chemistry. Lab 3. Prerequisite: PHYS 1313 recommended. Directed inquiry and hands on study of chemical reactions. Recommended for elementary education majors as model course to learn and teach science.
- 1515**
(L,N)General Chemistry. Lab 2. Prerequisite: 1314 or advanced placement. A continuation of general chemistry. No credit for students with credit in 1225.
- 2113**
Principles of Analytical Chemistry. Prerequisites: 1515 and MATH 1513 or 1715. Modern theories of solutions, separation techniques and methods of analysis.
- 2122**
Quantitative Analysis Laboratory. Lab 6. Prerequisite: 2113 or concurrent enrollment. Laboratory work related to material covered in CHEM 2113.

- 2990**
Special Problems in Chemistry for Non-majors. 1-2 credits, maximum 2. Prerequisite: 1515 or concurrent enrollment. Independent training in chemistry at the lower-division level.
- 3015***
The Chemistry of Organic Compounds. Lab 4. Prerequisites: 1215 and 1225 or equivalent. Terminal, one-semester non-majors course in organic chemistry covering the general principles of nomenclature, structures, bonding, methods of preparation, reactions and uses of acyclic, cyclic, and aromatic compounds. No credit for students with credit in 3053 or 3112.
- 3053***
Organic Chemistry. Prerequisite: 1515 or equivalent. Hydrocarbons and their derivatives, including specific compounds of theoretical, biological or industrial importance. No credit for students with credit in 3015.
- 3112**
Organic Chemistry Laboratory. Lab 6. Prerequisite: 3153 or concurrent enrollment. Laboratory exercises related to theoretical principles covered in CHEM 3053 and 3153. No credit for students with credit in 3015.
- 3153***
Organic Chemistry. Prerequisite: 3053. A continuation of 3053.
- 3164**
Physical Science for Teachers. Lab 2. Prerequisites: 1314, GEOL 1114, PHYSC 1114. Capstone course in physical science for potential science teachers. Review of physics and chemistry principles and phenomena as related to the curriculum.
- 3353**
Descriptive Inorganic Chemistry. Prerequisite: 1225 or 1515. Structures and properties of the elements and their many compounds in the broadest sense which includes the modern technologically important materials, organometallics, and inorganic substances of biological significance.
- 3434***
Physical Chemistry I. Prerequisites: 2113, MATH 2155. Introductory theoretical analysis of molecular structure, chemical bonding and macroscopic chemical systems using quantum theory, classical and statistical thermodynamics and kinetics. Students who are not chemistry majors may receive graduate credit.
- 3532***
Physico-Chemical Measurements. Lab 6. Prerequisites: 2122, 3434. Apparatus, experimental methods and calculations employed in physico-chemical investigations.
- 3553***
Physical Chemistry II. Prerequisite: 3434. A continuation of 3434. Students who are not chemistry majors may receive graduate credit.
- 4020***
Modern Methods of Chemical Analysis. 1-5 credits, maximum 5. Lab 2. Prerequisites: 2122, 3434. Theoretical and laboratory study of modern techniques, reagents and instruments employed in analytical chemistry.
- 4101***
Laboratory and Chemical Safety. Instruction on chemical safety, prudent laboratory practices, and federal, state, and OSU regulations on safety.
- 4320***
Chemical and Spectrometric Identification of Organic Compounds. 1-3 credits, maximum 3. Lab 1-2. Prerequisites: 3112 and 3153. Theory and practice in separating mixtures of organic compounds and some theory and practice in identifying organic compounds by spectroscopic methods.
- 4990***
Special Problems. 1-5 credits, maximum 6. Lab 3-15. Prerequisite: senior standing. Training in independent work, study of relevant literature and experimental investigation of an assigned problem.
- 5000***
Thesis. 1-6 credits, maximum 6. Investigations, chiefly experimental, with necessary conferences. Familiarizes the student with methods used in research in chemistry.
- 5011***
Graduate Seminar. Preparation and presentation of seminars, usually on subjects of current interest taken from the literature. Completion of 1 credit hour required for M.S. degree.
- 5103***
Physical and Chemical Separations. Prerequisite: one year of physical chemistry. Principles of bulk and multi-stage separation methods: chromatography, liquid-liquid extraction and zone melting.
- 5113***
Equilibrium and Kinetics in Analytical Chemistry. Prerequisite: one year of physical chemistry. Physical and chemical principles of equilibrium and kinetics as applied to analytical problems.
- 5220***
Modern Topics for Teachers. 1-6 credits, maximum 6. Prerequisite: teaching experience. Designed to help elementary and secondary science teachers improve their subject matter competence in chemistry. Content varies, depending on the needs of specific groups of teachers.
- 5223***
Chemistry of High Polymers. Prerequisites: 3153 and 3434 or equivalent. Preparation and polymerization of organic monomers; properties and uses of resulting high polymers; theories of polymerization; inorganic and natural organic polymers.
- 5260***
Inorganic Chemistry I. 1-3 credit hours, maximum 3. Prerequisites: 3353 or equivalent, and 3 hours of physical chemistry. Bonding theory, molecular symmetry and structure, characterization of inorganic compounds, coordination chemistry, crystal field theory, solution chemistry, and mechanisms of inorganic reactions in solution.
- 5283***
Solid-state Chemistry. Prerequisite: 5260. Structure, bonding, and properties of crystalline and amorphous inorganic solids. Emphasis on the characterization of inorganic solids and phase transitions in inorganic solids.
- 5323***
Reactions of Organic Compounds. Prerequisite: 3153. Products and mechanisms of reactions of importance in organic synthesis.
- 5373***
Spectrometric Identification of Organic Compounds. Lab 3. Prerequisite: 4320. Lectures on ultraviolet, circular dichroism, infrared, nuclear magnetic resonance (NMR) and mass spectrometry (MS). More advanced techniques in NMR and MS stressed. Hands-on training and use of modern spectroscopic instrumentation in laboratory.
- 5443***
Mechanism and Structure in Organic Chemistry. Prerequisites: 3153 and 3553. Relationship of properties of organic compounds to their structure; mechanisms of organic reactions.
- 5563***
Chemical Thermodynamics I. Prerequisite: 3553. Statistical and classical thermodynamics applied to chemical systems.
- 5623***
Quantum Chemistry I. Prerequisite: 3553. Fundamentals of quantum mechanics, including classical mechanics, wave representation of matter, the Schroedinger equation and atomic structure.
- 5960***
Inorganic Chemistry II. 1-3 credits, maximum 3. Prerequisite: 5260. Chemistry of main group and transition metal organometallic compounds, metal clusters, and catalysis by organometallic polymers, bioinorganic chemistry, and materials chemistry.
- 6000***
Research. 1-12 credits, maximum 55. Prerequisite: M.S. degree in chemistry or permission of instructor. Independent investigation under the direction and supervision of a major professor.
- 6011***
Advanced Seminar. Prerequisite: 5011 or M.S. degree. Preparation and oral presentation of critical reviews on chemical subjects. Usually related to the student's research area. Completion of 1 credit hour required for the Ph.D. degree.
- 6050***
Special Topics in Analytical Chemistry. 1-6 credits, maximum 6. Supervised study of topics and fields not otherwise covered.
- 6103***
Electroanalytical Chemistry. Prerequisite: 4024. The theory, practice and instrumentation in various areas of modern electroanalytical chemistry.
- 6113***
Analytical Spectroscopy. Prerequisite: 4024. Survey of selected topics in analytical applications of spectroscopic techniques. Fundamental concepts as well as current trends in research, including instrumentation.
- 6323***
Heterocyclic Compounds and Medicinal Chemistry. Preparations and reactions of cyclic organic compounds containing atoms other than carbon in the ring. Modern synthetic techniques as well as industrial methods for the preparation of heterocycles, especially those with medicinal properties and uses as related to structural characteristics of the compounds.
- 6353***
Chemistry of Natural Products. Prerequisite: 5323. Complex naturally occurring organic compounds such as alkaloids, terpenes and steroids.
- 6420***
Special Topics in Organic Chemistry. 1-9 credits, maximum 9. Prerequisite: 3153. Deals with topics not covered in other courses.
- 6453***
Chemical Kinetics. Prerequisite: 3553. The kinetics of chemical reactions and their theoretical interpretation.
- 6523***
Quantum Chemistry II. Prerequisite: 5623 or PHYSC 5613. Molecular quantum mechanics and chemical bonding.
- 6553***
Molecular Spectroscopy. Prerequisite: 5623. Spectra and structure of molecules.
- 6623***
Chemical Thermodynamics II. Prerequisite: 5563. A continuation of 5563.
- 6650***
Selected Topics in Advanced Physical and Inorganic Chemistry. 1-6 credits, maximum 12. Prerequisite: consent of instructor. Supervised study of selected topics and fields not otherwise covered.

Civil Engineering (CIVE)

- 3113 Intermediate Mechanics of Materials.** Prerequisite: ENSC 2142. Stress-strain behavior of engineering materials. Transformation of stresses and strains in two dimensions. Shear and moment diagrams for beams. Stresses in beams under combined loads. Deflection of beams. Buckling of columns.
- 3413 Structural Analysis.** Lab 3. Prerequisite: 3113. Analysis of internal forces and deflections of structures subjected to static loading. Beams, trusses, and framed structures analyzed by appropriate classical methods. Classical methods and modern computer procedures for the analysis of statically indeterminate structures.
- 3513 Structural Steel Design.** Lab 3. Prerequisite: 3113. Introduction to the design of structural steel members and connections in accordance with AISC specifications.
- 3523 Reinforced Concrete Design.** Lab 3. Prerequisite: 3113. Introduction to the design of reinforced concrete elements in accordance with the strength design requirements of the ACI Building Code.
- 3614 Engineering Surveying.** Lab 3. Prerequisite: MATH 1613 or MATH 1715. Principles and techniques of vertical and horizontal measurements related to engineering and construction projects. Linear and angular measurements, differential leveling, traverses, topographic surveys, construction surveying, horizontal and vertical curves, earthwork quantities, and design of route systems.
- 3623 Engineering Materials Laboratory.** Lab 3. Basic construction materials including Portland cement concrete, asphalt concrete, aggregates, and composite materials. Behavioral characteristics, use, and quality control of these materials. Basic statistical procedures used for material specifications. Laboratory sessions provide "hands on" experience in performing standard tests.
- 3633 Transportation Engineering.** Prerequisite: 3614 or consent of instructor. Planning, design and operations of transportation facilities. Vehicle characteristics and human factors in design. Traffic stream variables and their measurement techniques. Basic traffic flow models. Highway and street intersection capacity and level of service. Traffic control concepts. Transportation systems management. Application of statistical analysis and operations research to analyze transportation problems.
- 3713 Geotechnical Engineering.** Prerequisite: ENSC 2142. Physical and mechanical properties of soils, including specific gravity, grain size distribution, plasticity, permeability, consolidation, and shear strength. Use of physical and mechanical properties to calculate stresses in a soil mass, lateral earth pressures, bearing capacity, and slope stability. Application of physical and mechanical properties to design of foundations, retaining structures and slopes.
- 3813 Environmental Engineering Science.** Prerequisites: CHEM 1515, MATH 2155. Engineering aspects of the life support system; the carbon-oxygen cycle; cycling of nitrogen, sulfur and phosphorus; and the hydrologic cycle. Concepts of environmental pollution and degradation. Techniques for mitigation; water and wastewater treatment, solid and hazardous waste management, and air pollution abatement. Calculation of pollution potential and treatment system parameters.
- 3833 Applied Hydraulics.** Prerequisites: CHEM 1515 or equivalent, ENSC 3233, PHYS 2014. Basic hydraulic principles and their application in civil engineering problems. Analyses of water distribution networks, open channels, storm-water management and wastewater collection systems, water pumps, hydraulic models, hydraulic measurements, treatment plant hydraulics, and hydraulic structures.
- 3843 Hydrology I.** Prerequisite: ENSC 3233. Basic principles of surface and groundwater hydrology and their application in engineering problems. The hydrologic cycle, weather and hydrology, precipitation, evaporation, transpiration, subsurface waters, stream flow hydrographs, hydrologic and hydraulic stream routing, probability of hydrologic events, application of hydrologic models. Same course as BAE 4313.
- 3853 Environmental Engineering Laboratory.** Lab 3. Prerequisite: 3813. Performance of experiments with benchscale environmental engineering unit operations, review of chemical principles and analyses important to the evaluation of these and other environmental engineering applications. Emphasis on the development of experimental results that can be used in the design of full-scale units.
- 4010* Civil Engineering Research.** 1-4 credits, maximum 12. Prerequisite: senior standing or consent of instructor. Research and investigation of civil engineering problems.
- 4042 Senior Seminar.** Prerequisite: senior standing or consent of instructor. Topics relevant to the professional practice of civil and environmental engineering. Written communications skills are stressed. Resumes, letters of introduction and job interviews are discussed in detail. Management principles and project management are introduced. The advantages of professional registration and professional and technical society membership are covered. Laws impacting the practice of engineering such as OSHA and ADA are introduced. Other topics such as professional ethics, income taxes and investments are discussed.
- 4043 Senior Design.** Prerequisites: 3513, 3523, senior standing. Major comprehensive design experience using the team approach. Industry practitioners provide design projects and analyze and critique results. Extends the undergraduate experience and provides the student with opportunities to analyze and design complex structures.
- 4143* Environmental Engineering Design.** Prerequisites: 3813, 3853, 4833, ENSC 3233. Factors involved in the design of engineered environmental systems. Solving "real world" environmental engineering problems. Design experience using decision making techniques, integrating and expanding upon current knowledge, and defending engineering decisions made. Economic, environmental, social and regulatory aspects of environmental engineering design.
- 4273* Construction Planning and Scheduling.** Lab 3. Prerequisites: senior standing and consent of instructor. Critical-path methods of planning, scheduling and controlling construction projects. Includes both computer and noncomputer techniques.
- 4711* Basic Soils Testing Laboratory.** Lab 3. Prerequisite: 3713. Laboratory measurement of the physical and mechanical properties of soils; specific gravity, grain size distribution, plasticity, compaction, compressibility, and shear strength.
- 4763* Construction Estimating.** Lab 2. Prerequisite: senior standing. The construction industry, its makeup, operation, estimating and bidding procedures. Theory and practice of estimating materials, labor, equipment and overhead costs for various types of construction. Emphasis on preliminary cost estimates during the conceptual design phase of a construction project.
- 4823* Human Impact on the Environment.** The activities of humans and how they affect the aqueous, terrestrial and atmospheric environment.
- 4833* Unit Operations in Environmental Engineering.** Prerequisites: 3813, ENSC 3233. Fundamental principles of water and wastewater treatment, including basic theory and development of design parameters. Application of these to the design of unit operations and processes in various treatment plants.
- 5000* Master's Thesis or Report.** 1-6 credits, maximum 6. Prerequisite: graduate standing. A student studying for a master's degree will enroll in this course for 2 credit hours if a report is to be written; 6 credits if a thesis is to be written.
- 5010* Civil Engineering Seminar.** 1-3 credits, maximum 6. Prerequisites: graduate standing and approval of major professor. Review of literature of major fields of civil engineering.
- 5013* Aquatic Chemistry.** Prerequisites: 5813 or concurrent enrollment, CHEM 1515 or equivalent. Application of chemical principles to environmental problems. Chemical kinetics, chemical equilibrium, acid-base chemistry, and development of pc-pH diagrams and coordination chemistry. Precipitation and dissolution reactions and oxidation-reduction reactions.
- 5020* Civil Engineering Research.** 1-6 credits, maximum 6. Prerequisites: graduate standing and approval of major professor. Research and investigations other than thesis studies.
- 5030* Engineering Practice.** 1-6 credits, maximum 9. Prerequisite: approval of adviser. Professional supervised civil engineering practice involving authentic projects for which the student assumes a degree of professional responsibility. Activities must be approved in advance by the student's adviser and may consist of engineering experience on-campus or off-campus, or both. Periodic reports both oral and written are required as specified by the adviser.
- 5080* Engineering Problems.** 1-3 credits, maximum 6. Prerequisite: graduate standing. Problems of particular interest to graduate students in the field of applied science.

5123*
The Legal and Regulatory Environment of Engineering. Prerequisite: Junior, senior or graduate standing. The U.S. and Oklahoma court systems. Tort law and labor law having an impact on engineering and construction. Union organization and activities. Government contracting and the laws governing it. Discussions of the Occupation Safety and Health Act and Americans with Disabilities Act. In-Depth look at environmental policy, laws, and regulations affecting engineering including NEPA, CWA, SDWA, RCRA, CERCLA, and CAA. Water law.

5133*
Construction Contracts and Specifications. Prerequisite: graduate standing or consent of instructor. The nature of contracts. Contract documents. Master format. Principles of specification writing. Contract types. Bonds and insurance. Bidding. Subcontracting. Disputes and disputes resolution.

5143*
Project Engineering and Management. Prerequisite: graduate standing or consent of instructor. Management of the design and construction of civil engineering projects. Topics include owner's study, formation of project teams, design coordination, construction, and project closeout.

5153*
Contract Administration. Prerequisite: graduate standing or consent of instructor. Methods and techniques of tracking and control of construction projects. Evaluation of current research findings to contract implementation.

5163*
Construction Equipment Management. Prerequisite: graduate standing or consent of instructor. Analysis of construction equipment. Performance under various operating conditions. Application of engineering fundamentals to construction methods. Selection and costs of equipment, prediction of equipment production rates, and unit costs of work in place.

5173*
Concrete Construction. Prerequisite: graduate standing or consent of instructor. Design of formwork for concrete structures. Analysis of loads, deflections, and stresses of forming systems. Evaluation of economics of formwork designs.

5213*
Environmental Geotechnology. Prerequisites: background in soil mechanics and basic chemistry. A study of the ability of soil to retain pollutants, effect of pollutants on chemical, physical and geotechnical properties of soil. Description of soil remediation technologies.

5233*
Geotechnical Engineering Investigations. Prerequisites: 3713, 4711, and basic geology course. Description of methods of subsurface exploration, sampling, and in situ testing. Discussion includes a review of engineering geophysical methods, equipment and methods for boring and sampling of soil and rock, measurement of ground water conditions, and in situ testing equipment and methods such as cone penetration test, pressure meter test and others.

5243*
Use and Design of Geosynthetics. Prerequisites: 3713, 4711. Description of types of geosynthetics available for engineering uses. Pertinent engineering properties required to design for various functions, basic design methodology for geosynthetics for various functions, and construction and performance considerations.

5263*
Terrain Analysis. Prerequisites: Basic courses in soil mechanics and geology. Prediction of geotechnical engineering characteristics of geological landforms from remote sensing imagery. Emphasis on photographic stereo interpretation. Training and practice of this media in land-use applications and environmental problems.

5303*
Systems Analysis for Civil Engineers. Prerequisite: senior or graduate standing. Synthesis of systems modeling and simulation techniques, mathematical optimization procedures, and evaluation tools of multi-attributed systems including utility theory and decision analysis. Mathematical optimization techniques in the areas of resource allocation, transportation and water resources systems planning, structural design, construction management, and environmental and ecological problems.

5313*
Highway Traffic Operations. Prerequisite: 3633. Level of service, capacity and service volume concepts. Operational characteristics of uninterrupted-flow and interrupted-flow traffic facilities. The 1985 HCM procedures for analyzing the capacity of freeways, multilane and two-lane rural highways, urban arterials, signalized and unsignalized street intersections, and transit and pedestrian facilities. Administrative and planning actions for congestion management. Design alternatives and improvement strategies for effective use of urban arterial street width.

5343*
Urban Transportation Planning. Prerequisite: 3633. Determinants of demand for transportation and models for demand forecasting. Performance characteristics of transportation systems and models for performance. Quantitative analysis of multimodal transportation networks including prediction of flow patterns and service quality. Evaluation of social, environmental, and political impacts of transportation decisions. Application of systems analysis techniques to the generation, evaluation, and selection of alternative transportation systems.

5353*
City Planning and City Organization. Lab 3. Prerequisite: senior or graduate standing. Orderly development and extension in city growth, civic, legal and engineering aspects. Subdivisions, zoning, park system, water fronts, street systems, airports and transportation terminals, and traffic control. Functional organization of a city and city engineering organization.

5363*
Design and Planning of Airports. Prerequisite: 3633. Nature of civil aviation. Aircraft characteristics and performance related to airport planning and design. Air traffic control and navigation systems. Basics of airport planning and airport demand forecasting. Analysis of airport capacity and delays. Runway length requirements. Configuration and geometric design of runways, taxiways, holding aprons, and landing areas. Airport lighting, marking, and signing. Drainage and noise control.

5373*
Design of Traffic Control Systems. Prerequisite: 3633. Traffic control systems design, available technological options and range of agency needs. Design of vehicle detectors, controllers, communications links, signal display hardware and wiring. Development of timing plans using computer simulation models. Freeway surveillance and control: ramp metering, incident detection and motorist information systems. Preparation of contractual documents and construction supervision.

5383*
Geometric Design of Highways. Prerequisite: 3633. Geometric, functional and aesthetic aspects of roadway design. Alignment, sight distance, at-grade intersections, interchanges and freeway systems. Design tools and techniques.

5403*
Advanced Strength of Materials. Prerequisite: 3113. General states of stress and strain, theories of failure, energy principles, beam bending, shear center, torsion of prismatic shafts, beams on elastic foundations, plates and shells, elastic stability.

5413*
Classical Methods of Structural Analysis. Prerequisite: 3413. Advanced analysis of indeterminate frames, trusses and arches by classical, numerical, and energy methods with emphasis on methods for hand computations.

5423*
Matrix Analysis of Structures. Prerequisite: consent of instructor. Matrix analysis of two- and three-dimensional trusses and frames. Development of member stiffness matrices. Assemblage of structure matrices by direct stiffness method. Computer programs for structural analysis.

5433*
Energy Methods in Applied Mechanics. Prerequisites: 3113, MATH 2233 or MAE 3323. Advanced structural mechanics from the standpoint of virtual work; energy principles and variational calculus applied to the analysis of structures, mechanisms, dynamics, and vibrations.

5443*
Theory of Elastic Stability. Prerequisite: 5403. General theory of elastic stability; buckling of columns; analysis of beam-columns; stability analysis of structural frames, thin-walled beams of open cross-section, and plate structures.

5453*
Engineering Analysis. Prerequisite: ENSC 2112. Advanced, classical mathematical skills for engineers. Dimensional analysis, general tensor analysis, curvilinear coordinates, partial differential equations, perturbation theory, integral equations, special functions, eigen function analysis, integral transform methods, variational methods.

5463*
Structural Reliability and Engineering Judgment. Prerequisite: 3113 or equivalent, STAT 4033 or equivalent, or consent of instructor. Basic probability and statistics. Probability concept for failure analysis. System reliability. Bayesian approach. Inspection procedures. Allowable stress design versus load and resistance factor design. Classical theory of structural reliability. Reliability analysis of structures. Case histories of engineering judgment. Engineering ethics.

5503*
Computer-aided Structural Analysis and Design. Prerequisites: 3413; 3513 and 3523 (or concurrent enrollment); senior or graduate standing. Major comprehensive design experience. Promotion of a design office atmosphere in using a team approach. Industry practitioners provide design projects and critique results. Analysis and design of complex structures and preparation of contract documents and drawings. Emphasis on modern computer-based computation and presentation tools.

5513*
Advanced Reinforced Concrete Design. Prerequisite: 3523. Advanced topics in reinforced concrete design with emphasis on frames, slabs, and earthquake-resistant structures.

- 5523***
Advanced Steel Structure Design. Prerequisite: 3513. Advanced topics in steel design such as plastic design, plate girders, composite design, fatigue and fracture, stability, and bracing design.
- 5533***
Prestressed Concrete. Prerequisite: 3523. Design of simple and continuous prestressed concrete beams. Behavior under overload. Calculation of prestress losses and deflections.
- 5543***
Bridge Design. Prerequisites: 3513 and 3523. Structural design of steel and concrete highway bridges, including bridge types, parts of a bridge, loads and load distribution, analysis, design, and bridge rating. Emphasis on topics of special interest to students.
- 5553***
Fatigue and Fracture Mechanics. Prerequisite: MAE 4333 or consent of instructor. Fracture processes in engineering materials including design considerations, failure avoidance and predictability. Fatigue processes and high-strength, toughness-limited materials emphasized. Same course as MAE 5553.
- 5643***
Pavement Evaluation and Rehabilitation. Lab 3. Prerequisite: 5693 or consent of instructor. "State-of-the-art" pavement evaluation procedures and rehabilitation techniques. Field and laboratory methods of evaluating in situ pavement performance. Rehabilitation techniques including resurfacing, recycling, reconstruction, and restoration. Selection of the most feasible rehabilitation method based on life cycle costs.
- 5653***
Asphalt Materials and Mix Design. Lab 1.5. Prerequisite: 3633 or consent of instructor. Principles of asphalt concrete mix design including material characteristics and performance. Evaluation of Hveem and Marshall mix design methods. Asphalt cements, rubberized asphalt polymer asphalts, emulsions, cutbacks, and aggregates. Laboratory sessions focused on the engineering properties of the materials discussed.
- 5673***
Concrete Materials and Mix Design. Lab 1.5. Prerequisite: senior or graduate standing. Principles of concrete mix design including material characteristics, strength and durability requirements, environmental effects and forensic analysis. ACI and PCA mix design procedures. Laboratory on theoretical and practical aspects of concrete technology.
- 5693***
Pavement Design and Analysis. Prerequisite: 3633 or consent of instructor. Principles of pavement design including stress analyses, load and environmental effects and material characteristics. AASHTO, PCA and AI methods of pavement design. Computer methods. Practical aspects of life cycle cost analyses and construction methods.
- 5703***
Soils in Construction. Prerequisites: 3713, 4711 or consent of instructor. Soils types and general behavior during construction; earthwork construction requirements and specific considerations for embankments, pavements, buildings and retaining structures; groundwater control during construction; soil modification and stabilization; and construction considerations for geosynthetics. Basic design considerations, including selection of placement conditions for compaction; proportioning of groundwater control systems; selection of type and amount of soil modifier, and design of geosynthetics to meet specific functions.
- 5713***
Soil Mechanics. Prerequisites: 3713 and 4711. Application of soil mechanics principles and concepts in geotechnical areas of permeability and seepage, settlement analysis, bearing capacity, lateral earth pressures and retaining walls, slope stability, and metastable soils.
- 5723***
Foundation Engineering. Prerequisites: 3713 and 4711. Types of structural foundations including footings, mats, rafts, piles and drilled shafts. Site characteristics, exploration programs, field data, test results and construction materials and methods as basis for selection of type of foundation and design. Geotechnical design procedures and considerations.
- 5733***
Rock Mechanics in Engineering Design and Construction. Prerequisites: undergraduate courses in soils and geology. Stresses, strength variations and deformational behavior of rock. Engineering classification of rock. Methods of field and laboratory measurement of the engineering properties of rock. Rock mechanics consideration in the design and construction of engineering works.
- 5743***
Soil-Structure Interaction. Prerequisites: 3713 and senior or graduate standing in civil engineering. The mechanical interaction effects between soils and structures using suitable engineering procedures such as finite differences and finite element methods. Civil engineering problems where interaction effects are most dominant including grade beams (beams on elastic foundation), axially- and laterally-loaded piles, cantilever and anchored sheet pile walls.
- 5753***
Engineering Soil Stabilization. Prerequisites: 3713 and 4711. Theoretical and practical aspects of engineering soil stabilization as a method for improving and upgrading low quality and unstable soils for engineering purposes. Use of lime, fly ash, portland cement, asphalt, and other physical and chemical admixtures. Application of deep foundation stabilization methods such as preloading, deep compaction, injection, and reinforcement.
- 5793***
Soil Dynamics. Prerequisite: 3713. Behavior of soils under dynamic loads and its modeling. Liquefaction. Analysis of dynamically-loaded foundations and dynamic soil-structure interaction. Response of soil deposits and embankment dams to earthquakes.
- 5813***
Environmental Laboratory Analysis. Lab 3. Prerequisite: 4833 or concurrent enrollment. Analytical procedures for water and waste water contaminants. Emphasis on the chemical theory of procedures, analytical work and an understanding of the significance or need for such laboratory data for surface and groundwater management and water and wastewater treatment processes and design.
- 5823***
Environmental Risk Assessment and Management. Prerequisites: an introductory class in statistics and background in engineering, management or science. Environmental risk assessment and management. Applies elements of statistics, probability and environmental simulation to determine the public health and ecological risks from activities of humans.
- 5833***
Water Quality Management. Physical, chemical and biological factors in pollution and natural purification of rivers and lakes in relation to point and nonpoint sources of pollution. Development of low flow statistics and pollution loading functions for subsequent modeling projects. Dissolved oxygen and nonpoint source contamination models developed and applied.
- 5843***
Hydrology II. Prerequisite: 3843. Physical phenomena of the surface water hydrologic processes. Derived and empirical models for evaporation, infiltration, basin runoff and unsteady flow routing will be presented. Basic flood analysis techniques will also be studied.
- 5853***
Bioremediation. Prerequisite: 3813 or equivalent science background. Process selection and design of bioremediation systems for renovation of contaminated hazardous and industrial waste sites, soils, sludges. Site analysis emphasizing contaminant and environmental characteristics. Engineering factors to promote successful bioremediation. Design project required.
- 5863***
Advanced Unit Operations in Environmental Engineering. Prerequisite: 4833. Theory and design of advanced physical-chemical water and wastewater treatment processes applied to municipal, industrial, and hazardous waste situations.
- 5873***
Air Pollution Control Engineering. Causes, effects and control of atmospheric pollution.
- 5883***
Residuals and Solid Waste Management. Theory, design and operation of systems for handling, treatment, and disposal of process sludges (water treatment, wastewater treatment, industrial) and solid wastes. Potential material reclamation options.
- 5913***
Groundwater Hydrology. Prerequisite: 3843. Theory of groundwater movement, storage, exploration and pumping tests. Design of groundwater recovery and recharge systems.
- 5923***
Water Resources Planning and Management. Application of engineering economics and microeconomic theory to the planning and management of water resources projects including flood control, hydroelectric, water supply, and urban stormwater. Systems analysis approaches, primarily linear and dynamic programming, and their application in water resources.
- 5933***
Water Treatment. Prerequisite: 4833. Theory, design and operation of water treatment plants. Sizing of various unit processes. Water treatment plant control procedures.
- 5943***
Unit Operations and Processes Laboratory. Lab 3. Prerequisite: 4833, 5813 or equivalent. Bench and pilot-scale experiments as physical models of water and wastewater treatments. Techniques of data collection and analysis applied to design of physical, chemical and biological processes.
- 5953***
Biological Waste Treatment. Lab 3. Prerequisite: 4833 or equivalent. Fundamentals of microbial systems applied to waste treatment processes. Standard suspended-growth and fixed biofilm wastewater and sludge suspensions and treatment system design calculations.
- 5963***
Open Channel Flow. Prerequisite: 3833. Open channel hydraulics, energy and momentum concepts, resistance, channel controls and transitions, flow routing, and sediment transport.

- 5973***
Ground Water Quality. Prerequisite: graduate standing or consent of instructor. Ground water protection legislation. Fate and transport of nutrients, metals, other anions and cations, organics, bacteria and viruses in the subsurface environment. Pollution containment, abatement techniques. Aquifer restoration.
- 5983***
Groundwater Pollution Control. Theory, design and operation of groundwater pollution control systems. Includes examples from site specific applications as well as regional or national focus.
- 5993***
Groundwater Pollution Analysis and Transport. Prerequisite: 5913 or equivalent. Transport of contaminants through groundwater systems including basics of advective-dispersive-retardance and decay. Parameter and model selection. Detailed treatment of groundwater contamination. Emphasis on application of geostatistics to groundwater pollution problems. Construction and modeling semivariograms, use in kriging and co-kriging and in stochastic simulation. Conditional simulations, the inverse problem, Monte Carlo simulations and the construction of fault and event trees.
- 6000***
Ph.D. Research and Thesis. 1-16 credits, maximum 30. Independent research under the direction of a member of the graduate faculty by students working beyond the level of Master of Science degree.
- 6010***
Seminar. 1-6 credits, maximum 12. Prerequisites: consent of instructor and approval of the student's advisory committee. Analytical studies with suitable reports on problems in one or more of the subfields in civil engineering by students working beyond the level of Master of Science degree.
- 6403***
Theory of Elasticity. Stress, strain and deformation analysis of two- and three-dimensional elastic continua. Propagation of stress waves through elastic continua.
- 6413***
Plate and Shell Structures. Prerequisite: 5403. Bending of thin plate structures to include rectangular and circular plates. Analysis of orthotropic plates by classical and numerical methods. Introduction to shell bending theory.
- 6433***
Structural Dynamics. Analysis of bars, frames, towers, multistory building and truss structures subjected to dynamic disturbances; investigation of lumped and distributed mass systems; natural frequencies, response spectra, applications to blast loading and earthquake analysis.
- 6434***
Finite Element Analysis in Engineering. Prerequisite: consent of instructor. Finite element methods from an advanced viewpoint. Matrix mechanics; approximation theory; weighted residual and variational statements; shape functions and element types; parametric mappings; convergence criteria and error analyses; non-linear and transient methods; eigenanalysis; programming techniques; applications to solid mechanics, structures, fluids mechanics, and thermal problems.
- 6444***
Boundary Element Methods in Engineering. Prerequisite: consent of instructor. Matrix formulation and solution of complex two- and three-dimensional problems cast as boundary integral equations. Synthesis of integral relationships; elementary and advanced applications in solid mechanics, structures, fluids, and thermal problems; coupling with finite element analysis.
- 6553***
Earthquake-resistant Design. Review of characteristics of earthquakes. Consideration of site and structural parameters on response of building. Building code specifications. Structural analysis and design procedures necessary to achieve earthquake-resistant structures.
- 6713***
Seepage and Groundwater Flow. Prerequisite: 3713. Seepage through earthen dams and around hydraulic structures. Properties of phreatic surfaces. Seepage pressures, piping and boiling. Construction and utilization of flow nets. Groundwater mechanics applications including flow characteristics and changes in flow due to pump and drain systems.
- 6723***
Advanced Geotechnical Engineering. Prerequisites: 3713 and GEOL 1114 or 3023. Geologic occurrence and engineering significance of ground failure hazards such as slope movements, streambank erosion, subsidence, metastable soils and earthquakes. Emphasis on qualitative identification of ground failure hazards with quantitative assessment and remedial actions.
- 6843***
Stochastic Methods in Hydrology. Prerequisites: 5843, and STAT 4053. Stochastic and statistical hydrologic analyses of surface water and ground water systems. Analyses of urban and rural drainage, and detention systems. Same as BIOEN 6313.
- 6853***
Modeling of Water Resources Systems. Prerequisites: 5843 and 5913. Application of finite-difference and finite-element methods to predict water flow and chemical and biological water quality in saturated-unsaturated ground waters, streams, lakes, urban areas, and watersheds.
- 6913***
Advanced Environmental Laboratory Analysis. Lab 3. Prerequisite: 5813. Instrumental analysis of environmental contaminants. Process samples, effluents, residuals, and environmental samples. Use of gas and liquid (ion) chromatography, atomic absorption and other analytical methods.
- 6923***
Industrial Wastes Engineering. Prerequisite: graduate standing. Theory and methods of waste minimization, waste product reduction or reuse; process changes and treatment of residuals to reduce volume and toxicity of industrial wastes.
- 6953***
Advanced Biological Waste Treatment. Prerequisite: 5953. Advanced biological treatment processes and new process developments. Nutrient management, anaerobic wastewater treatment, hazardous waste bioremediation, land treatment, and macrophyte systems. Use of kinetic models for system design.

Communication Sciences and Disorders (CDIS)

2213
Phonetics. Prerequisite: sophomore standing. The analysis and description of speech at the segmental and suprasegmental levels. Development of students' perceptual and analytic skills in speech sound production. Practice using the International Phonetic Alphabet for broad and narrow transcription. Overview of the speech production mechanism and process.

3123
Audiology and Audiometry. Prerequisites: 2213, 3213 and acceptance into CDIS program. Anatomy and physiology of the hearing mechanism and related physics of sound. Common etiologies of hearing disorders. Establishing hearing screening programs. Practical experience in pure tone audiometry and impedance screening.

3213
Survey of Communication Disorders. Prerequisite: sophomore standing. The normal development of speech, language and hearing. The characteristics, diagnosis and treatment of speech, language and hearing disorders among all age groups. Suggestions for related professions involved with people with communication disorders.

3224
(S)Speech and Language Development. Prerequisites: 2213, 3213 and acceptance into professional program. Normal acquisition of phonology, morphology, semantics, syntax and pragmatics in children. Biological, cognitive social bases of language acquisition. Description of dialect variations, second language acquisition, and atypical language development. The relationship between spoken and written language development.

4010
Clinic Practicum. 1-3 credits, maximum 3. Lab 2-6. Prerequisites: 4022, 4031, 4323 or 4413, senior standing, 3.25 GPA in the major and consent of adviser. Supervised clinical practicum in speech-language pathology and audiology.

4022
Clinical Methods and Issues. Prerequisites: 2213, 3213, 3224 and declared speech pathology major. Fundamental processes and procedures of clinical practicum, report writing, goal selection and production, assessment and recording of speech and language behaviors; development of interpersonal skills with clients, families, and other professionals; problem solving skills; knowledge of professional organizations and credentialing.

4031
Clinical Observations. Lab 2. Prerequisites: 2213, 3213, 3224; declared communication sciences and disorders major; must be taken concurrently with or subsequent to 4022. Observation and critiquing of speech and language pathology and audiology clinical activities.

4033*
Sign Languages. Prerequisite: junior standing or consent of instructor. Introduction to methods of sign language currently used among the U.S. deaf society, socially and educationally, including traditional American Sign Language (ASL), Manually Coded English (MCE, SEE) and fingerspelling. Linguistic components of sign and various sociological, psychological, and adaptive communication issues having an impact on the deaf community. Two hours per week, devoted to lecture and theory; one hour involved in a variety of interactive sign language skill work in smaller groups.

4133*
Aural Rehabilitation for the Acoustically Handicapped. Prerequisites: 2213, 3123, 3213. Clinical aspects of habilitation and rehabilitation programs for the deaf and the hard-of-hearing, including speech reading, auditory training, speech conservation, speech and language therapy, hearing aid orientation and counseling. Study of amplification units including assistive listening devices.

- 4214 Anatomy and Physiology of the Speech Mechanism.** Lab 1. Prerequisite: 3213. Structure and function of the respiratory, phonatory, articulatory, and neural systems involved in the oral communicative processes. Laboratory experiences required.
- 4222* Language Analysis.** Prerequisites: 3224, ENGL 2443. Applications of content, form and use analysis methods to language samples of individuals with communication disorders. Analyses of word, phrase, sentence and discourse levels. Variations as a function of age, culture, modality (spoken or written), and disorder type.
- 4253* Diagnostic Procedures in Communication Disorders.** Prerequisites: 3224, 4022. Speech and language diagnostic testing and procedures, interpreting diagnostic information and deriving appropriate treatment goals.
- 4313* Speech Science.** Prerequisite: 4214. Scientific bases of the acoustic parameters, the perceptual and productive processes of speech, and the interrelationships of those factors during speech communication.
- 4323* Language Assessment and Intervention.** Prerequisite: 3224. Fundamentals of language assessment diagnosis and intervention; goal selection and procedural processes for language treatment with infants, toddlers and preschool-age children.
- 4413* Phonological Assessment and Intervention.** Prerequisite: 3224. Current theories and research in clinical phonology and applied linguistics related to phonological disorders in children. Normal development and contemporary approaches to assessment and treatment. Lecture, discussion, projects and clinical observation.
- 4443* Stuttering.** Prerequisite: junior standing or consent of instructor. Recent research into the nature, causes and treatment of stuttering.
- 4980 Independent Study in Communication Sciences and Disorders.** 1-3 credits, maximum 3. Prerequisite: junior standing and consent of instructor. Directed readings or research in communication sciences and disorders.
- 4993 Senior Honors Thesis.** Prerequisites: departmental invitation, senior standing, Honors Program participation. A guided reading and research program ending with an honors thesis under the direction of a faculty member. Required for graduation with departmental honors in communication sciences and disorders.
- 5000* Research and Thesis.** 1-3 credits, maximum 6. Prerequisite: consent of graduate faculty. Research in speech, language and hearing sciences and disorders.
- 5013* Research Methods in Communication Disorders.** Prerequisite: 3213. Research methods with emphasis on methods used most frequently in communication sciences and disorders; experience devising, evaluating, and implementing research.
- 5113* Language Disorders in Children.** Prerequisites: 3224, 4323. Principles of language assessment and intervention based on linguistic, cognitive, and social learning theories. Critical analysis of current research. Design of assessment and intervention programs.
- 5123* Clinical Audiology.** Prerequisites: 3123, 4133, 4313. Hearing disorders and their etiologies. Clinical application of pure tone and speech audiometric tests and impedance screening. Clinical management of the hearing impaired. Central auditory processing disorders diagnosis and management.
- 5142* Clinical Phonology.** Prerequisite: 4413. Current issues in linguistic theories related to the assessment and treatment of phonological disorders in children. Critical analysis of current research.
- 5153* Neurological Communication Disorders.** Prerequisite: 4214. Communication changes occurring with aging and common neurological diseases and trauma. Neurophysiological bases and etiology. Evaluation and treatment of aphasia and right hemisphere disorders.
- 5160* Dysphagia.** Prerequisite: 4214. Anatomy and neurophysiology of the swallowing mechanism in relation to pediatric and adult dysphagia. Evaluation, diagnosis and treatment of swallowing problems in children and adults including videofluoroscopic training with case studies. The first two-thirds of the course focus on adult dysphagia and the latter one third on pediatric dysphagia.
- 5172* Motor Speech Disorders.** Prerequisite: 5153. Nature, evaluation and treatment of neurologically-based motor speech disorders such as dysarthria and apraxia.
- 5182* Cognitive Communication Disorders.** Prerequisite: 5153. Nature, evaluation and treatment of acquired cognitive communication disorders secondary to traumatic injury or dementia.
- 5210* Advanced Practicum.** 1-6 credits, maximum 9. Prerequisite: consent of instructor. Practical experience for the advanced student on or off campus.
- 5232* Communication Disorders in Infants and Toddlers.** Prerequisite: 3224. The birth to 3-year-old population who are at risk or have communication and language disorders. Symptoms, evaluation, prevention and intervention approaches. Family assessment including interdisciplinary and multidisciplinary approaches. Impact of prenatal, perinatal and postnatal biological and environmental risks on developmental outcomes.
- 5242* Language Disorders of School-Age Children and Adolescents.** Prerequisites: 4323, 5113. Nature of spoken and written language disorders in school-age children and adolescents. Impact of language disorders on academic achievement. Assessment and intervention strategies.
- 5333* Voice Disorders.** Prerequisite: 4313. The physiology of the vocal mechanism and factors which cause voice deviations. Recent research on diagnostic and intervention procedures in a variety of disorders. Independent study, observations in medical settings, and special demonstrations.
- 5422* Adaptive Communication Systems.** Prerequisite: major in communication science and disorders or consent of instructor. Evaluation and management of communication disorders in individuals requiring specially adapted educational intervention programs. Adaptive communication technologies.
- 5432* Physically-based Communication Disorders.** Prerequisites: 4214, 4313. Recent research in the etiology, assessment and management of communicative disorders in individuals with orofacial, physical and other multiple anomalies.
- 5442* Communication Disorders in Individuals with Developmental Delay.** Prerequisites: 3224, 5113. Etiology, assessment and intervention considerations for communication disorders in children and adults with varying degrees of developmental delay.
- 5710* Special Topics in Communication Disorders.** 1-4 credits, maximum 9. Prerequisite: consent of department head. Individual and group investigations of problems in communication sciences and disorders.
- 5720* Seminar in Communication Disorders.** 1-3 credits, maximum 3. Prerequisite: consent of instructor. Topics relevant to the evaluation and treatment of communication disorders presented on a rotating basis.
- 5730* Independent Study in Communication Sciences and Disorders.** 1-3 credits, maximum 3. Prerequisite: graduate standing and consent of instructor. Directed readings or research in communication sciences and disorders.
- 5732* Professional Issues.** Prerequisite: graduate standing in speech pathology. Discussion of professional standards, ethics, practice and issues in speech-language pathology.
- 5742* Multicultural Applications in Communication Disorders.** Prerequisites: 3224, 4253, or consent of instructor. The study of communication differences and disorders in culturally and linguistically diverse individuals. Clinical applications in assessment and intervention. Case study and program design.
- 5750* Advanced Diagnostics.** 1-2 credits, maximum 2. Prerequisite: 4253, 5113, 5153. Critical analysis and design of assessment protocols for children and adults with communication disorders. Interpretation and implications for intervention planning.
- 5760* Portfolio.** 1-2 credits, maximum 2. Prerequisite: graduate standing. Nature and preparation of professional portfolio with faculty guidance.

Computer Science (CS)

- 1002 Computer Literacy.** Lab 2. For students with little or no personal computer skills. Use of Internet and productivity software such as word processing and spreadsheets.
- 2103 (A)Computer Programming.** Lab 2. Prerequisite: MATH 1513 or equivalent. Introduction to computer programming using a block-structured high-level computer language, including subprograms and arrays. Principles of problem solving, debugging, documentation, and good programming practice. Elementary methods of searching and sorting. Course not intended for computer science majors.

- 2113**
(A)Computer Science I. Prerequisite: MATH 1513 or equivalent. Introduction to computer science using a block-structured high-level computer language, including subprograms, arrays, recursion, records and abstract data types. Principles of problem solving, debugging, documentation and good programming practice. Elementary methods of sorting and searching. Use of operating system commands and utilities.
- 2133**
Computer Science II. Prerequisites: 2113, concurrent enrollment in 2653. Recursive algorithms. Intermediate methods of searching and sorting. Mathematical analysis of space and time complexity, worst case, and average case performance.
- 2301**
FORTRAN 77 Programming. Lab 2. Prerequisite: 2113. FORTRAN 77 control structures, arrays, subroutines, functions, input/output. A major programming assignment will be completed by each student enrolled in the course.
- 2331**
SAS Programming. Prerequisite: 2113. SAS as a general purpose programming language. Data representation, input/output, use of built-in procedures, report generation.
- 2351**
UNIX Programming. Lab 2. Prerequisite: 2113. The UNIX programming system. The programming environment. The UNIX file system and the shell. Use of pipes and filters.
- 2432**
The C Programming Language. Prerequisite: 2113. C programming language types, operators, expressions, control flow, functions, structures, pointers, arrays, UNIX interface.
- 2570**
Special Problems in Computer Science. 1-3 credits, maximum 6. Prerequisites: consent of instructor and freshman or sophomore standing. Current topics and applications of computer science. Existing and new topics to computer science. Allows lower-division students to study topics not provided in existing classes. Can be individual study or a class with a new subject.
- 2653**
Discrete Mathematics I. Prerequisite: MATH 1513 or 1715. Logic, set theory proof techniques, probability and combinatorics, relations and function, matrix algebra, graphs, Boolean algebra and lattices. Same course as MATH 2653.
- 3030**
Industrial Practice in Computer Science. 1-6 credits, maximum 12. Prerequisites: 3443, MATH 2155, junior standing, consent of departmental adviser. Applied computing in industry. Topics vary with cooperating employers. Written reports will be specified by adviser.
- 3302**
ADA Programming. Prerequisite: 2133. ADA-R control structures, data structures, subprograms, types, parallel processing, exception conditions.
- 3363***
Organization of Programming Languages. Prerequisites: 2133, 3653. Programming language constructs. Run time behavior of programs. Language definition structure. Control structures and data flow programming paradigms.
- 3373**
Object-oriented Programming and Visual C++. Prerequisite: 2133 or consent of instructor. Elements of the object model. Object-oriented design methods. Message passing and the inheritance hierarchy. Operator overloading. An overview of contemporary object-oriented languages. C++ programming using Visual C++.
- 3423***
File Structures. Prerequisite: 2133. Basic physical characteristics of peripheral storage devices. File organization and processing methods for sequential, direct, indexed, tree structured and inverted files. Application of data structure concepts to logical and physical file organization: Performance analysis. Elements of advanced data base systems.
- 3443**
Computer Systems. Prerequisite: 2133. Functional and register level description of computer systems, computer structures, addressing techniques, macros, linkage, input-output operations. Introduction to file processing operations and auxiliary storage devices. Programming assignments are implemented in assembly language.
- 3513**
Numerical Methods for Digital Computers. Prerequisites: MATH 2155, 3013, knowledge of FORTRAN. Digital computer approximate solutions of algebraic and transcendental equations, solutions of linear and nonlinear equations, functional approximations, least squares curvefitting and applied topics. Practical programming experience in applications of these techniques.
- 3570**
Special Problems in Computer Science. 1-3 credits, maximum 6. Prerequisites: junior standing and consent of instructor. Current topics and applications of computer science. Existing and new topics to computer science. Allows lower division students to study topics not provided in existing classes. Can be individual study or a class with a new subject.
- 3613**
Theoretical Foundations of Computing. Prerequisites: 2133, 2653. Introduction to the classical theory of computer science. Sequential machines and their applications to devices, processes and programming. Models of computation: finite-state automata, push-down automata, Turing machines. The role of non-determinism. Limits of digital computation. Computability and unsolvability. The Church-Turing Thesis.
- 3653**
(A)Discrete Mathematics II. Prerequisite: 2653 or MATH 3613. A continuation of 2653; algebraic structures, coding theory, finite state machines, machine decomposition, computability, formal language theory. Same course as MATH 3653.
- 4003***
Mathematical Logic and Computability. Prerequisite: MATH 3613 or PHIL 3000 or 3003 or consent of instructor. The basic metatheorems of first order logic: soundness, completeness, compactness, Lowenheim-Skolem theorem, undecidability of first order logic, Godel's incompleteness theorem. Topics include enumerability, diagonalization, formal systems, standard and nonstandard models, Godel numberings, Turing machines, recursive functions, and evidence for Church's theses. Same course as MATH 4003 and PHIL 4003.
- 4113***
(A)Techniques of Computer Science for Science and Engineering. Prerequisites: one year calculus and senior or graduate standing. For graduate and advanced undergraduate students requiring a one-semester treatment of computer topics. No background in computing topics assumed. Comprehensive treatment of the FORTRAN programming language with emphasis on numerical applications. Number systems, finite arithmetic, iterative processes, program structuring, numerical methods, program libraries are covered.
- 4143***
Computer Graphics. Prerequisites: 2133, MATH 2145. Interactive graphics programming; graphics hardware; geometrical transformation; data structures for graphic representations; viewing in three dimensions; representation of 3D shapes; hidden edge and hidden surface removal algorithms; shading models.
- 4273***
Software Engineering. Prerequisites: 2133, 3443 or ECEN 3213. Fundamental characteristics of the software life cycle. Tools, techniques, and management controls for development and maintenance of large software systems. Software metrics and models. Human factors and experimental design. Same course as ECEN 4273.
- 4283***
Computer Networks. Prerequisites: 2133, 3443 or ECEN 3213; UNIX knowledge. Computer networks, distributed systems and their systematic design. Introduction to the use, structure, and architecture of computer networks. Networking experiments to describe network topology. ISO reference model. Same course as ECEN 4283.
- 4323***
Design and Implementation of Operating Systems I. Prerequisites: 2133, 3443 or ECEN 3313. Process activation and process context block. Batch, multi-programmed, and timeshared operating system. Process management, memory management, and synchronization primitives. Deadlock prevention, avoidance and detection.
- 4343***
Data Structures and Algorithm Analysis I. Prerequisite: 2133. Storage, structures, data and information structures, list processing, trees and tree processing, graphs and graph processing, searching, sorting.
- 4443***
Compiler Writing I. Prerequisites: 2133, 3443. Syntax and semantics of procedure-oriented languages and theory of translation techniques used in their compilation. Study of languages for particular application areas, including nonalgebraic languages.
- 4513***
Numerical Mathematics: Analysis. Prerequisites: MATH 2233, MATH 3013, knowledge of FORTRAN. Machine computing, algorithms, and analysis of errors applied to interpolation and approximation of functions solving equations and systems of equations, discrete variable methods for integrals and differential equations. Same course as MATH 4513.
- 4570***
Special Topics in Computing. 1-3 credits, maximum 5. Advanced topics and applications of computer science. Typical topics include operating systems, multiprocessor systems, programming systems or various mathematical and statistical packages. Designed to allow students to study topics not provided in existing courses.

- 4793**
Artificial Intelligence. Prerequisites: 2133, 2653. Broad coverage of core artificial intelligence (AI) topics, including search-oriented problem solving, knowledge representation, logical inference, AI languages, history and philosophy of AI.
- 4883**
(S)Social Issues in Computing Sciences. Prerequisite: senior standing. Social implications of computer use or misuse with emphasis on the effects on the individual, society and other human institutions. Social responsibilities of people involved in using or applying computers.
- 4993**
Senior Honors Project. Prerequisites: departmental invitation, senior standing, Honors Program participation. A guided reading and research program ending with an honors project under the direction of a faculty member, with a second faculty reader and an oral examination. Required for graduation with departmental honors in computing and information science.
- 5000***
Research and Thesis. 1-6 credits, maximum 6. Prerequisite: consent of major professor. A student studying for a master's degree who elects to write a thesis or a report must enroll in this course.
- 5013***
Linear Programming. Prerequisites: MATH 3013 or IEM 4014; FORTRAN. Simplex algorithm to solve deterministic linear optimization models considering maximization and minimization objectives; degeneracy, alternative optima and no feasible solutions. Revised simplex procedures. Duality theory, economic interpretations, dual simplex and complementary pivoting. Sensitivity analysis and parametric programming. Special cases of linear optimization problems and underlying mathematical foundations. Large-scale models including computational considerations. Same course as INDEN 5013.
- 5030***
Professional Practice. 1-9 credits, maximum 9. Prerequisites: graduate standing in computer science, consent of the department head. Experience in the application of computer science principles to problems encountered in industry and government. Participation in problem solving in the role of junior computer scientist, junior software engineer, or computer science intern. All problem solutions documented. Required written report to the major professor.
- 5070***
Seminar and Special Problems. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Designed to allow students to study advanced topics not provided in existing courses.
- 5113***
Computer Organization and Architecture. Prerequisite: 3443. Computer architecture, computer control, microprogrammed control, addressing structures, memory hierarchies, hardware description languages, specific architectures, hardware simulation, emulation.
- 5154***
Computer Science Migration. Lab 2. Prerequisite: graduate standing. A survey of computer science for students whose undergraduate major was not computer science. Programming in high-level languages. Programming in assembly language. Algorithm design and analysis. Computer system fundamentals. Fundamental data structures.
- 5253***
Digital Computer Design. Prerequisite: ECEN 3223. Analysis and design of digital computers. Arithmetic algorithms and the design of the arithmetic/logic unit (ALU). Serial and parallel data processing; control and timing systems; microprogramming; memory organization alternatives; input/output interfaces. Same course as ECEN 5253.
- 5273***
Advanced Software Engineering. Lab 2. Prerequisite: 4273. Continuation of 4273. Advanced theory and practice of software design methodology. Large-scale design and implementation problems. Experimental design for software engineering. Same course as ECEN 5273.
- 5283***
Computer Network Programming. Prerequisite: 4283. Detailed technical concepts related to computer and telecommunications software development. Client-server programming using various application program interfaces, including STREAMS, the Transport Layer Interface (TLI), and Berkeley Sockets. Application development using TCP/IP protocols.
- 5313***
Formal Language Theory. Prerequisite: 3613. Formal language theory applied to procedure-oriented languages. Application of finite state algorithms to lexical analysis. Chomsky hierarchy of languages. Generation, recognition, and closure properties of languages.
- 5323***
Design and Implementation of Operating Systems II. Prerequisite: 4323. Task systems and concurrent programming, synchronization and inter process communication. Theoretical investigation of resource sharing and deadlock, memory management, strategies, and scheduling algorithms, queuing theory, distributed operating systems. System accounting, user services and utilities.
- 5333***
Compiler Writing II. Prerequisite: 4443. Continuation of 4443. Theory and practice of compiler writing techniques. Compiler writing systems. A formal approach to computer languages.
- 5363***
Advanced Organization of Programming Languages. Lab 2. Prerequisite: 3363. Continuation of 3363, mathematical theory of computer language organization functional programming. Parallelism in languages. Mathematics of control structures and data structures. Applicative languages. Symbolic languages.
- 5373***
Object-oriented Programming for Telecommunications. Prerequisites: 4343 and working knowledge of C programming. Object-oriented design methodology. Message passing, inheritance and operator overloading. Contemporary distributed object-oriented programming using C++. Practical applications of object-oriented techniques in telecommunications.
- 5413***
Data Structures and Algorithm Analysis II. Prerequisite: 4343. Data structures and their application in recursive and iterative algorithms. Static and dynamic data structure representations and processing algorithms. Dynamic and virtual storage management.
- 5423***
Information Organization and Retrieval. Prerequisites: 3423, 4343 or equivalents. An overview of database management systems, entity-relationship model, relational model, relational algebra, relational calculus, structural query language, relational database design with normalization theorems, database integrity constraints, object-oriented model.
- 5433***
Multi-level Storage Processing for Data Bases. Prerequisites: 3423, 4343. Physical characteristics of memory devices. Data organization methods. Logical versus physical structure. Performance analysis.
- 5513***
Numerical Analysis I. Prerequisite: 4513 or MATH 4513. Algorithms and error analysis; solution of equations; interpolation and approximation theory.
- 5543***
Numerical Analysis for Differential Equations. Prerequisites: 4513 or MATH 4513 and 4233. Advanced machine computing, algorithms, analysis of truncation and rounding errors, convergence and stability applied to discrete variable, finite element, and spectral methods in ordinary and partial differential equations. Same course as MATH 5543.
- 5553***
Numerical Analysis for Linear Algebra. Prerequisites: MATH 3013 and CS 4513 or MATH 4513. Advanced machine computing, algorithms, analysis of rounding errors, condition, convergence, and stability applied to direct and iterative solution of linear systems of equations, linear least squares problems, including LU and QR factorization, conjugate gradients, QR algorithm, and Lanczos method. Same course as MATH 5553.
- 5653***
Automata and Finite State Machines. Prerequisite: 5313. Finite state model, state diagrams and flow tables, equivalent states and equivalent machines. Formal grammars, context-free languages and their relation to automata. Turing machines, computability and recursive function. Same course as MATH 5653.
- 5663***
Computability and Decidability. Prerequisite: 5313. Effectiveness, primitive recursivity, general recursibility, recursive functions, equivalence of computability, definitions, decidability, and recursive algorithms. Same course as MATH 5663.
- 5793***
Artificial Intelligence and Expert Systems. Prerequisites: 4793, graduate standing in computer science. Advanced knowledge representation and expert systems programming, including reasoning under uncertainty. Applications to planning, intelligent agents, natural language processing robotics and machine learning. Development of an expert system or research report required. Common lectures with ECEN 5293, IEM 5933, and MAE 5793.
- 6000***
Research and Dissertation. 2-15 credits, maximum 30. Prerequisites: graduate standing and approval of advisory committee. Independent research under the direction of a member of the graduate faculty. For students working toward a Ph.D. degree.
- 6023***
Nonlinear and Integer Optimization. Prerequisites: 5013 or IEM 4014; FORTRAN or Pascal. Theoretical and practical aspects of nonlinear and integer optimization. Development and application of nonlinear optimization techniques for unconstrained and constrained problems; sequential search, gradient, penalty and barrier, and projection methods. Development and application of integer and mixed integer techniques for unconstrained and constrained problems; implicit enumeration, branch and bound, and cutting methods. Same course as IEM 6023.

6240*

Advanced Topics in Computer Organization. 2-6 credits, maximum 12. Prerequisites: 5113 and 5253. Structure and organization of advanced computer systems, parallel and pipeline computers, methods of computation, alignment networks, conflict-free memories, bounds on computation time.

6253*

Advanced Topics in Computer Architecture. Prerequisite: 5253 or ECEN 5253. Innovations in the architecture and organization of computers, with an emphasis on parallelism. Topics may include pipelining, multiprocessors, data flow, and reduction machines. Same course as ECEN 6253.

6300*

Advanced Topics in Programming Languages. 2-6 credits, maximum 12. Prerequisite: 5313. Interpreter models of programming language semantics, Vienna definition language, lambda calculus, LISP definition; Knuth semantic systems and their formulation, translational and denotational semantics. May be repeated with change of topics.

6350*

Advanced Topics in Operating Systems. 2-6 credits, maximum 12. Prerequisite: 5323. Design and analysis of operating systems. Concurrent processes, server scheduling, models of auxiliary storage, memory management, virtual systems, performance algorithms. May be repeated with a change in topics.

6400*

Advanced Topics in Information Systems. 2-6 credits, maximum 12. Prerequisites: 5413, 5423. Principles of distributed database systems. Overview of relational database management systems (DBMS) and computer networks, distributed DBMS architecture, distributed database design, distributed concurrency control, query processing, distributed DBMS reliability.

6500*

Advanced Topics in Numerical Analysis. 2-6 credits, maximum 12. Prerequisites: 5543, 5553. Systems of nonlinear equations, nonlinear least squares problems, iterative methods for large systems of linear equations, finite element methods, solution of partial differential equations. May be repeated with change of topics.

6600*

Advanced Topics in Analysis of Algorithms. 2-6 credits, maximum 12. Prerequisite: 5413. Analysis of various algorithms. Sorting, searching, computational complexity, lower bounds for algorithms; NP-hard and NP-complete problems; parallel algorithms; proof of correctness of algorithms. May be repeated with change of topics.

6623*

Algebraic Structures of Formal Grammars. Prerequisites: 5313, 5653. Context-free languages, Kleene languages, Dyck languages, context-sensitive languages; use of algebraic systems to define languages; linear bounded automata.

6700*

Advanced Topics in Artificial Intelligence. 2-6 credits, maximum 12. Prerequisite: 5793 or consent of instructor. Machine learning; computer perception and robotics; logic programming; natural language understanding; intelligent agents; medical informatics. May be repeated with change of topics.

Construction Management Technology (CMT)

1213

Introduction to Construction. Lab 1. Overview of the entire construction industry with emphasis on construction materials, methods and systems. Both building and heavy highway construction drawings and their interpretation.

2253

Construction Drawings and CAD. Lab 6. Interpretation and production of construction drawings, architectural and engineering drafting using both drafting machines and computer aided drafting.

2273

Computer Application in Construction. Lab 3. Prerequisites: 1213 and MATH 1513. Disk operating systems, introduction to programming in Basic, word processing, spreadsheets. Applications to the construction industry.

2333

Construction Practices and Procedures. Light, heavy and industrial construction. Foundation layout, framing and finish work, site investigations, excavation, precast concrete, tilt up, structural steel and metal building construction and project management.

2343

Concrete Technology. Lab 3. Fundamentals of concrete and concrete making materials including admixtures. Proportioning concrete mixtures. Batching, mixing, conveying, placing, finishing and curing concrete. Hot and cold weather concreting, jointing, volume change and crack control.

3263

Estimating I. Prerequisites: 2253 and 2333. Quantity take-off with emphasis on excavation, formwork and concrete, masonry, rough carpentry and miscellaneous specialty items.

3333

Construction Practice. Prerequisites: junior standing and consent of department head. Supervised field experiences in construction during the junior or senior year, emphasizing the wide variety of layout, concrete placement, framing and finish techniques employed.

3363

Timber and Form Design. Lab 3. Prerequisite: MECDET 3323. Basic timber structures with emphasis on concrete form applications.

3463

Environmental Building Systems. Lab 3. Prerequisite: PHYS 1214. Plumbing, heating, air-conditioning, electrical and lighting systems as applied to residences and commercial buildings.

3553

Steel Design. Lab 3. Prerequisite: MET 3323. Analysis and design of steel beams and columns. Bolted and welded connections.

3663

Concrete Design. Lab 3. Prerequisite: MET 3323. Analysis and design of reinforced and pre-stressed concrete in accordance with the ACI building code.

4050

Advanced Construction Management Problems. 1-6 credits, maximum 6. Prerequisites: junior standing and consent of instructor. Special problems in construction management.

4263

Estimating II. Prerequisite: 3263. Extensive use of actual contract documents for quantity take-off, pricing and assembling the bid for several projects. Use of computers in estimating.

4273

Computer Estimating. Lab 3. Prerequisite: 4263. Various software programs applied to estimating for building construction. Automated take off (Digitizer) systems.

4283

Construction Organization and Management. Prerequisite: senior standing. Organizing and managing office and field staff. Authority and responsibility. Introduction to the construction manager concept. Principles of management applied to construction contracting.

4293

Construction Manager Concepts. Prerequisites: CIVE 4273 and last semester prior to graduation. Capstone course utilizing skills and knowledge of estimating scheduling, bidding, construction management, CAD, TQM, partnering, safety, and other managerial resources. Defining the expanding role of the construction manager in industry.

4443*

Construction Safety and Loss Control. Prerequisite: senior standing. A detailed study of OSHA Part 1926 - Construction Safety and Health Compliance and related safety topics; all elements of the OSHA 30-hour training course; students completing the course are OSHA Certified Competent Persons; concepts and methods of loss control.

4563

Construction Law and Insurance. Prerequisite: senior standing. Legal and insurance problems as they pertain to the construction industry.

4781

Seminar. Prerequisites: senior standing and consent of instructor. Career placement and promotion within the construction industry. Aspects of the collective bargaining process. Functions of committees as service to the industry.

Counseling Psychology (CPSY)

1112

World of Work. Assists students in exploring career options through increased understanding of self and expanded knowledge of occupational information. Includes a study of the decision-making process and a look at the present and future changing world of work.

5000*

Master's Thesis. 1-6 credits, maximum 6. Prerequisite: consent of advisory committee chairperson. Report of research conducted by a student in the master's program in counseling. Credit given and grade assigned upon completion and acceptance of the thesis.

5042*

Interviewing Techniques. Basic principles underlying effective interviewing and interpersonal communication skills. Overview of various types of interviews. Application and analysis of interviews through video and audio tapes.

5123*

Medical Information in Counseling. Orientation to medical information and medical aspects of disability. Application to clinical problems in human service professions such as rehabilitation counseling, counseling psychology, and related disciplines.

- 5173***
Gerontological Counseling. An examination of mental health treatment modalities and approaches to counseling with older adults. An experiential component is included.
- 5183***
Introduction to Rehabilitation Counseling. Background, legal aspects and philosophy of rehabilitation. Overview of current practices in rehabilitation and related areas.
- 5223***
Psychology of Disability. Psychological and sociological implications of physical disability and illness. Dynamics involved in adjusting to disabling conditions including issues in rehabilitation psychology, counseling, and somatopsychology.
- 5320***
Seminar in Counseling Psychology. 3-9 credits, maximum 9. Prerequisite: consent of instructor. In-depth exploration of contemporary topics in counseling psychology.
- 5453***
Vocational and Career Information. Local, state and national sources of occupational information about jobs and sociological factors related to career planning and worker effectiveness.
- 5473***
Introduction to Counseling Practice. Prerequisite: consent of instructor. Orientation to counseling practice through observation and participation. The supervised experiences permit the student and the counselor education staff to evaluate the student's strengths and weaknesses as a potential counselor or student personnel administrator.
- 5483***
Community Counseling and Resource Development. Prerequisites: 5473 and 5553 or consent of instructor. Application of educational, preventive, and crisis interventions in a variety of human service settings, including the development and evaluation of community helping resources.
- 5503***
Multicultural Counseling. Emphasis on effective communication skills in cross-cultural counseling or helping relationships and the integration of theoretical knowledge with experimental learning. Psycho-social factors, life styles, etc. of various cultural and ethnic groups and their influence on the helping relationship.
- 5513***
Secondary School Counseling and Development. Cooperation of the school counselor, teachers, principals, and parents emphasized in organizing, developing, implementing, and evaluating a counseling and development program in secondary schools.
- 5523***
Individual Appraisal. 3 credits, maximum 6. Methods of developing a framework for understanding individuals and techniques for data collection, assessment, and interpretation such as interviews, testing, and case study. The study of individual differences including ethnic, cultural, and gender factors.
- 5533***
Developmental Interventions. Lab 2. Counseling theories and techniques for working with children, adolescents, and their parents in individual and group counseling and consulting. Laboratory portion translates theory to practice.
- 5543***
Career Development Theories. Historical and contemporary viewpoints advanced by Ginsberg, Super, Holland, Roe, etc. Counselors are assisted in developing the theoretical and applied basis for developing school-based career education programs and for assisting individuals in career planning.
- 5553***
Principles of Counseling. A comprehensive foundation for counseling practice and the application of contemporary theories to further knowledge of counseling as a communication process.
- 5563***
Conceptualization and Diagnosis in Counseling. Prerequisites: 5473 and 5553 or consent of instructor. Foundation in skills necessary to conceptualize and diagnose clients presentation of problems in counseling. Intake interviewing and report writing skills, case conceptualization skills, and differential diagnostic skills using the DSM system.
- 5573***
Elementary School Counseling and Development. Cooperation of the school counselor, teachers, principals, and parents emphasized in organizing, developing, implementing, and evaluating a counseling and development program in elementary schools.
- 5583***
Group Process. Lab 2. Group dynamics, theory and techniques applicable to working with people of all ages in various school and non-school settings. Group member competencies are stressed during the laboratory period.
- 5593***
Counseling Practicum. 3-12 credits, maximum 12. Prerequisites: grade of "B" or better in 5473 and 5553; admission to the counseling and student personnel program or consent of instructor. Supervised experience in human interaction processes of counseling and consulting with the major goal of facilitating positive growth processes through individual supervision. May be conducted in a variety of settings with a wide range of developmental levels.
- 5670***
Rehabilitation Counseling Practicum. 1-12 credits, maximum 12. Prerequisites: graduate standing and consent of instructor. Applied experience for graduate students in counseling.
- 5683***
Internship in Counseling. 1-12 credits, maximum 12. Prerequisites: grade of "B" or better in 5590 and admission to the counseling and student personnel program. Supervised experience working and studying in a counseling agency or setting.
- 5720***
Workshop. 1-9 credits, maximum 9. Professional workshops on various topics. Designed to meet unique or special needs of professionals in various mental health fields.
- 6000***
Doctoral Dissertation. 1-25 credits, maximum 25. Prerequisite: consent of advisory committee chairperson. Report of research conducted by a student in the doctoral program in counseling psychology. Credit given and grade assigned upon completion and acceptance of the doctoral dissertation.
- 6053***
Ethical and Legal Issues in Professional Psychology. Prerequisite: consent of instructor. Ethical and legal standards applied to the professional practice of psychology.
- 6083***
Principles of Counseling Psychology. Prerequisite: admission to the doctoral program in counseling psychology. Development, theoretical foundations and applications of therapeutic models of counseling and psychology.
- 6123***
Adult Personality Assessment. Prerequisite: consent of instructor. Administration and interpretation of adult personality assessment instruments such as Rorschach, TAT and DAP.
- 6153***
Personality Theories. Prerequisite: consent of instructor. An in-depth analysis of personality theories and personality disorders.
- 6310***
Advanced Practicum and Supervision. 3-12 credits, maximum 12. Prerequisites: 5590 and master's degree. For prospective counseling psychologists, counselor educators and supervisors, and practicing counselors. Supervised assistance in development of counseling, consulting and supervising competencies.
- 6313***
Advanced Group Interventions. Lab 1. Prerequisite: 5583 or equivalent. Discussion and exploration of various aspects of group development and treatment. Theory and application of theory. Various factors associated with group psychotherapy cohesion, dynamics and screening.
- 6413***
Counseling Psychology Practicum I. Prerequisites: 5593 and admission to the doctoral program in counseling psychology. For prospective counseling psychologists. Individual and group supervision and didactic experiences to facilitate the development of counseling psychology competencies with clients at practicum sites. Establishing therapeutic conditions conducive to growth and change.
- 6423***
Counseling Psychology Practicum II. Prerequisite: grade of "B" or better in 6413. For prospective counseling psychologists. Individual and group supervision and didactic experiences to facilitate the development of counseling psychology competencies with clients at practicum sites. Integrating theory and research into the practice of counseling psychology.
- 6433***
Counseling Psychology Practicum III. Prerequisite: grade of "B" or better in 6423. For prospective counseling psychologists. Individual and group supervision and didactic experiences to facilitate the development of counseling psychology competencies with clients at practicum sites. Integrating theory and psychological assessment skills into the practice of counseling psychology.
- 6443***
Counseling Psychology Practicum IV. Prerequisite: grade of "B" or better in 6433. For prospective counseling psychologists. Individual and group supervision and didactic experiences to facilitate the development of counseling psychology competencies with clients at practicum sites. Building integrating consultation skills into the practice of counseling psychology.
- 6553***
Advanced Practice in Marital and Family Treatment. Prerequisite: consent of instructor. Advanced methods in assessment, diagnosis and treatment of marital and family problems. Skill development, professionalism, ethics and case management. Dynamics of co-therapy and conjoint treatment. Case consultation format. Same as PSYC 6553.

6560*
Advanced Internship in Counseling. 1-3 credits, maximum 6. Prerequisite: admission to the doctoral program in counseling and student personnel or applied behavioral studies emphasizing counseling and development, and consent of instructor. Designed to facilitate counseling effectiveness and to set the stage for a productive life of professional practice.

6850*
Directed Reading. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Directed reading for students with advanced graduate standing.

Curriculum and Instruction Education (CIED)

0123
Improving College Reading Skills. Lab 1. Individualized instruction and lab experiences for the improvement of college reading and learning skills, including vocabulary, reading rate, comprehension and learning strategies. May be used to fulfill the reading improvement requirement established by State Regents policy. Graded on a satisfactory-unsatisfactory basis.

1230
Reading and Study Skills for College Students. 1-4 credits, maximum 4. Lab 1-4. Instruction and laboratory experience for the improvement of reading rate, vocabulary, comprehension and study skills. Graded on pass-fail basis.

2450
Early Lab and Clinical Experience in Elementary Education I. 1-2 credits, maximum 2. Lab 3-6. Prerequisite: declaration of intention to pursue a program in Teacher Education. The initial preprofessional clinical experience in schools, kindergarten through grade eight. Required for full admission to Teacher Education. Graded on a pass-fail basis.

3005
Foundations of Literacy. Lab 0-2. Prerequisites: ENGL 1113, 1213, 2413 with a grade of "C" or better. Survey of evaluation, selection and utilization of literature of childhood; introduces cognitive and linguistics foundations of literacy; language conventions needed to compose and comprehend oral and written texts. Work in school setting.

3122
Utilization of Instructional Media. Familiarizes students with a broad range of instructional media and with principles and techniques related to their selection, utilization and evaluation.

3132
Microcomputer Technologies for Education. Lab 2. Literacy level interaction with microcomputer principles and techniques related to selection, evaluation and classroom integration of instructional and tool application software.

3153
Teaching Mathematics at the Primary Level. Lab 2. Prerequisites: MATH 1513 or 1493, MATH 3403 and 3603, or consent of instructor. Developmental levels in selection and organization of content and procedures for primary mathematics education.

3283
Foundations of Reading Instruction. Current theories of developmental reading instruction at the primary and intermediate grade levels.

3430
Early Lab and Clinical Experience in Elementary Education II. 1-2 credits, maximum 3. Lab 3-6. Directed observation and teaching in schools, kindergarten through grade eight. Concurrent seminar explores multicultural education and mainstreaming programs. Graded on a pass-fail basis.

3450
Field Experiences in the Schools, K-12. 1-2 credits, maximum 2. Lab 3-6. Prerequisite: consent of instructor. Seminars, directed observation and participation in the schools, K-12. Develops experience in meeting the mental, social, physical and cultural differences among children. Available in discipline-specialized sections: foreign languages. Graded on a pass-fail basis.

3620
Field Experiences in the Middle School. 1-4 credits, maximum 4. Lab 2-8. Seminars, directed observation, and participation in a particular subject area of the middle school (grades 5-9). Experience in meeting the mental, social, physical and cultural differences among middle school children. Graded on pass-fail basis.

3622
Middle Level Education. Lab 0-2. Overview of the nature and needs of early adolescents as well as an examination of the curriculum, instruction, and organization of middle grade schools. Field-based experience in a middle school.

3710
Field Experiences in the Secondary School. 1-3 credits, maximum 3. Lab 2. Prerequisite: consent of instructor. Seminars, directed observation and participation in a particular subject area of the secondary school. Develops experience in meeting the mental, social, physical and cultural differences among children. Graded on a pass-fail basis.

3813
Topics of Middle School Mathematics. Prerequisite: consent of instructor. Strategies for teaching the topics of the middle grades and the mathematics basic skill areas of the middle grades (grades 5-9).

4000
Field Studies in Education. 1-4 credits, maximum 4. Independent study and/or field experiences, such as spending a semester in an experimental program working with handicapped children in schools, in-depth studies in research projects, internships with school personnel. Graded on a pass-fail basis.

4003*
Teaching Fundamental Concepts of Mathematics. Prerequisite: full admission to Teacher Education. Teaching of the basic skill areas. Study and comparison of contemporary basic mathematics textbooks. Recommended to be taken concurrently with public school practicum experiences.

4005
Literacy Assessment and Instruction. Lab 0-2. Prerequisite: 3005 or consent of literacy faculty. Comprehensive survey of teaching strategies, formal and informal assessment, curriculum materials, theory, and research pertaining to reading, writing, spelling, and oral language development at the primary and elementary school levels. Practical experiences required.

4012
Integration of Literacy across the Curriculum. Prerequisites: 4005 or consent of literacy faculty; full admission to Professional Education. Integration of reading, writing and oral language; integration of literacy instruction into the content areas in elementary school curriculum.

4013*
Humanizing the Educational Process. Provides the student with a greater personal awareness and understanding of the dynamics of human relatedness within the classroom teaching-learning process.

4023
Children's Literature. Survey, evaluation, selection and utilization of materials for children; extensive reading with emphasis on books which meet the needs and interest of children through grade six.

4043
Classroom Applications of Microcomputers. Lab 2. Instructional computing course for educators; principles involved in programming a microcomputer; extended applications of tool software and telecommunications; issues and strategies for planning and implementing computer technologies in the schools.

4053*
Teaching Geometry in the Secondary School. Prerequisite: full admission to Teacher Education. Overview of the present secondary geometry curricula and future trends. Axiomatic development of Euclidean geometry, proofs and transformational geometry from the perspective of the secondary mathematics teachers. Study and comparison of contemporary basic mathematics textbooks. Recommended to be taken concurrently with 3710 and MATH 4043.

4063*
Teaching Mathematical Modeling. Strategies for teaching mathematical modeling. Problem classroom topics.

4153
Teaching Mathematics at the Intermediate Level. Lab 1. Prerequisites: 3153 and full admission to Professional Education. Selection and organization of content, procedures for instruction, and evaluation of outcomes in teaching the mathematics of the intermediate grades. Some attention to instruction in upper grades of the elementary school.

4213
Introduction to the Visual Arts in the Curriculum. Lab 4. Provides an understanding of the theoretical basis for the use of art activities in developing sensory perception and aesthetic sensitivity as an integral part of the curriculum. Includes a wide range of opportunities for student involvement in experimentation and exploration with a variety of two- and three-dimensional art media. Emphasis on both creative expression and appreciation of the visual arts in the home, school and community as a vital aspect of instruction in the school, preschool level through grade eight.

4222
Application of Advanced Technologies to Instruction. Production, utilization, application of media available through advanced technologies. Systematic instructional technology approach to teaching-learning process.

4233
Reading Diagnosis and Remediation. Lab 1. Prerequisites: 3283, full admission to Teacher Education. Identification and treatment of reading problems in the classroom including group and individual diagnostic procedures. Practical experiences required.

4253
Language Arts in the Elementary School Curriculum. Prerequisite: full admission to Teacher Education. The purposes, selection and organization of content, teaching and learning procedures, and evaluation of outcomes in elementary school listening, speaking and writing.

- 4260 Skill Development in the Reading Program.** 1-3 credits, maximum 3. Lab 0-4. Relationship between reading skills, child development and curriculum, and instructional strategies for sequential skill development in reading.
- 4270 Reading in Content Areas in the Elementary School.** 1-3 credits, maximum 3. Lab 0-4. Integration of reading instruction in the elementary school curriculum with emphasis upon application of reading to various content areas.
- 4280 Informal Practices in Reading.** 1-3 credits, maximum 3. Lab 0-4. Purposes and methods of informal instruction in reading utilizing the language experience approach and individualized voluntary reading procedures. Informal evaluation of reading development.
- 4293 Teaching Reading in the Elementary School.** Lab 0-8. Application of skills, techniques and materials utilized in the effective teaching of reading in the elementary schools.
- 4313* Young Adult Literature.** Survey of print and non-print materials, including multicultural and multi-ethnic materials for young adults from middle school through high school. History, criticism, selection and evaluation of young adult literature and exploration of its relation to the needs and interests of young people. Same course as LBSC 4313.
- 4323 Social Studies in the Elementary School Curriculum.** Prerequisite: full admission to Teacher Education. Purposes, selection and organization of content, teaching and learning procedures and evaluation of outcomes in elementary social studies.
- 4343 Science in the Middle Level Curriculum.** Prerequisites: enrollment in 3620 and full admission to Teacher Education. Objectives, organization, and selection of science content and the analysis of teaching, learning, and evaluation procedures for middle level science.
- 4353 Science in the Elementary School Curriculum.** Prerequisite: full admission to Teacher Education. The purposes, selection and organization of content, teaching and learning procedures and evaluation of outcomes in elementary school science.
- 4363 Design and Management of the Elementary School Classroom.** Prerequisites: EPSY 3113, FRCD 3253, or consent of instructor, and full admission to Professional Education. Design and management of the physical, social, intellectual, cultural, special needs, and learning materials aspects of the school classroom, kindergarten through grade 8. Purposes, selection, and organization of classroom management systems and teaching approaches.
- 4450 Internship in Elementary Education.** 1-12 credits, maximum 12. Lab 3-36. Prerequisites: elementary clinical experience and full admission to Teacher Education. Advanced clinical experience as associate (student) teacher in schools, kindergarten through grade eight. Graded on a pass-fail basis.
- 4453 Senior Seminar in Elementary Education.** Prerequisites: senior standing; full admission to Professional Education; and concurrent enrollment in 4450. Legal and ethical issues, forms of assessment including standardized testing, working with colleagues and other professionals, integration of performing arts including music and drama, and completion of a professional portfolio. Taken concurrently with student teaching in the final semester of the elementary education program.
- 4460 Kindergarten-Primary Education: Methods.** 2-3 credits, maximum 3. Prerequisite: full admission to Teacher Education. Purposes, methods of teaching, classroom design and management, classroom routine, and selection and organization of content in kindergarten-primary education.
- 4473 Reading for the Secondary Teacher.** Prerequisites: full admission to Teacher Education and consent of instructor. Materials and procedures in the teaching of reading in secondary schools for content area teachers.
- 4560* Environmental Education.** 1-4 credits, maximum 4. Lab 1. Development of (teacher/leader) competencies in the content, methods, philosophy, and historical perspective of contemporary environmental education curricula using both indoor and outdoor settings as a multidisciplinary learning laboratory.
- 4713 Teaching and Learning in the Secondary School.** Prerequisite: full admission to Teacher Education. Purposes, selection and organization of curriculum content, teaching and learning theories and procedures, and evaluation of outcomes for diverse students. Teaching techniques and materials in grades 7-12 subject areas. Available in certification disciplines: art, English/language arts, foreign languages, mathematics, science, social studies.
- 4720 Internship in the Secondary Schools.** 1-12 credits, maximum 12. Lab 3-36. Prerequisites: 3223 or equivalent, 3710, 4713, 4723 and continued full admission to Teacher Education. Supervised observation and student teaching in fields in which the student intends to qualify for teaching certification. Development of awareness of and experience with mental, social, physical and cultural differences among adolescents. Graded on a pass-fail basis.
- 4724 Planning and Management in the Multicultural Secondary Classroom.** Prerequisites: 4713 or degree plan equivalent with "C" or better; verification of student teaching placement; continued full admission to Teacher Education. Taken concurrently with the student teaching internship. Includes student teaching seminar (one hour). Based on curriculum and teaching theory in 4713, planning and organizing for the secondary classroom in a diverse society, grades 7-12. Classroom management and discipline approaches as well as teacher research, parental involvement, school climate and community relations. Available in discipline-specialized sections: English/language arts, mathematics, science and social studies.
- 4730 Planning and Management in the Multicultural Classroom, K-12.** Prerequisites: 4713 or degree equivalent with grade of "C" or better; verification of student teaching placement, continued full admission to teacher education. Taken concurrently with the student teaching internship. Includes student teaching seminar (one hour). Based on curriculum and teaching theory, planning and organizing for the secondary classroom in a diverse society, grades K-12. Classroom management and discipline approaches as well as teacher research, parental involvement, school climate and community relations. Available in discipline-specialized sections: art, foreign language.
- 5000* Master's Report or Thesis.** 1-6 credits, maximum 6. Prerequisite: consent of adviser. Students studying for a master's degree enroll in this course for a total of 2 credit hours if they write a report or 6 hours if they write a thesis.
- 5033* Teaching Foreign Languages in the Schools.** Prerequisite: graduate standing or full admission to Teacher Education. Curriculum, materials, methods and procedures related to foreign languages (grades K-12).
- 5043* Fundamentals of Teaching.** Current issues and trends in teaching theory, practice and research with emphasis on teacher reflection.
- 5053* Fundamentals of Curriculum Development.** A study of curriculum that includes philosophy, history, decision making, major concepts and terms.
- 5063* Curriculum Inquiry.** Study of major research in the field of curriculum studies and supervision, with analysis of various forms of inquiry in curriculum research, such as philosophical, phenomenological, historical, empirical, narrative, critical, feminist and action inquiry, among others.
- 5123* Curriculum in the Secondary School.** Contemporary curricular issues, philosophies and points of view in secondary school education.
- 5130* Advanced Studies in Children's Literature.** 1-3 credits, maximum 6. The history of children's books against a world background of prevailing political, economic and social factors influencing cultural patterns and values. The tools of research in children's literature and the nature and direction of contemporary children's book publishing in the United States and abroad.
- 5133* Photography for Instruction.** Photography skills emphasizing 35mm and instamatic type cameras with application to instruction and other communication situations such as photo-copying, use of high-contrast film for graphics, and simple photography projects for school-age students.
- 5143* Language Arts in the Curriculum.** Content and current issues in the language arts. Materials and methods for teaching the communication skills.
- 5173* Kindergarten-Primary Curriculum.** Study of kindergarten-primary curriculum including philosophy, history, current practice and issues. For administrators, teachers and students in curriculum and early childhood education.

5223*
Teaching Science in the Elementary School. Materials, methods and classroom procedures related to science in the elementary school.

5233*
Teaching Science in the Secondary School. Materials, methods and classroom procedures related to science in the secondary school.

5253*
Intermediate (4-6) Mathematics Education. The study of the theory and research on mathematics curriculum and instruction at the intermediate (4-6) grade levels. Problem solving, fractions, decimals, percent, and applications.

5263*
Remediation in School Mathematics. Lab 2. Identification of learning disabilities in school mathematics. Selection of appropriate remedial measures.

5270*
Practicum in School Mathematics. 1-3 credits, maximum 6. Lab 2-6. Diagnostic and therapeutic procedures in mathematics with students of all ages. Laboratory classes provide for clinical experiences in evaluation and instruction with children experiencing difficulty in mathematics.

5273*
Kindergarten-Primary (K-3) Mathematics Education. Theory and research on mathematics learning and teaching from the preschool level through the early elementary years. Study and analysis of children's construction of mathematics knowledge and the implications for teaching. Methods for promoting conceptual understanding and enthusiasm for the further study of mathematics.

5280*
Workshop in Science Education. 1-4 credits, maximum 4. Develops and/or implements elementary and secondary science programs.

5323*
Teaching Social Studies in the Schools. Curriculum, materials, methods and procedures related to social studies.

5350*
The Visual Arts in the Curriculum. 1-3 credits, maximum 6. Lab 2. Creative approaches to the use of two- and three-dimensional media as they relate to various aspects of education. Opportunities available for periodic group and individual evaluation in order to give direction and significance to future growth.

5423*
Developmental Reading at the Primary Level. Analysis of sequential growth in reading from the preschool level through the early elementary years. Examination of the reading process and instructional procedures.

5433*
Developmental Reading at Intermediate, Middle and Secondary Levels. Examination of the developmental reading curriculum at intermediate, middle and secondary levels including evaluation of teaching methods and materials.

5463*
Diagnosis and Treatment of Reading Problems. Diagnosis of reading disabilities, remedial measures and work with clinical cases.

5473*
Clinical Aspects of Reading Disability. Refines the diagnostic and remedial skills of the student through the study of clinical instruments, research, informal measurements and remedial approaches used in reading clinics.

5510*
In-service in Reading. 1-6 credits, maximum 6. Guidance in the development of reading curriculum, programs, methodology and materials for in-service teacher education groups. Content developed around needs of specific groups.

5520*
Practicum in Reading. 1-6 credits, maximum 6. Lab 2-4. Prerequisite: 5463. Application of diagnostic and therapeutic procedures with readers of all ages. Laboratory classes provide for clinical experience in evaluation and instruction in developmental and remedial programs in reading for children.

5613*
Effective Teaching of Mathematics in the Secondary School. Prerequisite: consent of instructor. Directed advanced practicum in secondary school mathematical education. Includes study of current research findings in mathematical education, teaching strategies, materials and evaluation procedures in the secondary school. For experienced classroom teachers, superintendents, principals and supervisors.

5623*
Multicultural and Diversity Issues in Curriculum. Understanding of the historical and contemporary perspectives toward cultural diversity. Development of an awareness of diverse culture and language communities; understanding of critical issues of race, class, gender, and ethnicity in education; perennial issues of multiculturalism in public education and in global society; a comprehensive overview of principles and current research on bilingual and multicultural education.

5633*
Developmental Reading for College and Adult Learners. Identification of the needs, materials, curricula, and instructional strategies for college and adult readers. The study of illiteracy. Consideration of the development, organization and supervision of programs for such learners.

5730*
Seminar in Education. 1-6 credits, maximum 6. Seminar topics may differ depending upon the nature of current interests and topics in American education.

5750*
Seminar in Mathematics Education. 1-6 credits, maximum 6. Lab 0-6. Prerequisite: consent of instructor. Problems, issues and trends in mathematics education.

5850*
Directed Study. 1-3 credits, maximum 3. Lab 1-3. Prerequisite: consent of instructor. Directed study for master's level students.

6000*
Doctoral Thesis. 1-15 credits, maximum 15. Required of all candidates for the Doctor of Education degree. Credit is given upon completion of the thesis.

6033*
Analysis of Teaching. Advanced study of multiple forms of analysis of teaching such as behavioral, phenomenological, and constructivist with emphasis on major research on teacher reflection and teacher narrative.

6043*
Curriculum Leadership. A study of curriculum leadership and implications for schooling; focus on what it means to be a curriculum leader in times of major societal change and educational reform.

6080*
Seminar in Science Education. 1-6 credits, maximum 6. Problems, issues and trends in science education. The focus at the pre-service or in-service level.

6113*
Curriculum of the Elementary School. Contemporary trends, philosophies and points of view in elementary school education.

6133*
Theory to Practice in Education. A culminating seminar demonstrating the application of theory from several disciplines to the practical problems of education: curriculum development, organization, teaching strategies and evaluations.

6152*
Current Issues in Art in the School Curriculum. Problems, issues and trends in art education programs of the elementary and secondary schools and their relationship to the total curriculum. For teachers, supervisors and administrators.

6433*
Seminar in Reading. Research in reading including evaluation of research proposals. Problems and issues in reading instruction are discussed using knowledge gained through both research and classroom practice.

6683*
Developmental Reading and Exceptionality. Prerequisite: 5423 or 5433. Developmental reading needs of various groups of exceptional individuals. Methods and materials of instruction.

6850*
Directed Reading. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Directed reading for students with advanced graduate standing to enhance students' understanding in areas where they wish additional knowledge.

6853*
Improvement of Instruction in Reading. Problems and issues related to reading instruction. The roles of various school personnel in changing curriculum and methods.

6880*
Internship in Education. 1-8 credits, maximum 8. Lab 3-24. Prerequisite: consent of instructor. Directed off-campus experiences designed to relate ideas and concepts to problems encountered in the management of the school program.

6910*
Practicum. 1-6 credits, maximum 6. Prerequisite: consent of adviser. Helps the student carry out an acceptable research problem (practicum) in his/her local school situation. Credit given upon completion of the written report.

Design, Housing and Merchandising (DHM)

1003
Design Theory and Processes for Apparel and Interiors. Lab 4. Design elements, principles and processes applied to design and merchandising.

1103
Basic Apparel Assembly. Lab 4. Basic apparel assembly techniques. Problems including basic fit, spreading and cutting methods and equipment, and use and application of sewing equipment including lock, chain, and overedge.

1123
Graphic Design for Interiors. Lab 6. Interior design majors only. Drafting and visual communication techniques related to interiors.

- 1433 Fashion Innovation and Marketing.** The process of fashion innovation; variables of fashion affecting production and distribution of consumer goods; development of present structure in the fashion industry.
- 2003 Creative Problem Solving in Design and Merchandising.** Participatory problem solving in design and merchandising; critique of proposed solutions as a positive process of evaluation.
- 2110 Fashion Showmanship.** 1 credit, maximum 8. Preparation, production and evaluation of special fashion-related events. Professional learning experiences will include modeling techniques, organization and directing procedures.
- 2203 Intermediate Apparel Assembly.** Lab 4. Prerequisite: 1103. Development of skill in apparel assembly. Intermediate problems in fit, spreading, cutting, and sequencing of apparel assembly operations for lined garments, plaids, other special fabrics and closures.
- 2303 Materials and Finishes for Interior Building Systems.** Lab 4. Prerequisites: 1003, 1123, 2993. Materials and procedures used in the design and production of interiors and building systems.
- 2343 Design and Space.** Lab 6. Prerequisites: 1123, 2223 and 2313. Creative exploration of three dimensional spaces in interior design.
- 2573 Textiles.** Lab 2. Study of textiles emphasizing fibers, yarns, fabric structures, and finishes for end-use application.
- 2913 Sewn Product Quality Analysis.** Lab 2. Prerequisites: 1433, 2573. Garment manufacturing process with emphasis on evaluating garment quality and its relationship to performance. Examined from the retailers', manufacturers', and consumers' perspectives.
- 2993 Communication and Presentation Techniques for Apparel and Interior Design.** Lab 4. Prerequisites: 1003, ART 1103 and SPCH 2713. Creative communication methods and techniques including a variety of media for two- and three-dimensional presentations in apparel and interior design.
- 3002 Professional Image and Dress.** Role of appearance and dress in creating a professional image for men and women. Figure and wardrobe analysis, professional clothing needs, individualized clothing decisions.
- 3013 Flat Pattern Design.** Lab 4. Prerequisites: 2203 and MATH 1513. Interpretation of dress design developed through the medium of flat pattern; introduction to pattern drafting.
- 3023 Advanced Flat Pattern Design.** Lab 4. Prerequisite: 3013. Advanced apparel design problems using flat pattern and CAD techniques.
- 3102 Fashion Sketching.** Lab 4. Prerequisites: 1003 or 3 credit hours of art and completion of 60 credit hours. Principles and techniques of sketching in the fashion field.
- 3153 Mass Production of Apparel and Related Products.** Lab 4. Understanding and applying mass production strategies for apparel and related products. Design for production and production operations including CAD marker making and material utilization, production simulation modeling, and costing.
- 3203 Functional Clothing Design.** Lab 4. Prerequisites: 2573, 3013 and 4 credit hours of chemistry. Problem-solving approach to functional clothing design for specialized market segments (athletic sportswear, occupational clothing, children's wear, clothing for the handicapped) including performance evaluation of selected materials using standard methods of textile testing.
- 3213 (H)Heritage of Dress.** Prerequisite: 3 credit hours of history. Survey of historic modes of dress as they reflect the social, economic and cultural life of a people. Application of design principles to modern dress.
- 3233 (H)Heritage of Interiors I.** Religious, civic, commercial, and domestic architecture and furnishings prior to and including the 18th Century with emphasis on the periods which have greatly influenced housing and interior design.
- 3243 Design of Interior Components.** Lab 4. Prerequisite: pass proficiency review. Design, materials, construction and production of interior design components including custom furnishings and interior treatments and modification.
- 3253 Environmental Design for Interior Spaces.** Lab 4. Prerequisite: pass proficiency review. Design factors and human performance criteria for lighting, acoustics and thermal/ atmospheric comfort as they relate to the practice of interior design.
- 3263 Interior Design Studio I: Residential.** Lab 4. Prerequisite: pass proficiency review. Studio course utilizing the design process in the analysis and planning of residential environments.
- 3300 Supervised Field Experience.** 1-3 credits, maximum 6. Prerequisite: 3243 or consent of instructor. Field experience in specialized residential, commercial and institutional design with both historic and contemporary elements.
- 3353 (S)Socio-Economic Aspects of Housing.** Family housing needs, present social and economic conditions affecting housing and building processes and the roles of business and government in housing.
- 3363* Interior Design Studio II: Small Scale Contract.** Lab 4. Prerequisites: 3243 and 3263. Studio course utilizing the design process in the analysis and planning of small office, institutional and retail environments with emphasis on materials, lighting, codes and accessibility.
- 3373 Computer-aided Design for Interiors.** Lab 4. Prerequisite: 1123. Computer-aided design and drafting for two-dimensional and three-dimensional interior systems.
- 3433 Fashion Retailing.** Prerequisites: 1433, ACCT 2103, ECON 1113. Marketing structures at retail level; job descriptions and responsibilities at management level; financial and control functions.
- 3533 Decorative Fabrics.** Lab 4. Prerequisite: 3 credit hours in art. Historic and contemporary textile designs. Creation of textile designs using personal inspirations, cultural expressions and a variety of techniques.
- 3553 Profitable Merchandising Analysis.** Prerequisites: ACCT 2103, MATH 1513 or 1483. Relationship analysis of profit and loss statement. Retail mathematical calculations necessary to plan and control merchandising results, open-to-buy, mark-up, mark-down, turn-over, stock-sales ratio.
- 3643 Apparel and Accessories for Special Markets.** Prerequisites: 1433, PSYC 1113, SOC 1113, and completion of 60 credit hours. An analysis of the apparel and accessory needs of specialized market segments and the products designed to meet those needs, with consideration given to both product design and merchandising.
- 3663 Fashion Promotion Media.** Lab 2. Prerequisites: 1433 and completion of 60 credit hours. Advertising and other special-purpose media used in the promotion of fashion merchandise. Study and application of procedures used in planning, evaluating and directing effective sales promotion activities.
- 3823 Professional Practices for Interior Design.** Prerequisites: 2343, 3263 and 3303. Future professional role and responsibilities, business procedures and employer-employee relationships which characterize the employment situation in interior design.
- 3853 Visual Merchandising.** Lab 1. Prerequisites: 1003, 1433 and completion of 60 credit hours. Study and application of principles and practices in merchandise presentation for commercial purposes.
- 3991 Pre-internship Seminar.** Prerequisites: 24 credit hours of required DHM courses with a 2.50 major GPA and SPCH 2713. Skills requisite to completion of a directed, practical experience in a work situation within the fashion industry.
- 3994 Internship.** Prerequisites: 3433, 3553, 3663 and 3991 (apparel merchandising students); 3013 and 3991 (apparel design and production students). Directed practical experience in an approved work situation related to the fashion industry.
- 4003 (S)Environmental Perspectives on Apparel and Interior Design.** Prerequisites: completion of 90 credit hours. Analysis of apparel and interior design, development and use from physical, technological, economic, political, religious, social and aesthetic perspectives.
- 4011 Post Internship Seminar.** Prerequisite: 3994. Study and comparison of student work experiences. Individual student conferences, review of merchant supervisor reactions.
- 4143* Design for Special Needs.** Problems and alternative solutions for apparel and interiors for special groups, e.g., the aging, children, the handicapped, special markets. Includes field study or design problem.
- 4163* (H,I)Housing in Other Cultures.** Housing and interior design and expressions of cultural beliefs, attitudes, family patterns and environmental influences.
- 4243* Draping.** Lab 4. Prerequisite: 2203. Interpretation of garment design developed through the medium of draping on dress forms.

- 4263***
Interior Design Studio III: Large Scale Contract. Lab 4. Prerequisites: 3253, 3363 and 3823. Studio course utilizing the design process in the analysis of large scale office planning and institution design including systems and specifications.
- 4293***
Interior Design Studio IV. Lab 4. Prerequisite: 4263. Studio course developing comprehensive interior design projects in historic preservation and adaptive reuse and an advanced design project.
- 4323***
(H)Heritage of Interiors II. Prerequisite: 3233 or consent of instructor. Exploration of the architecture, interiors and furnishings of a variety of structures. Residential, commercial, governmental, institutional, and recreational buildings of different cultures of the 19th and 20th centuries.
- 4403***
Creative Costume Design. Lab 4. Prerequisites: 3213, 3013 and 4243 or consent of instructor. Application of design principles and construction techniques in the development of original designs.
- 4443***
Facility Management for Contract Interiors. Philosophy and principles of facility management and the practice of coordinating the physical workplace in relation to the workforce and organizational structure of the corporate environment.
- 4453***
Entrepreneurship and Product Development for Apparel and Interiors. Prerequisites: ECON 1113 and completion of 90 credit hours. In-depth study of entrepreneurship concepts as applied to manufacturers and retailers of apparel and interior products including product development, accounting and control, merchandising and buying, operation and management, advertising and promotion.
- 4523**
Critical Issues in Design, Housing and Merchandising. Prerequisite: senior standing. Capstone course examining critical issues in design, housing and merchandising in the context of central themes from general education.
- 4810***
Analysis of Current Literature Including Research in Design, Housing and Merchandising. 1-2 credits, maximum 2. Analysis of current research in relation to design, housing and merchandising.
- 4820**
Professional Internship. 1-6 credits, maximum 6. Prerequisites: 3823 and consent of instructor. A supervised internship experience which simulates the responsibilities and duties of a practicing professional.
- 4850***
Special Unit Course in Design, Housing and Merchandising. 1-6 credits, maximum 6. In-depth study of specific areas of design, housing and merchandising.
- 4900**
Honors Creative Component. 1-3 credits, maximum 3. Prerequisites: College of Human Environmental Sciences Honors Program participation, senior standing. Guided creative component for students completing requirements for College Honors in the College of Human Environmental Sciences. Thesis, creative project or report under the direction of a faculty member in the major area, with second faculty reader and oral examination.
- 4993***
(I)Textiles and Apparel in the International Economy. Prerequisites: 2913, ECON 1113, and 90 hours. Broad multi-disciplinary study of textiles and apparel in the international economy.
- 5000***
Master's Thesis. 1-6 credits, maximum 6. Prerequisites: graduate standing and consent of major professor. Research related directly to design, housing and merchandising for the master's thesis.
- 5003***
Theoretical Perspectives for Design, Housing and Merchandising. A study of terminologies associated with theory. Exploration of key theories and their application to practice and research in design, housing and merchandising.
- 5110***
Research Developments in Design, Housing and Merchandising. 1-3 credits, maximum 3. Current development and needs in research in design, housing and merchandising including application of research methods to design, housing and merchandising and research planning.
- 5113***
Theories of Creative Process in Design and Merchandising. A study of the creative processes used in art, science, business and hybrid disciplines, with application to design and merchandising.
- 5233***
Design Evaluation. Prerequisite: consent of instructor. Theoretical perspectives on evaluation of applied design; examination and evaluation of historic and contemporary designers, their philosophies and their work.
- 5240***
Master's Creative Component. 1-6 credits, maximum 6. Prerequisites: consent of major professor and department head. An in-depth design application of theoretical design models and philosophies. A maximum of six hours to be used by graduate students following Plan III for the master's degree.
- 5273***
Interpretative Theories of Material Culture. A theoretical analysis of the influences of cultural values and characteristics upon the design, acquisition and use of apparel, furnishing and building products, and the cultural diffusion of those material goods.
- 5343***
Constructed Environment and Human Behavior. Prerequisites: 5110, 5273, PSYC 1113, SOC 1113. An exploration and evaluation of the physical attributes of the constructed environment and the interrelationships with the social and psychological aspects of human behavior.
- 5360***
Advanced Studies in Design, Housing and Merchandising. 1-6 credits, maximum 6. Investigation into special areas in the fields of design, housing and merchandising.
- 5383***
Design, Housing and Merchandising in Higher Education. Prerequisite: 9 credit hours in design, housing and merchandising. Development and organization of curricula and teaching methods for design, housing and merchandising.
- 5440***
Career Internship. 1-6 credits, maximum 6. Prerequisites: consent of instructor and department head. An individualized career-oriented internship. Selected learning experiences in approved work situations in industry, government, education or research institutions related to design, housing or merchandising.
- 5533***
- Functional Apparel: Theory and Design.** Lab 4. Prerequisites: 2573, 4013, 5110. A holistic approach to the study of apparel design with an emphasis on integrating knowledge of the needs and functions of the individual, the structural properties of textiles and apparel design.
- 5653***
Merchandising Trends, Practices and Theories in Apparel and Interior Industries. Prerequisite: nine credit hours in marketing or merchandising. Current trends in merchandising; theories, concepts and processes related to management level problems.
- 5810***
Problems in Design, Housing and Merchandising. 1-3 credits, maximum 6. Prerequisites: consent of instructor and department head. Individual and group investigations and discussions of special problems in the various phases of design, housing and merchandising.
- 5830***
Design, Housing and Merchandising Seminar. 1-6 credits, maximum 6. Prerequisite: consent of instructor. A selected group of current issues in design, housing and merchandising.
- 6000***
Doctoral Thesis. 1-12 credits, maximum 30. Prerequisite: consent of major professor. Research in design, housing and merchandising for the Ph.D. degree.
- 6133***
Research Methods in Design, Housing and Merchandising. Prerequisite: consent of instructor. Survey and discussion of research methods, experiences in research design and analysis of data.
- 6203***
Theories of Dress and Communication. Appearance as a type of nonverbal communication related to appearance. Theoretical structures depicting the use of dress in communication.
- 6303***
Sociological, Psychological and Economic Aspects of Consumer Behavior. Prerequisite: 5653. Analysis and integration of social, psychological and economic theories related to consumer acquisition of products. Application and testing of these theories as appropriate to apparel and interior consumption processes.
- 6403***
Merchandising Theory Application and Strategy Implementation. Prerequisite: 5653. Integration of marketing, merchandising, and management theories, strategies, models, and frameworks. Application of theories and implementation of strategies relevant to apparel and interior industries.
- 6410***
Independent Study in Design, Housing and Merchandising. 1-3 credits, maximum 6. Prerequisite: consent of instructor. Selected areas of design, housing and merchandising for advanced graduate students working toward the doctorate degree.
- 6810***
Advanced Problems in Design, Housing and Merchandising. 1-6 credits, maximum 6. Prerequisites: consent of instructor and department head. Intensive individual or small-group study of problems in various areas of design, housing and merchandising for advanced graduate students who are working toward doctorate degrees.
- 6830***
Design, Housing and Merchandising Seminar. 1-3 credits, maximum 6. Prerequisite: consent of instructor. Problems and recent developments in design, housing and merchandising.

Economics (ECON)

1113

(S)The Economics of Social Issues. Issues-oriented approach. Basic economic principles introduced and developed through study of important social issues: for example, inflation, unemployment, poverty, discrimination, crime, population growth and environmental quality. Develops the economist's approach to social problems, and evaluates the contribution of economics to their solution. No credit for students with prior credit in 2103 or 2203. No general education credit for students also taking ECON 2103 or AGEC 1114.

2103

(S)Introduction to Microeconomics. Prerequisite: 15 credit hours. Goals, incentives and outcomes of economic behavior with applications and illustrations from current social issues: operation of markets for goods, services and factors of production; the behavior of firms and industries in different types of competition; income distribution; and international exchange. No general education credit for students also taking ECON 1113 or AGEC 1114.

2203

Introduction to Macroeconomics. Prerequisite: 2103 or AGEC 1114. The functioning and current problems of the aggregate economy: determination and analysis of national income, employment, inflation and stabilization; monetary and fiscal policy; and aspects of international interdependence.

3010

Special Topics in Economics. 1-3 credits, maximum 9. Prerequisites: 2203, prior approval of instructor. Analysis of a contemporary topic in economics. Course content will vary to reflect changing social issues and trends in applied economics.

3023*

Managerial Economics. Prerequisite: 2203. Application of economic theory and methodology to decision problems of private industry, non-profit institutions and government agencies; demand and cost analysis, forecasting, pricing and investment.

3113*

(S)Intermediate Microeconomics. Prerequisite: 2203. How the market system organizes economic activity and an evaluation of its performance. Principles of price theory developed and applied to the interactions of consumers, producers and resource owners in markets characterized by different degrees of competition.

3123*

(S)Intermediate Macroeconomics. Prerequisite: 2203. Development of a theoretical framework for studying the determinants of national income, employment and general price level. National income accounting, consumption, investment, government spending and taxation, the supply of and demand for money. Monetary, fiscal and incomes policies considered with regard to unemployment, inflation and economic growth.

3213

Game Theory and Experimental Economics. Prerequisite: three credit hours in economics. The fundamentals of strategic actions presented in a game theory context and the validation of these ideas with economic experiments.

3313*

Money and Banking. Prerequisite: 2203. The economics of money and banking. Operations of commercial banks and structure and competition of the banking industry. Organization and operation of the Federal Reserve System and its effects on interest rates, employment and prices. An introduction to monetary economics and international banking concludes the course.

3423*

(S)Public Finance. Prerequisite: 3 credit hours in economics. The economics of the government sector. Scope of government activity, efficiency in government expenditures, federal budget, fiscal and debt management policy. Principles of taxation. Major tax sources, tax distribution, tax issues. Current public finance problems such as revenue sharing, negative income tax, urban transport systems and national health insurance.

3513*

(S)Labor Economics and Labor Problems. Prerequisite: 3 credit hours in economics. Economic analysis of contemporary labor market problems and survey of U.S. unionism. The labor force, education and training, discrimination, inflation and unemployment theories of the labor movement, economic impact of unions and public policy toward labor.

3523*

(S)Poverty and Economic Insecurity. Prerequisite: 3 credit hours in economics. Problems, programs and proposals for dealing with poverty and economic insecurity.

3613*

(S)International Economic Relations. Prerequisite: 3 credit hours in economics. International trade and finance; international economic organizations; the foreign economic policy of the U.S.

3713*

(S)Government and Business. Prerequisite: 3 credit hours in economics. Methods of measuring the extent of monopoly power in American industries and ways of evaluating the effects of this power on consumer welfare. U.S. antitrust laws, their enforcement and landmark court decisions under these laws.

3813*

Development of Economic Thought. Prerequisite: 3 credit hours in economics. The ideas of great economists with emphasis upon economic concepts and systems of thought in relation to social, ethical and political ideas under evolving historical conditions.

3823

American Economic History. Economic development and economic forces in American history; emphasis upon industrialization and its impact upon our economic society since the Civil War. Same course as HIST 4513.

3903*

(S)Economics of Energy and the Environment. Prerequisite: 2103. Issues related to the development and use of energy resources, and the management of the natural environment.

4000

Economics Honors Seminar. 3-6 credits, maximum 6. Prerequisite: Honors Program participation. Topical seminar in economics for junior and senior students in the Honors Program. Special problem areas of the economy or the economics discipline. Appropriate for Honors students in any major.

4010*

Basic Studies in Economics. 1-6 credits, maximum 6. Prerequisite: 3 credit hours in economics. Economic concepts, theory, issues and problems. Designed for elementary and secondary teachers. Economics education teaching methods included.

4213*

Econometric Methods. Prerequisites: 2203, STAT 3013 or 4013. Basic quantitative methods used in economic analysis emphasizing applications to economic problems and interpretation of empirical results. Statistical analyses, regression and forecasting techniques using computer programs.

4223*

Business and Economic Forecasting. Prerequisites: 2203; STAT 3013 or 4013. Forecasting business and economic variables. Regression models and time series models such as exponential smoothing models, seasonal models, and Box-Jenkins models. Evaluation of methods and forecasting accuracy. Application of methods using computer programs.

4313*

Advanced Banking. Prerequisite: 3313. Central and commercial banking, including Federal Reserve policymaking, banking structure, capital adequacy and taxation of banks. Friedman's proposals for monetary and banking reform.

4413*

State and Local Government Finance. Prerequisite: 3 credit hours in economics. State and local government revenue and expenditure patterns in a federal fiscal system; intergovernmental fiscal problems; taxation in a federal system; adjustment to economic growth and change.

4513*

Labor and Public Policy. Prerequisite: 3513 or MGMT 3313 or BUSL 3213. Public policy affecting union management relations; common law, state and federal legislation; Wagner, Taft-Hartley and Landrum-Griffin Acts; labor dispute adjustment with emphasis on the theory, legal status and practice of arbitration, in both private and public sectors.

4643*

(I,S)International Economic Development. Prerequisite: 3 credit hours in economics. Problems of underdeveloped economies related to the world economy; obstacles to economic growth and policies for promoting growth.

4713*

(S)Economics of Industries. Prerequisite: 2103. Industrial organization of major U.S. industries. The structure-conduct-performance paradigm is used to evaluate how costs and concentration interact with pricing, marketing and R&D decisions to affect industry profitability, technological progress, and the efficient allocation of resources. Case studies included.

4723*

Economic Analysis of Law. Prerequisite: 3 credit hours in economics. Use of economic analysis to explain why certain laws exist and to evaluate the effects of various alternative rules of law on economic efficiency and behavior. Emphasis on the economics of the common law areas of property, contracts, and torts. Also, products liability, crime and punishment, distributive justice, and discrimination.

4823*

(I,S)Comparative Economic Systems. Prerequisite: 2203. Comparative analysis of the economic theory and institutions of capitalism, socialism, and mixed systems.

4913*

(S)Urban and Regional Economics. Prerequisite: 3 credit hours in economics. Urban and regional economics; the spatial aspects of poverty, land use, the urban environment and rural industrial development.

- 4993**
Economics Honors Thesis. Prerequisites: departmental invitation, senior standing, Honors Program participation. A guided reading and research program ending with an honors thesis under the direction of a faculty member, with second faculty reader and oral examination. Required for graduation with departmental honors in economics.
- 5000***
Research and Thesis. 1-6 credits, maximum 6. Workshop for the exploration and development of research topics. Research leading to the master's thesis.
- 5003***
Research Report. Prerequisite: consent of committee chairperson. Supervised research for M.S. report.
- 5010***
Research and Independent Studies. 1-3 credits, maximum 10. Prerequisite: consent of departmental committee under a workshop arrangement or supervised independent studies.
- 5013***
Contemporary Environmental Policy. Economic, social and political factors that influence the formation and implementation of environmental policy. Environmental policy instruments (including pollution taxes, standards and marketable pollution permits), measurement of environmental damages and risk. Risk comparison, regulatory issues, health risk assessment, and risk communication. Political-economic considerations.
- 5113***
Managerial Economics. Economic theory applied to business decision making. Concepts of microeconomics and macroeconomics related to understanding the economic system, analysis of policy, forecasting, and international economics. No credit for Ph.D. students in economics.
- 5123***
Microeconomic Theory I. Prerequisites: 3113, MATH 2265 or MATH 2713. Contemporary price and allocation theory with emphasis on comparative statics.
- 5133***
Macroeconomic Theory I. Prerequisites: 3123, MATH 2265 or MATH 2713. National income, employment and the price level from the point of view of comparative statics.
- 5223***
Mathematical Economics I. Prerequisites: 3113, MATH 2265 or equivalent. Mathematical concepts of single variable and multivariate calculus, topological properties of Euclidean space, convergence, linear algebra, optimization theory and the Kuhn-Tucker Theorem with applications from economic theory.
- 5243***
Econometrics I. Prerequisite: 4213 or STAT 4043. Theory and application of econometrics to economic problems. Topics include OLS, GLS, distributed lags, serial correlation, heteroskedasticity, and simultaneous equations.
- 5313***
Monetary Economics I. Contemporary issues in monetary theory and policy. Demand for money and supply of money theory, interest rate theory and issues in monetary policy.
- 5413***
Economics of the Public Sector I. Allocation and distribution effects as well as incidence of governmental budget policies.
- 5433***
Economics of the Public Sector II. Fiscal policy as a means of promoting economic stabilization and growth.
- 5543***
Labor Market Theory and Analysis. A critical evaluation of the theoretical and empirical literature dealing with labor market processes; wage determination and the impact of unions on relative wages; estimation of aggregate labor supply; resource allocation and labor mobility; the inflation-employment tradeoff and the economics of labor market discrimination.
- 5613***
International Finance. Open economy macroeconomics and the role of devaluation, fiscal and monetary policy in the open economy, monetary approach to the balance of payments, portfolio balance and asset market approaches to the determination of exchange rates.
- 5623***
Economic Development I. Characteristics and problems of less-developed countries. Criteria of growth and development with emphasis on strategies for development. The role of capital, labor, technological progress and entrepreneurship. Growth models.
- 5633***
International Trade. International trade and commercial policy. Comparative advantage, general equilibrium and modern trade theories; welfare implications of international resource allocation models; the theory of protection and international interdependence.
- 5643***
Economic Development II. Major problems of development policy. Inflation and mobilization of capital, investment criteria, agriculture, foreign trade, population and manpower, planning and programming methods.
- 5713***
Industrial Organization I. Organization and operation of the enterprise sector of a free enterprise economy; interrelations of market structure, conduct and performance; public policies affecting these elements.
- 5723***
Industrial Organization II. Alternative market structures and their relationships to market performance; the empirical evidence concerning these. Public policies toward business, including emphasis on U.S. antitrust laws and economic analysis of their enforcement; theories of public utility regulation.
- 5903***
Regional Economic Analysis and Policy. Selected topics in location theory, regional economic growth and policies toward regional development in the U.S.
- 5913***
Urban Economics. The urban area as an economic system. Problems of economic policy in urban environment.
- 6000***
Research and Thesis. 1-12 credits, maximum 30. Prerequisite: approval of advisory committee. Workshop for the exploration and development of research topics. Research leading to the Ph.D. dissertation.
- 6010***
Seminar in Economic Policy. 1-3 credits, maximum 6. Intensive analysis of selected problems in economic policy. Individual research, seminar reports and group discussion of reports.
- 6113***
Seminar in Economic Theory. Microeconomics.
- 6123***
Seminar in Economic Theory. Macroeconomics.
- 6133***
Microeconomic Theory II. Prerequisite: 5123. Contemporary price and allocation theory with emphasis on general equilibrium analysis. Welfare economics.
- 6143***
Macroeconomic Theory II. Prerequisite: 5133. National income, employment and the price level from the point of view of dynamics. Growth models.
- 6223***
Mathematical Economics II. Prerequisite: 5223. A mathematical approach to general equilibrium and welfare economics.
- 6243***
Econometrics II. Prerequisite: 5243. Advanced econometric theory covering single and simultaneous equations models, seemingly unrelated regressions, limited dependent variable models, causality, and pooled models.
- 6313***
Monetary Economics II. Intensive analysis of classical monetary theory and individual research on selected problems in monetary economics. The ideas of Patinkin, Wicksell, Fisher and Keynes.
- 6803***
History of Economic Thought. Economic theories from the 18th century until the present with emphasis on the origin and improvement of analytical tools.
- 6813***
Seminar in Economics Systems. Selected topics dealing with the economic theory and institutions of capitalism, socialism, communism, and fascism. Individual research, seminar reports, and group discussion of reports.

Education (EDUC)

- 1111**
Orientation to Education. Lab 1. Study of the profession of education with emphasis on the skills, qualities and student support services available throughout the campus. Graded on a pass-fail basis.
- 2510**
Innovative Education Studies. 1-3 credits, maximum 6. Designed to meet unique or special needs of individuals involved in education. Topics include contemporary approaches to meeting educational challenges on the professional as well as the personal classroom experience. Graded on a pass-fail basis.
- 3090**
Study Abroad. 12-18 credits, maximum 18. Prerequisites: consent of the Office of International Programs and associate dean of the college. Participation in a formal study abroad program in which a semester or year is spent in full-enrollment at a university outside the U.S.
- 3110**
Honors Directed Study. 1-3 credits, maximum 3. Prerequisite: admission to College of Education Honors program. Individualized directed study approved by a sponsoring professor or Honors coordinator.
- 4050**
Honors Colloquium. 1-9 credits, maximum 9. Prerequisites: junior standing and consent of instructor or Honors coordinator. Study of an interdepartmental and interdisciplinary nature of various important issues and aspects as related to the field of education. Provides an intellectual challenge for the able student with a strong dedication to scholarship.

4110
Teacher Education Seminar. 1-6 credits, maximum 6. Problems, trends, and pertinent education issues. May include simulation, small-group instruction and field-based experiences. For the pre-service or in-service level.

4920
Teacher Education Practicum. 1-9 credits, maximum 9. Prerequisites: admission to Teacher Education and 15 credit hours of professional education. Directed observation and supervised laboratory and clinical experiences in appropriate teacher education program areas. Appraisal and learning theory approaches employed.

5110*
Contemporary Educational Issues. 1-6 credits, maximum 6. Contemporary topics and issues in the broad field of education. May include television interaction, small group discussion and outreach and field experiences. Written reports required. Graded on a pass-fail basis.

5113*
Gender and Ethnicity Issues in Education. Methods, practices, and materials in educational institutions at all levels in the United States and their effect on individuals and their membership in society. Legal remedies and guidelines that combat discrimination by gender, sexual preference, ethnic group, and cultural background in educational settings.

5910*
Educational Field Experiences. 1-6 credits, maximum 6. Prerequisites: senior or graduate standing and consent of instructor. Guided field experience appropriate to a specific program of study. Field experience preceded and followed by appropriate on-campus seminars, readings and reports.

Educational Leadership (EDLE)

5000*
Thesis or Report. 1-10 credits, maximum 10. Prerequisite: consent of instructor. Master's students may earn up to two hours of credit for a report or six hours of credit for a thesis. Students working on a specialist's report may earn a maximum of 10 hours of credit.

5633*
Community Education. Purpose, organization and administration of community education and its various components.

5720*
Education Workshop. 1-4 credits, maximum 8. Analysis of organizational, administrative, and instructional problems by common schools and higher education personnel.

5813*
Public School Administration. The scope and function of public school administration.

5973*
Historical Background of Contemporary Issues in Higher Education. The history of American colleges and universities to the present; an overview of major contemporary issues in American higher education.

5983*
Administration and Law in Higher Education. Overview of the organization and administration operations and analyses of social, political and legal influences on colleges and universities.

6000*
Doctoral Thesis. 1-15 credits, maximum 15. Required of all candidates for the Doctor of Education degree. Credit given upon completion of the thesis.

6003*
Educational Ideas. Seminar for majors. Decision-making processes used in educational systems today.

6233*
Critical Issues in Higher Education. Prerequisite: 6753. Issues that have shaped and are shaping higher education in American society.

6243*
Connecting Theory and Practice in Administering Schools. Application of research findings and theoretical concepts to best practice in administering educational organizations.

6253*
The Principalship. Strategies, techniques and solutions for the principal to use in the operation of a public school. Development of policy statements, handbooks, budgets and schedules.

6263*
Professional Development and Instructional Improvement. Developmental perspectives of human, conceptual and technical skills needed for continuing professional development and instructional improvement through supervisory processes.

6323*
Public School Finance. Development of conceptual bases in economics of education, taxation, distribution systems, policy analysis; application to Oklahoma school finance; and introduction to budget development.

6333*
The Business Function in School Administration. Analysis and critique of practice of budget planning and development, administration and evaluation. Selected topics in school accounting and other business management functions.

6353*
The Superintendency. Integration of theory and practice through examination of roles and responsibilities of the superintendent. Leadership, communications and the changing nature of public education.

6393*
The Human Factor in Administering Schools. Analysis and critique of current issues in school personnel administration such as recruitment, selection, promotion, morale, salary, staff relations and teacher assessment.

6420*
The Politics of Education. 2-3 credits, maximum 3. Activities of schools as they relate to the political environment, e.g., voter behavior, change strategies and community power structures.

6453*
Special Topics in Education Law. Analysis and critique of selected topics in school law relating to public school administration.

6463*
Higher Education Law. National and state constitutional provisions, laws, and court cases concerning higher education. Considerable legal research required.

6473*
Practicum in Instructional Supervision. Prerequisite: 6263 or consent of instructor. Application of modern approaches to instructional supervision through practice in recording and analyzing teacher behavior in actual classroom settings. Clinical and group methods for improving instruction.

6573*
Special Topics in Education Facilities. Analysis and critique of validity of selected established standards and research in education facilities.

6583*
The Impact of College on Students and on Society. The psychological and sociological impact that attending four-year colleges and universities has on undergraduates from their freshman year until they graduate.

6603*
Organizational Theory in Education. Selected organizational typologies, conceptualizations and theoretical frameworks as they relate to organizational behavior and behavior of personnel in organizations.

6613*
Organizing, Developing and Administering Community Education. Relationship between education and the community, with special emphasis on community needs and resources and the development of a total community education program. Skills and competencies for planning, implementing and evaluating community education programs.

6650*
Problems in Educational Administration. 1-4 credits, maximum 8. Special administrative problem in common schools or higher education, e.g., school plant, school/community relations, administration and the instructional programs, attrition and finance.

6683*
The Community College. The American two-year college including historical and philosophical development, curricula, students and the learning process, faculty and instruction, administration and governance, support and control. Principles, practices and problems of community colleges in America.

6703*
Finance in Higher Education. Problems and prospects of financing American education, with in-depth discussion of selected topics, e.g., social capital, federal aid, faculty salaries and state support.

6710*
Special Problems. 1-4 credits, maximum 8. Assists administrators with either recurrent or unique problems arising in common schools or in higher education. Emphasizes evaluation and planning related especially to staff, programs and faculty needs.

6730*
Planning and Educational Change. 1-4 credits, maximum 4. Organizational and environmental parameters, sources of change, barriers to change, and strategies for planning and implementing organizational change.

6753*
Historical Development of Higher Education. History and development of higher education, studies of objectives and functions of institutional types and of students and faculty.

6803*
Administration in Higher Education. Prerequisite: 6753. Functions and principles of administration in higher education from historical and contemporary points of view. Both internal and external forces acting on the institution treated.

6813*
Development and Implementation of Academic Programs. Development and implementation of academic programs including curriculum for colleges and universities, investigation of teaching-learning relationships, and instructional emphasis.

6823*
Educational Leadership. Prerequisite: 6803. Marshalling scarce resources to achieve institutional goals and objectives congruent with the needs and abilities of persons associated with the institution. Research on leadership models and styles, with consideration given to application in higher education today. May also be of value to those in business and industry, politics, and government.

6833*
College and University Presidency. The role and function of the presidency. For those who anticipate a career in college and university administration or a related management position.

6843*
The Academic Department. Organization and administration in higher education emphasizing an analysis of the academic department and its leader, the department head.

6850*
Directed Reading. 1-4 credits, maximum 6. Directed reading for students with graduate standing.

6853*
Educational Systems, Design and Analysis. Prerequisites: 3 credit hours of statistics and 3 credit hours research design. Current research literature in educational administration, both common school and post-secondary studies. Substantial application of quantitative and qualitative skills to educational administration.

6870*
Seminar. 1-4 credits, maximum 10. Topical issues related to administration and/or higher education, including research techniques available to analyze such topics.

6880*
Internship in Education. 1-4 credits, maximum 8. Prerequisite: consent of department head. Directed internship experiences designed to relate ideas and concepts to problems encountered in education by faculty and administrators.

6910*
Practicum. 1-5 credits, maximum 9. Required of all candidates for the Specialist in Education degree. Designed to help the student carry out an acceptable field study or research problem. Credit given upon completion of the written report.

Educational Psychology (EPSY)

3113
Psychological Foundations of Childhood. The child from conception to puberty with focus on educational implications of development in cognitive, affective and psychomotor domains.

3213
Psychology of Adolescence. The adolescent from pubescence to adulthood with focus on educational implications of development in cognitive, affective and psychomotor domain.

3413
Child and Adolescent Development. The person from conception through adolescence with focus on education implications of development in cognitive, affective, social, and physical domains.

4063*
Exploration of the Creative Experience. The creative experience in art (visual to performing), articulation (oratory to literature), thought (philosophy to psychology), business (practices to products), leisure (procreation to recreation). Western and Eastern viewpoints. Personal creative development fostered by modeling and by investigation of proven techniques. A wide range of creative endeavor with an experiential approach. Future-oriented applications.

4223
Human Learning in Educational Psychology. Instructional psychology focusing on the study of teaching and learning theory as part of an instructional program to deal with individual, cultural, and environmental differences. Case studies and group discussion emphasizing motivation, planning, evaluation, classroom problems and management.

5000*
Master's Thesis. 1-6 credits, maximum 6. Prerequisite: consent of advisory committee chairperson. Report of research conducted by a student in the master's program in school and educational psychology. Credit given and grade assigned upon completion and acceptance of the thesis.

5023*
Introduction to School Psychological Service. Prerequisite: admission to school psychology or school psychology program. History, role and function, and issues and problems of the school psychological service worker.

5063*
Introduction to Gifted and Talented Education. Concepts, techniques and strategies for providing differentiated educational programs and experiences for the gifted and talented. State and Federal legislation; development of gifts and talents; program types; identification systems; program development; materials development; teaching techniques and methodologies.

5103*
Human Development in Psychology. Introduction to basic research and theories of cognitive, emotional and social development. Applications to educational and family settings.

5163*
Counseling Techniques for Teachers of Gifted and Talented Students. Techniques for dealing with the conflicts experienced by gifted and talented students. Strategies for consulting with teachers, peers, and parents regarding optimal development of gifts. Peer counseling techniques, dealing with self-concept, social and emotional concerns, problem solving and decision making, referral procedures and self analysis for teachers related to learning and teaching philosophy and style.

5210*
Practicum in School Psychometry. 2-6 credits, maximum 6. Prerequisites: admission to school psychometry program, successful completion of required course work and consent of instructor. Supervised experience in the practice of skills and procedures of school psychometry in a school setting.

5213*
Advanced Educational Psychology. Learning and its effect upon coping and adjustment. How learning, environmental and personality factors interact to change human behavior.

5320*
Seminar in Educational and School Psychology. 3-9 credits, maximum 9. In-depth exploration of contemporary topics in educational and school psychology.

5363*
Differentiated Curriculum Techniques and Materials for Gifted and Talented. Development of curriculum content for horizontal and vertical enrichment and acceleration. Commercial and teacher-prepared materials in imagination; imagery; analogy; metaphor; inductive, deductive and abductive thinking; science; philosophy; psychology; logic systems; problem solving; concept learning; creativity; creative dramatics, etc. Conceptual approaches to the use of the preceding in various interest-based and non-interest-based formats.

5463*
Psychology of Learning. Application to education of the principles and theories of the psychology of learning.

5510*
Practicum in School Psychology. 2-6 credits, maximum 6. Prerequisites: admission to school psychology program and consent of instructor. Supervised experience in the schools of psychological service delivery. Assessment, consultation, direct interventions and development of professional practice for school psychologists within school settings. Science-based child-success model. Two-three semester sequence.

5620*
Practicum with Exceptional Learners. 1-8 credits, maximum 8. Lab 1-8. Prerequisite: consent of instructor. Supervised individual and group experience with exceptional learners. The particular experience (learning disability, mental retardation, gifted, etc.) is determined by the student's field of specialization.

5663*
Creativity for Teachers. Theoretical origins of creativity and their concomitant applications in the learning environment. Blocks to creative thinking, imagination, imagery, creativity testing, developing ideas and innovations, creative problem solving and teaching techniques and methods to maximize creative potential in all kinds and types of students.

5713*
Transpersonal Human Development. Human development in terms of individual consciousness, focusing on the implications of such extraordinary states of consciousness as those associated with hallucinogenic drugs and mystical religious experience. Integration of psychological and religious interpretations of development. Applications to practical problems in education and psychology.

5720*
Educational and School Psychology Workshop. 1-9 credits, maximum 9. Workshop on various topics related to educational and school psychology.

5753*
Psychoeducational Assessment of Preschoolers. Relevant issues and challenges associated with the intellectual, social and behavioral assessment of preschool children, from the vantage point of recent research, discourse and policy initiatives. The link between assessment and intervention.

5763*
Teaching Methods and Techniques for the Gifted and Talented. Subject and skill-related learning facilitation that is process-oriented and doing-centered. The role of the teacher as facilitator, counselor and non-directive change agent. Individualized educational plans, involving independent study, tutoring, correspondence, clustering, mentors, learning centers, resource centers.

5783*
Psycho-educational Testing of Exceptional Individuals. Intensive practice in the selection, administration and interpretation of individual tests, appropriate for exceptional individuals.

5863*
Developing Programs for the Gifted and Talented. Programs based on various philosophies and structural concepts of gifted and talented education, e.g., mainstreaming, self-contained, pullouts, magnet schools, time blocking, acceleration and enrichment. Programs designed for general and specific academic ability; however, exposure will be provided to creative and productive thinking programs, leadership programs, and visual and performing arts programs. Specific models included.

5933*
Altered States of Consciousness in Human Development. Theory and research concerning the role of altered states of consciousness in human development. Practical techniques for facilitating healthy human development which might be of use to counselors, teachers, and other human services workers. Techniques include guided imagery, progressive relaxation and, especially, meditation.

5962*
Developing Support Resources for Gifted and Talented Programs. Development, management, and evaluation of volunteer programs in intra- and extra-class settings. Program types include parent-aid, volunteer-aid, mentors, tutors, group sponsors. Developing community interest, finding external resources, external funding and resource information sources.

5993*
Identification and Behavior Characteristics of the Gifted and Talented. Cognitive, affective, and behavioral characteristics of the gifted and talented. Selection of tests and interest inventories. Selection and/or developing of nomination/recommendation forms/models, inventories, checklists, rating scales, sociograms as well as data abstraction from cumulative and anecdotal records. Functions of gifted/talented identification committees.

6000*
Doctoral Dissertation. 1-25 credits, maximum 25. Prerequisite: consent of advisory committee chairperson. Report of research conducted by a student in the doctoral program in educational school psychology. Credit given and grade assigned upon completion and acceptance of the doctoral thesis.

6030*
Doctoral Seminar in School Psychology. 3-6 credits, maximum 6. Prerequisite: admission to school psychology doctoral program. Research in school psychology in areas such as philosophy of science, major areas of emphasis, research design, ethical concerns, solving problems in schools, and publication. Scientific and professional ethics and standards of psychologists.

6043*
Adult Development. Theory and research concerning human development during the adult years. Practical applications for serving adult populations in education and education-related settings.

6110*
Seminar in School Psychology. 1-3 credits, maximum 6. An assessment of psychological techniques applied to problems encountered in the internship.

6113*
Child Personality Assessment. Prerequisite: admission to school psychology or counseling psychology program, or consent of instructor. The personal and social assessment of children using objective and projective techniques.

6163*
Emotion and Cognition. The relationship between emotion and cognition as it relates to knowing and learning. History, wisdom and the interdependence of affect and cognition, the effects of mood on memory, emotion in feminist epistemology, the role of feeling in the writing process, intuition, and narrative thought. Exploration of potential research.

6210*
Internship in School Psychology. 3-6 credits, maximum 12. Prerequisites: admission to school psychology program; completion of all course work; completed readiness for internship form and approval of school psychology faculty. Supervised field experience of nondoctoral school psychologists by certified school psychologists for a maximum of 1200 hours over the course of an academic year, or half-time for two years.

6323*
Psychological Consultation. Prerequisite: graduate standing in the applied behavioral studies or psychology program. Models and strategies for the delivery of special services in the schools and other agencies that focus on serving the mental health needs of children, adolescents and adults. The use of consultation as a problem solving alternative to the assessment/label approach.

6460*
Internship in Educational Psychology. 1-9 credits, maximum 9. Prerequisite: consent of instructor. Supervision and guidance of teaching and service in educational psychology. May be repeated for credit when work assignment varies. Required of all teaching assistants in educational psychology during the first semester of each new teaching assignment. Includes cooperative planning and evaluation.

6533*
Human Motivation. A theoretically-oriented approach to the concept of motivation; essential precursors to human behavior and applications to the solution of real and hypothetical problems.

6613*
Instructional Systems Design. A practically-oriented coverage of analyzing, defining, sequencing and validating instructional systems. Developing educational objectives, course development, matching instruction to individual differences and evaluation of systems. Techniques of developing and validating instructional components.

6850*
Directed Readings in Educational and School Psychology. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Directed reading for students with advanced graduate standing in educational and school psychology.

6880*
Internship in Education. 1-8 credits, maximum 8. Lab 3-24. Prerequisites: admission to advanced graduate program and consent of department head. Directed off-campus experiences designed to relate ideas and concepts to problems encountered in the management of the school program.

Educational Technology (EDTC)

4113*
Multi-media Program Production. Prerequisite: 3122. Design and production of synchronized automatic sound slide programs coordinated with subject matter content. Includes photographic techniques, audio recording and sound-mixing methods, graphics, and synchronizing techniques. Individual projects required.

4703*
Computer Applications in the Middle School Science Curriculum. Principles and techniques related to using microcomputer technology in teaching middle school science: microcomputer interfacing, simulation, and interactive video-disk.

5000*
Master's Report or Thesis. Prerequisite: consent of instructor. Students studying for a master's degree enroll in this course for a total of 2 credit hours if they write a report or 6 hours if they write a thesis.

5103*
Advanced Computing Applications in Education. Lab 0-2. Includes educational applications involving authoring systems, data-base management, hardware interfacing, and non-instructional uses within the school environment. Impact of current issues on instructional computing.

5113*
Videotape Television for Instruction. Educational design and production of videotape using single camera, small studio production and other technology. Individual and team projects.

5153*
Computer-Based Instruction Development. Lab 0-2. Prerequisite: 4043 or equivalent. Examinations of curriculum strategies, related research issues, and techniques for developing computer-based instruction. Students will develop and evaluate computer-based instruction with case studies.

5720*
Education Workshop. 1-8 credits, maximum 8. For teachers, principals, superintendents and supervisors who have definite problems in instruction or administration. Students must register for the full number of credit hours for which the workshop is scheduled for a particular term.

5753*
Educational Technology Strategies. Lab 1. Principles of designing instructional units and courses incorporating integrated advanced technologies within the framework of the current educational environment. Contemporary education issues. Advanced educational technologies: importation, information assessment, accessibility, linkage to curricula, support, planning, and teacher empowerment. Assumes concept of teacher as designer/conductor vs. teacher as consumer.

5773*
Administration and Supervision of Audiovisual Materials. Building, planning, selecting and purchasing equipment and materials, surveying existing materials, and planning and financing adequate programs. For administrators or teachers who are responsible for audiovisual programs.

5850*
Directed Study. Prerequisite: consent of instructor. Directed study for master's level students.

6000*
Doctoral Dissertation. Required of all candidates to the Doctor of Education degree. Credit is given upon completion of the thesis.

6850*
Directed Reading. Prerequisite: consent of instructor. Directed reading for students with advanced graduate standing to enhance students' understanding in areas where they wish additional knowledge.

6880*
Internship in Education. Prerequisite: consent of instructor. Directed off campus experiences designed to relate ideas and concepts to problems encountered in the management of the school program.

6910*

Practicum. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Helps the student carry out an acceptable research problem (practicum) in a local school situation. Credit given upon completion of the written report.

Electrical and Computer Engineering (ECEN)

2011

Experimental Methods I. Lab 3. Prerequisites: PHYS 2114; corequisite: ENSC 2613. Basic electrical measurements and instrumentation techniques and devices. Use of voltmeters, ammeters, oscilloscopes, impedance bridges to study resistive, inductive, and capacitive circuit elements in steady state and transient operation. Reinforces ENSC 2613 and introduces design of instrumentation networks. Serves as introduction for nonmajors.

3021

Experimental Methods II. Lab 3. Prerequisites: 2011, ENSC 2613; corequisite: ECEN 3713. Second laboratory in electrical measurements and instrumentation techniques and devices. Frequency response using gain/phase meter and spectrum analyzer. Identification of unknown two-port networks, steady state operation of linear networks. Reinforces ECEN 3713 and continues with the design of networks.

3031

Experimental Methods III. Lab 3. Prerequisites: 3021, 3713; corequisite: 3313. Third laboratory in electrical measurements and instrumentation techniques and devices. Use of transistor curve tracers. Transistor operating points. Behavior of BJT amplifiers. MOSFET circuits and behavior. Operational amplifiers and feedback circuits. Reinforces ECEN 3313, continuing the design experience in the context of electronics.

3113

Energy Conversion. Lab 2. Prerequisites: 3021, 3613. Physical principles of electromagnetic and electromechanical energy conversion devices and their application to conventional transformers and rotating machines. Network and phasor models; steady-state performance.

3213

Microcomputer Principles and Applications. Lab 2. Prerequisite: junior standing or above. Introductory microcomputers. Digital logic elements and number systems, memory components and organization. Microprocessor and microcomputer system architecture, assembly language programming, software development, interfacing techniques.

3233

Digital Logic Design. Lab 2. Boolean algebra, optimization of logic networks. Design using SSI, and MSI, LSI components. ROM and PLA applications. Analysis and design of clock sequential logic networks. Flip-flops, counters, registers. Asynchronous circuit design and analysis. Laboratory experience in implementing combinational and sequential logic devices.

3313

Electronic Devices and Applications. Prerequisites: 2011, 3713. Semiconductor electronic components including MOSFETs, BJTs, JFETs, and OpAmps. Emphasis on device models and use of solid state electronic devices to analyze, synthesize and design amplifiers and switching circuits. SPICE simulations are extensively utilized. Basic building blocks for analog and digital applications.

3513

Signal Analysis. Prerequisites: 3413 and 3713. Deterministic signals. Fourier series and Fourier transforms. Impulse response, convolution and correlation. Sampling theorem. Analog modulation techniques.

3613

Electromagnetic Fields. Prerequisites: ENSC 2613, MATH 2233. Time-harmonic and transient response of transmission lines. Maxwell's equations and their applications to engineering problems in electrostatics, magnetostatics, time-harmonic fields and plane wave propagation.

3713

Network Analysis. Prerequisites: ENSC 2613, MATH 2233. Laplace transform, transfer functions, magnetically coupled circuits and two-port networks.

3723

Systems I. Prerequisites: ENSC 2122, 2613, MATH 2233. Physical and mathematical modeling of electrical and mechanical dynamic systems. Transient response of first- and second-order systems. Laplace transform techniques for solving differential equations, transfer functions, frequency response and resonance. Same course as MAE 3723.

3813

Engineering Optics. Prerequisites: PHYS 2114, MATH 2155, MATH 3013. Review of classical optics and optical systems. Ray matrices. Introduction to lasers and optical beams. Birefringence. Polarization-sensitive optical devices. Electro-optic and acousto-optic modulators. Resonators on an introductory level.

3913

Solid State Electronic Devices. Prerequisite: ENSC 3313, 3613, PHYS 3313. Solid state physics basis of modern electronic devices. Introductory quantum mechanics. Energy bands in solids. Electronic properties of semiconductors. Junction diodes. Bipolar transistors. Field effect transistor.

4010*

Technical Problems and Engineering Design. 1-12 credits, maximum 12. Prerequisite: consent of instructor. Individual independent study projects selected in consultation with the instructor; analysis or design problems, literature searches and computer simulations may be involved.

4013

Senior Design Laboratory I. Lab 2. Prerequisites: 3013, 3313, 3413, and 3213 or 3233. Complete design cycle for several small design projects, each including establishing objectives, synthesis, analysis, construction, testing and evaluation. Use of modern lab equipment and fabrication techniques. Development of communication skills.

4023

Senior Design Laboratory II. Lab 2. Prerequisite: 4013. Continuation of ECEN 4013. Student project teams design, build, test and present results for realistic projects from university and industrial sponsors. Formulation of specifications, consideration of alternative solutions, feasibility considerations, detailed system descriptions, economic factors, safety, reliability, aesthetics, ethics and social impact.

4133*

Power Electronics. Prerequisite: 3113. Power electronic devices, components, and their characteristics; DC to AC conversion; fundamentals of inverters and waveshaping devices; application aspects; control aspects; characteristics and state-of-the-art of advanced power inverter and power conditioning topologies.

4153*

Power System Analysis and Design. Prerequisite: 3113. Power system component models from circuit theory. Formulation and design of the load flow model and the optimum economic generator allocation problem utilizing computer methods.

4213*

Computer-based System Design. Lab 2. Prerequisites: 3213 and CS 2113. Design of microprocessor-based systems through proper integration of hardware and software. Serial and parallel communications, sensor interfacing, computer control of external devices, and color graphics hardware. Design of PASCAL and assembly language modules for optimum real-time system performance.

4243*

Computer Architecture. Prerequisites: 3213 and 3233. Functional organization and hardware design of digital computer systems with emphasis on microprocessor-based systems. CPU organization, features of microprocessors including advanced 32-bit CPU's, memory system design including cache, virtual memory, error detection and correction, I/O operations including direct memory access and peripheral interface design.

4263*

Computer Engineering Projects. Lab 2. Prerequisites: 3233, 4013 and 4213. Team projects involving design, construction, and testing of hardware interfaced with mini- and micro-computers in instructional laboratory. Emphasis on software and hardware documentation. IEEE-488 bus; interface chips; comparison of mini-computer operating systems; IEEE-488 bus; bus analyzer; LSI interface chips; mini- and micro-computers as laboratory tools and system components.

4273*

Software Engineering. Lab 2. Prerequisites: CS 2133, 3443 or ECEN 3213. Fundamental characteristics of the software life cycle. Tools, techniques, and management controls for development and maintenance of large software systems. Software metrics and models. Human factors and experimental design. Same course as CS 4273.

4283*

Computer Networks. Prerequisites: 3213 or CS 3443; UNIX knowledge. Computer networks, distributed systems and their systematic design. Introduction to the use, structure, and architecture of computer networks. Networking experiments to describe network topology. ISO reference model. Same course as CS 4283.

4303*

Digital Electronics Circuit Design. Lab 2. Prerequisite: 3233, 3313. Theory of digital and electronics circuits. Digital logic families TTL, IIL, ECL, NMOS, CMOS, GaAs. Large signal models for transistors. Implementation at RAM and ROM. Circuit design for LSI and VLSI.

4313*

Linear Electronics Circuit Design. Prerequisite: 3313. Class A and B small-signal, push-pull power, complementary symmetry, differential and operational amplifiers, utilizing field-effect transistors, bipolar transistors, tunnel diodes and integrated circuits. Emphasis on amplification in electronic devices, design and analysis of wide-band amplifier circuitry.

4353*

Communication Electronics. Prerequisite: 3313. Design of tuned voltage and power amplifiers, oscillators and mixers, modulation and detection, and parametric amplifiers.

- 4413***
Automatic Control Systems. Prerequisite: 3723 or MAE 3723. Properties of feedback control systems, mathematical models of basic components, state-variable models of feedback systems, time-domain analysis, stability, transform analysis, frequency domain techniques, root-locus design of single input single output systems and simple compensation techniques. Same course as MAE 4053.
- 4503***
Random Signals and Noise. Prerequisites: 3413, 3513 and 3713. Analysis of electrical systems using elementary concepts of probability, random variables and random processes. Frequency and time domain response of linear systems driven by random inputs. Statistical properties of electrical noise. Analysis and design of optimum linear systems.
- 4523***
Communication Theory. Prerequisite: 3513. Noise in modulation systems. Digital data transmission. Design of optimal receivers. Introduction to information theory.
- 4533***
Data Communications. Prerequisite: 4503. Signal detection in noise. Tradeoffs between bandwidth signal-to-noise ratio and rate of information transfer. Transmission multiplexing and error handling. Elements of computer network design. Data link protocols.
- 4613***
Microwave Engineering. Prerequisite: 3613. Aspects of propagation, transmission, and radiation of microwave energy. Plane wave propagation; lossless and lossy media, reflection, refraction, and polarization. Transmission line theory; lumped element model, characteristic impedance, impedance matching, and transient response. Theory of waveguides and cavity resonators. Microwave network theory and S-parameters. Introduction to radiating systems.
- 4703***
Active Filter Design. Lab 2. Prerequisites: 3413 and 3713. Introduction to passive filters; operational amplifiers as network elements; filter specifications; design of active filters. Laboratory design projects and computer simulations.
- 4763***
Discrete-time Signals and Systems. Prerequisites: 3413, 3513, and 3713. Introduction to discrete linear systems using difference equations and z-transforms. Discrete Fourier analysis. Design of digital filters. Sampling theorem.
- 4773***
Real Time Digital Signal Processing. Prerequisite: 4763 or equivalent. DSP Processor architectures and programming. A/D, D/A, polled and interrupt-driven I/O. Realtime implementation of FIR/IIR filters, the FFT, and other DSP algorithms on special purpose DSP hardware from Motorola, Texas Instruments and others. Link between DSP theory and practical implementation.
- 4813***
Optical Electronics. Prerequisites: 3313, 3613. Extension of electronics principles into the optical domain. Ray matrices of passive devices. Properties and propagation of Gaussian beams. Design of optical resonators and oscillators. Lasers. Propagation through fiber optics. Detection problems. Integrated optical circuits.
- 5000***
Thesis or Report. 1-6 credits, maximum 6. Prerequisite: approval of major professor. A student studying for the master's degree will enroll in this course for a maximum of six credit hours.
- 5030***
Professional Practice. 1-8 credits, maximum 8. Experience in application of electrical engineering principles to typical problems encountered in industry and government engineering design and development projects. Solutions to the problems require participation by the student in the role of junior engineer or engineer-intern. Problem solutions involve economics and ecological considerations as well as technology, and must be adequately documented.
- 5050***
Seminar. 1-12 credits, maximum 12. Prerequisite: consent of adviser. Students investigate certain engineering problems not normally covered in existing courses.
- 5113***
Power System Analysis by Computer Methods. Quasi-static control of power systems and analysis of power systems under abnormal operating conditions. Transient stability studies. Models formulated and solutions outlined for implementation on the computer.
- 5123***
Engineering Systems Reliability Evaluation. Techniques and concepts needed for evaluating the long-term and short-term reliability of a system. Topics include static and spinning generation capacity; transmission, composite, interconnected, and dc system reliability evaluations; and power system security. Applications to systems other than power systems included. For students with little or no background in probability or statistics.
- 5153***
Direct Energy Conversion. Energy conversion techniques and applications; thermo-electrics, thermionics, fuel cells, MHD and other processes involving electrical, mechanical and thermal energies. State-of-the-art developments in direct energy conversion using selected papers from journals and other publications. Gives the student a proper perspective of the possibilities and problems associated with satisfying future energy requirements.
- 5193***
Power Economics and Regulation. Prerequisites: vector calculus, familiarity with complex numbers. Natural monopoly, regulated monopolies. Power pricing. Deregulation and the Energy Policy Act of 1992. Bulk power markets, transmission access and wheeling. Economic dispatch and system operations. Security and reliability. Environmental externalities and Clean Air Act compliance. Procurement of new capacity and integrated resource planning. Cogenerators and independent power producers.
- 5203***
Parallel Processing. Prerequisite: graduate standing. Computational methods for solving problems with parallel processing. Parallel architectures and interconnect structures. Programming techniques, including problem decomposition, vector and matrix algorithms, Monte Carlo methods, sorting, and simulation. Performance measures and performance evaluation. Applications to signal processing, image processing and machine vision. Opportunity to explore concepts on a modern hypercubetopology computer system.
- 5223***
Digital Systems Testing. Prerequisite: 3233. Testing of combinational and sequential circuits. Test generation techniques. Design of reliable and testable circuits and systems. Testing for LSI and VLSI.
- 5253***
Digital Computer Design. Prerequisite: 3233. Analysis and design of digital computers. Arithmetic algorithms and the design of the arithmetic/logic unit (ALU). Serial and parallel data processing; control and timing systems; microprogramming; memory organization alternatives; input/output interfaces. Same course as COMSC 5253.
- 5263***
VLSI Digital Systems Design. Prerequisite: 4303; recommended: 5253. Design of very large-scale digital systems on a single chip. Review of MOS technology. Design rules imposed by fabrication techniques. Systematic structures for control and data flow; system timing; highly concurrent systems. Experimental opportunities available.
- 5273***
Advanced Software Engineering. Lab 2. Prerequisite: 4273. Continuation of 4273. Advanced theory and practice of software design methodology. Large scale design and implementation problems. Experimental design for software engineering. Same course as COMSC 5273.
- 5283***
Computer Vision. The development of machine vision and advanced image understanding techniques for robotics, automated inspection, biomedicine. Object recognition, motion analysis, object tracking, segmentation, representation, and 3-D analysis.
- 5293***
Artificial Intelligence and Expert Systems. Prerequisite: graduate standing in electrical engineering. Fundamental concepts: search-oriented problem solving, knowledge representation, logical inference, building. An expert system, artificial intelligence languages, specialized machine architectures. Applications to planning, natural language processing, and robotics. Development of an expert system or research report required. Common lectures with COMSC 5793, INDEN 5933 and MAE 5793.
- 5313***
Solid-state Electronics I. An advanced study of electronic networks. Application of solid-state devices to the medium- and low-frequency regions. Integrated networks as replacements for discrete-component networks. Discrete and integrated operational amplifiers. Broad-band and tuned amplifiers.
- 5353***
Advanced Power Electronics. Prerequisite: 4133. Characteristics of high power semiconductor devices and the application of such devices to power conditioning, inversion, and wave shaping at high power levels.
- 5363***
CMOS Analog Integrated Circuit Design. Prerequisite: 4313. Advanced study of solid state CMOS linear integrated circuits. Topics include: Op Amps, comparators, multipliers, D/A and A/D converters and Op Amp building blocks. Op Amp building blocks include, differential pairs, current mirrors, gain, output stages, and references. VLSI layout and circuit simulation using SPICE.
- 5413***
Optimal Control. Prerequisite: 5713 or MAE 5713. Optimal control theory for modern systems design. Specification of optimum performance indices. Dynamic programming, calculus of variations and Pontryagin's minimum principle. Iterative numerical techniques for trajectory optimization. Same course as MAE 5413.

5433*
Robotics Kinematics, Dynamics and Control. Prerequisite: 4413 or MAE 4053 or consent of instructor. Kinematic and dynamic analysis of robot manipulators. Inverse kinematics, motion planning and trajectory generation. Industrial practice in robot servo control. Dynamics and control in the presence of constraints. Actuators and sensors. Force sensors and vision systems. Robotic force control and its applications in industry. Passivity based control algorithms. Advanced control techniques for motion and force control. Same course as MAE 5433.

5463*
Nonlinear System Analysis and Control. Prerequisite: 4413 or MAE 4053. Failure of superposition of effects; phase-plane analysis; limit-cycles; Lyapunov stability; hyperstability and input-output stability; controllability and observability of nonlinear systems; feedback linearization; robust nonlinear control system design. Same course as MAE 5463.

5473*
Digital Control Systems. Prerequisite: 4413 or MAE 4053. Input-output and state-space representation of linear discrete-time systems. Approximate methods in discrete-time representation. Stability methods. Controllability, observability, state estimation, and parameter identification. Design and analysis of feedback control system using frequency-domain and state-space methods. Introduction to optimal control. Same course as MAE 5473.

5483*
Digital Data Acquisition and Control. Prerequisite: undergraduate course in programming. Use of microcomputers operating in real-time applied to engineering systems for data acquisition and control, use of analog to digital, digital to analog, and digital input/output, synchronous and asynchronous programming. Competence in the engineering use of microcomputers through lectures and laboratory applications. Same course as MAE 5483.

5493*
Software Design for Real-time Distributed Systems. Prerequisite: 5483 or MAE 5483 or consent of the instructor. Fundamental concepts associated with the design of software for implementation on distributed computer systems using real-time operating systems. Parallel computing in a real-time environment and control algorithm design. State-of-the-art boards including analog-to-digital and digital-to-analog equipment and newest computer-aided software engineering tools. Same course as MAE 5493.

5513*
Stochastic Systems. Prerequisites: 3513 and 4503 or STAT 4033. Theory and applications involving probability, random variables, functions of random variables, and stochastic processes, including Gaussian and Markov processes. Correlation, power spectral density, and nonstationary random processes. Response of linear systems to stochastic processes. State-space formulation and covariance analysis. Same course as MAE 5513.

5523*
Estimation Theory. Prerequisite: 5513 or MAE 5513. Optimal estimation theory including linear and nonlinear estimation of discrete and continuous random functions. Wiener and Kalman filter theory included. Same course as MAE 5523.

5533*
Modern Communication Theory. Prerequisite: 5513. Noise as a random process, analog and digital signal detection in the presence of noise, optimum receiver design using signal space concepts and introduction to information theory. Trade-offs between bandwidth, signal-to-noise ratio and the rate of information transfer. Example system designs include earth satellite, deep space and terrestrial communication systems and computer communication networks.

5543*
Data Transportation and Protection. Data and its representation; finite field matrices, pseudorandom sequences; information protection; space division networks; synchronization; and channel and error control.

5553*
Telecommunications Systems. Prerequisite: graduate standing. Ways and means voice, data and video traffic is moved long distances. Data networks (Ethernet and Token Ring Local Area Networks; FDDI and SMDS Metropolitan Area Networks; Internet, Frame Relay, and ATM Wide Area Networks); the telephone system (POTS, network synchronization and switching, ISDN, SONET, cellular telephone); and video (NTSC, switching and timing, compressed video standards such as MPEG and Px64, HDTV).

5613*
Electromagnetic Theory. Prerequisite: 3613. First graduate level treatment of classical electromagnetic theory. Wave equation, potential theory, boundary conditions. Rectangular, cylindrical and spherical wave functions. Conducting and dielectric guiding structures. Scattering and radiation. Introduction to numerical techniques.

5623*
Antenna Theory. Prerequisite: 3613. Fundamental antenna parameters, including directivity, efficiency, radiation resistance, and pattern. Analysis of dipole, loop, aperture, broadband, and traveling wave antennas. Array theory. Introduction to numerical techniques used in modern antenna design.

5633*
Radar Theory. Prerequisites: 3613; 4503 or 5513. Theoretical treatment of radar principles. Overview of radar systems and techniques, radar equation, integration of signals. Radar cross-section of single and multiple targets. Waveform design, resolution, ambiguities and accuracy. Range, speed and angular measurements. Detection of targets in noise. Statistical description of clutter. Signal processing techniques.

5643*
Wireless Communications. Prerequisites: 3613, 4503. Aspects of radiowave propagation for fixed and mobile communication systems. Review of Maxwell's equations and plane wave propagation, antenna principles. Reflection, refraction, diffraction, fading and scintillation, attenuation, ducting, diversity. Propagation in a cellular environment. Satellite communications.

5653*
Foundations of Electrodynamics I. Prerequisite: 3613. Rigorous derivation of Maxwell's equations utilizing Coulomb's law and postulates of special relativity; the invariance of Maxwell's equations under Lorentz transformations, the four-vector form of Maxwell's equations, scalar and vector potential functions, solutions of the Laplace and Poisson equations, solutions of the homogeneous and inhomogeneous wave equations with applications to guided waves, radiation and scattering.

5703*
Optimization Applications. Prerequisite: graduate standing. A survey of various methods of unconstrained and constrained linear and nonlinear optimization. Applications of these methodologies using hand-worked examples and available software packages. This applications oriented course is intended for engineering and science students. Same course as CHE 5703, IEM 5023 and MAE 5703.

5713*
Linear Systems. Prerequisite: graduate standing or consent of instructor. Introduction to the fundamental theory of finite-dimensional linear systems with emphasis on the state-space representation. Mathematical representations of systems; linear dynamic solutions; controllability, observability, and stability; linearization and realization theory; and state feedback and state observer. Same course as MAE 5713.

5733*
Neural Networks. Prerequisite: graduate standing. Introduction to mathematical analysis of networks and learning rules, and on the application of neural networks to certain engineering problems in image and signal processing and control systems. Same course as CHE 5733 and MAE 5733.

5753*
Digital Processing of Speech Signals. Prerequisite: 4763 or 5763. Digital signal processing; speech production; digital modeling of speech; short time analysis and synthesis; the short time Fourier transform, linear predictive coding and solution of the normal equations; vocal tract spectrum calculation; speech coding; homomorphic processing; applications of speech processing. Introduction to more advanced topics as time permits.

5763*
Digital Signal Processing. Introduction to discrete linear systems; frequency-domain design of digital filters; quantization effects in digital filters; digital filter hardware, discrete Fourier transforms; high-speed convolution and correlation with application to digital filtering; introduction to Walsh-Fourier theory.

5773*
Intelligent Systems. Prerequisite: 5733 or MAE 5773. Introduction to the state-of-the-art intelligent control and system successfully deployed to industrial and defense applications. Emerging intelligent algorithms (e.g., NN, FS, GA, EP, DES); intelligent control architecture (e.g., bottom-up, top-down, semiotics); reinforcement learning and hybrid systems; and case studies and design projects. Same course as MAE 5773.

5793*
Digital Image Processing. Prerequisite: 4763 or 5763. Digital image processing including image acquisition and characterization, transforms, coding and compression, enhancement, restoration and segmentation. Use of modern image processing software on Sun and IBM work stations.

5813*
Optical Engineering. Physical and physiological concepts of light and vision. Review of reflection, refraction, diffraction. Analysis of basic optical devices: dielectric interfaces, mirrors, optical cavities. Laser as an electronic oscillator. Review of gaussian beam propagation in optical circuits.

5833*
Fiber-Optic Communication Systems. Prerequisite: graduate standing or consent of instructor. Five generations of fiber-optic communication systems described in detail. Technical advances and increased capability of each system. Historical framework of how technical capability at the time forced technical decisions. A systems engineering point of view, emphasizing optimization of all components of the optical fiber link.

5853*
Ultrafast Optoelectronics. Prerequisite: graduate standing or consent of instructor. Combining ultrafast laser pulses with electronic circuitry. Increased device performance. Optoelectronic/electrical pulses as short as 0.2 psec. High performance areas illustrating the power of advanced techniques in applications.

6000*
Research. 1-30 credits, maximum 30. Prerequisite: consent of major professor. Independent research for students continuing graduate study beyond the level of the M.S. degree.

6050*
Special Topics. 1-9 credits, maximum 9. Prerequisite: consent of instructor. Subjects to be selected by the graduate faculty in electrical engineering to cover state-of-the-art advances.

6123*
Special Topics in Power Systems. Prerequisite: 5113. Selected relevant current topics related to power system operation and planning.

6253*
Advanced Topics in Computer Architecture. Prerequisite: 5253 or CS 5253. Innovations in the architecture and organization of computers, with an emphasis on parallelism. Topics may include pipelining, multiprocessors, data flow, and reduction machines. Same course as CS 6253.

6263*
Advanced VLSI Design and Applications. Prerequisites: 5223 and 5263. System timing. Designing testable integrated circuits. Specialized parallel processing architectures. Application examples.

6363*
Analog VLSI for Signal Processing. Lab 2. Prerequisite: 4273. Continuation of 5363. Advanced theory and practice of analog VLSI design methodology. Very large scale design and implementation of signal processing solutions, including oversampled A/Ds, neural networks and filters.

6423*
System Identification. Prerequisite: 5473 or 5713 or MAE 5473 or MAE 5713. Linear and nonlinear system modeling of random systems. Models of linear time-invariant systems, non-parametric methods and preliminary model development, parameter estimation methods, convergence and consistency, asymptotic distributions of parameter estimates. Nonlinear modeling. Same course as MAE 6423.

6453*
Adaptive Control. Prerequisite: 5473 or 5713 or MAE 5473 or MAE 5713. Analysis and design of control techniques that modify their performance to adapt to changes in system operation. Review of systems analysis techniques, including state variable representations, linearization, discretization, covariance analysis, stability, and linear quadratic Gaussian design. On-line parameter estimation, model reference adaptive systems, self-tuning regulators, stable adaptive systems. Same course as MAE 6453.

6463*
Advances in Nonlinear Control. Prerequisite: 5463 or MAE 5463. Introduction to vector fields and Lie algebra; controllability and observability of nonlinear systems; local decompositions; input-output and state-space representation of nonlinear systems; feedback linearization; controlled invariance and distribution; control of Hamiltonian systems. Same course as MAE 6463.

6483*
Robust Multivariable Control Systems. Prerequisite: 5713 or MAE 5713. Introduction to multivariable systems: SISO robustness vs. MIMO robustness; multivariable system poles and zeros; MIMO transfer functions; multivariable frequency response analysis; multivariable Nyquist theorem; performance specifications; stability of feedback systems; linear fractional transformations (LFT's); parameterization of all stabilizing controllers; structured singular value; algebraic ricatti equations; H2 optimal control; H-infinity controller design. Same course as MAE 6483.

6523*
Information Theory. Prerequisite: 5513 or consent of instructor. Mathematical theory of information (Shannon theory) including information measure and transmission rates and capacities. Source coding theory including algebraic and error-correcting codes. Design of waveforms for noise immunity. Information transfer in learning systems.

6823*
Advanced Optical Techniques. Prerequisite: 5813 or 5853. State-of-the-art optical devices and research methodologies. Investigation and discussion of contemporary developments in non-linear optical devices and laser applications. Includes both analytical and experimental techniques.

Electrical Engineering Technology (EET)

1003
Introduction to Microcomputer Programming. Lab 2. Co-requisite: MATH 1513. Programming a microcomputer in BASIC. Algorithms to solve defined problems. Numerical limitations of small machines.

1104
Fundamentals of Electricity. Lab 3. Prerequisite: MATH 1513. Elementary principles of electricity covering basic electric units. Ohm's law, Kirchoff's law, circuit solutions, network solutions, magnetism, inductance and capacitance.

1244
Circuit Analysis I. Lab 4. Prerequisites: 1104, co-requisite MATH 1613. Analysis of AC electric circuits. The use of network theorems and phasors, coupled circuits, resonance, filters, and power.

2213
Essentials of Electricity. Lab 2. Prerequisites: MATH 1513, 1613. Electric circuits and machines, including Ohm's law, magnetism, direct-current motors, generators and controls, alternating current, single-phase circuits, polyphase circuits and alternating current machinery. For non-electronics majors only.

2303
Technical Programming. Lab 3. Prerequisites: 1104, MATH 1513 or completion of comparable engineering science courses. Introduction to machine programming using industrial standard languages, emphasis on problems from science and technology.

2544
Pulse and Digital Techniques. Lab 3. Prerequisites: 1244 and 1225. Electronic circuits used in digital control and computation. Pulse generation, Boolean algebra and logic circuits.

2635
Solid State Devices and Circuits. Lab 1. Prerequisites: 1244, MATH 1613. Diodes, transistors, LSI linear devices; their operation and applications in electronic circuits.

3104
Elements of Electricity and Electronics. Lab 1. Prerequisite: MATH 1513. Essentials of electricity, controls, and electronics for non-majors. No credit for ECT majors.

3113
Circuit Analysis II. Prerequisite: 3123; co-requisite: GENT 3123. Application of elementary switching functions and Laplace transforms to electronic circuit analysis. Circuit analysis in the S-plane, transfer functions. Application of circuit analysis software.

3124
Elements of Design, Analysis and Fabrication by Machine Methods. Lab 1. Prerequisites: 1244, 2544, 2635. Methods of designing, analyzing and fabricating electronic circuits using standard software packages.

3234
Nondestructive Testing. Lab 2. Commonly used nondestructive testing in industry; radiography. Magneflux, liquid penetrant, ultrasonic and eddy current testing.

3254
Intel 32-bit Processors. Lab 1. Prerequisites: 2544, CS 2113. Intel Pentium family of processors. Study of the assembly language instruction set, writing and executing programs. Machine language programming and hardware. Interface techniques.

3264
Motorola 32-bit Processors. Lab 1. Prerequisites: 2544, CS 2113. Motorola 68xxx family of processors. Study of the assembly language instruction set, writing and executing programs. Machine language programming and hardware. Interface techniques.

3354
Advanced Circuits I. Lab 1. Prerequisites: 2634, 3113, MATH 2133. Fundamentals of mixers, oscillators, detection, modulation, amplifier strips, feedback, coupled circuits and impedance matching.

3363
Data Acquisition. Lab 3. Prerequisites: 2544, 2634. Methods used to convert physical variables to digital signals and vice versa. Signal conditioning, digital-to-analog converters, analog-to-digital converters, sample-and-hold circuits, sensors, and transducers. The use of computers in data acquisition and signal processing.

4050
Advanced Electronic Problems. 1-4 credits, maximum 4. Prerequisites: junior standing and consent of head of department. Special problems in the electronic area.

4153
Data Communications. Lab 3. Prerequisites: 3263, 3363, 3354 and 3733. Data communications including point-to-point, LANs, WANs, and switched networks. Topologies, protocols, routing, error detection and correction, text compression, modulation techniques, OSI, TCP/IP, Internet, and ISDN. Laboratory focus on design, assembly, test, demonstration, oral and written presentation of the design project. Capstone course for the computer option.

4314

Elements of Control. Lab 3. Prerequisites: 3113, 3123, 3363, GENT 3123. Principles of analog and digital control, with emphasis on the analysis of feedback control systems in their various conceptual configurations. Application of feedback control theory to the analysis and design of present day circuits and systems. Use of circuit analysis software.

4353

Advanced Circuits II. Lab 3. Prerequisites: 3123, 3354, 3363, 4314. Theory and application of specific special circuits. Laboratory focus on design, assembly, test, demonstration, and oral presentation of the design project. Capstone course for the electronics option sequence.

4654

Microwave Techniques. Lab 3. Prerequisites: 3113, 3354, GENT 3123. Communication principles and measurement techniques in the UHF and microwave spectrum, coaxial and waveguide transmission lines, antenna systems and signal transmission, modulation and detectors, oscillators and amplifiers, introduction to signal transmission and modulation methods.

4832

Senior Project. Lab 3. Prerequisite: 20 credit hours of upper-division electronics courses or consent of instructor. For the student's last semester. A synthesis of all pertinent skills and knowledge developed in the curriculum. Students work as product design group developing a useful or marketable electronics product or device through design, assembly, test, and demonstration phases. Graded written and oral presentations.

Engineering (ENGR)

1111

Introduction to Engineering. Lab 1. Study skills, orientation and enrollment in engineering. Computer-based productivity tools. Engineering ethics and careers.

1311

Introductory Engineering Graphics. Principles, techniques and skills of graphics as used in engineering.

1322

Engineering Design with CAD. Lab 2. Introduction to engineering design using modern design methodologies and state-of-the-art computer-aided design tools. Hands-on design, construction and testing through participation in a design project contest.

1412

Introductory Engineering Computer Programming. Programming to solve problems typical of practice in engineering. Techniques and methods.

2030

Co-op Industrial Practice I. 1-6 credits, maximum 12. Prerequisites: sophomore standing and permission of Co-op coordinator. Pre-engineering industrial practice. Written reports as specified by advisor. Application of credit to meet degree requirements varies with level and department.

2100

Orientation Projects. Lab 2-6. 1-3 credits, maximum 3. Prerequisite: pre-engineering standing. Enrollment in independent study or small groups. Projects to assist students with special needs to adjust to engineering curriculum.

3030

Co-op Industrial Practice II. 1-6 credits, maximum 12. Prerequisites: junior standing and permission of Co-op coordinator. Pre-engineering industrial practice. Written reports as specified by advisor. Application of credit to meet degree requirements varies with level and department.

3090

Study Abroad. 12-18 credits, maximum 36. Prerequisites: OSU GPA of 3.00 or higher and consent of the Office of International Programs and the associate dean of the College. Participation in a formal study abroad program spending a semester or year in full-time enrollment at a university outside the U.S.

3111

Introduction to Engineering for Transfer Students. Prerequisite: transfer status with 28 or more credit hours. Adjustments from previous college situation needed to select a proper course of studies based on abilities, aptitudes and interests.

3333

Acoustics of Music and Speech. Prerequisite: 45 credit hours completed. Algebra base treatment of the physical principles of sound in music and speech, and the sense of hearing. Sound production by musical instruments, acoustic response of auditoriums, and principles of sound reinforcement.

4030

Co-op Industrial Practice III. 1-6 credits, maximum 12. Prerequisites: senior standing and permission of Co-op coordinator. Pre-engineering industrial practice. Written reports as specified by advisor. Application of credit to meet degree requirements varies with level and department.

4060*

Topics in Technology and Society. 1-3 credits, maximum 6. Problems of society relating to technology and added problems stemming from their solution. Minimal reliance on mathematics; for engineering and nonengineering students.

Engineering Science (ENSC)

2112

Statics. Lab 2. Prerequisites: PHYS 2014 and MATH 2145. Resultants of force systems, static equilibrium of rigid bodies and statics of structures. Shear and moment diagrams.

2113

Statics. Prerequisites: MATH 2145, PHYS 2014. Resultants of force systems, static equilibrium of rigid bodies, statics of structures, and fluid statics. Shear and moment diagrams.

2122

Elementary Dynamics. Prerequisite: 2112. Kinematics and kinetics of particles, systems of particles, and rigid bodies from a Newtonian viewpoint utilizing vector algebra and calculus. Work energy and impulse momentum principles.

2123

Elementary Dynamics. Prerequisite: 2113. Kinematics and kinetics of particles, systems of particles, and rigid bodies from a Newtonian viewpoint using vector algebra and calculus. Work-energy and impulse-momentum principles. Planar and three-dimensional kinetics and kinematics of rigid bodies.

2142

Strength of Materials. Prerequisite: 2112. Bending moments, deformation and displacements in elastic and plastic deformable bodies.

2143

Strength of Materials. Prerequisite: 2113. Bending moments, deformation and displacement in elastic and plastic deformable bodies. Axial, torsional and shear loads. Buckling stress transformations and combined loads.

2213

Thermodynamics. Prerequisites: CHEM 1515, PHYS 2014, MATH 2145. Properties of substances and principles governing changes in form of energy. First and second laws.

2613

Introduction to Electrical Science. Prerequisites: PHYS 2114 and MATH 2155. Elements of electrical engineering; AC and DC circuits, mesh and node formulation of network equations, steady-state response to sinusoids, energy, power and power factor.

3233

Fluid Mechanics. Prerequisites: MATH 2155 or concurrent enrollment and CHEM 1515, PHYS 2014. The study of fluid properties, statics, conservation equations, dimensional analysis and similitude, viscous flow in ducts, inviscid flow, boundary layer theory, open channel flow, turbomachinery and fluid measurement techniques.

3313

Materials Science. Prerequisite: CHEM 1314 or CHEM 1515. Introductory level. Relationship between structure and properties of materials and engineering applications. Atomic, microscopic and macroscopic properties.

Engineering and Technology Management (ETM)

5111*

Introduction to Strategy, Technology, and Integration. Prerequisite: admission to the M.S. in ETM program or consent of instructor. The first credit hour of a three-credit hour creative component requirement. The "big picture" of engineering and technology management, emphasizing the importance of strategy, technology, and integration, where timing of products and services are keys to market success.

5121*

Capstone to Strategy, Technology and Integration I. Prerequisite: admission to the M.S. in ETM program or consent of instructor. The first part of the capstone and the second credit hour of the creative component requirement. Proposal for a project to be completed for the ETM 5131 course. Substantive use of ETM course material, and a notable and relevant contribution to the student's organization. Participation in formal critique and discussion of other proposals.

5131*

Capstone to Strategy, Technology and Integration II. Prerequisite: admission to the M.S. in ETM program or consent of instructor. The second part of the capstone and the third and final credit hour of the creative component requirement. Presentation of student's project. Substantive use of ETM course material, and a notable and relevant contribution to the student's organization. Participation in formal critique and discussion of other projects.

5211*

Enterprise Integration. Prerequisite: admission to the M.S. in ETM program or consent of instructor. Conceptualizing, designing and operating advanced manufacturing systems within an integrated enterprise-wide framework. Recent developments in computer and communication technologies and conceptual breakthroughs regarding the nature and behavior of integrated enterprises.

5221*
Application and Execution of Engineering Teaching. Prerequisite: admission to the M.S. in ETM program or consent of instructor. Management and group issues inherent in the application and implementation of high performing work teams. The team's roles in improving organizational performance, along with the best practice procedures and techniques that increase team effectiveness.

5231*
Benchmarking. Prerequisite: admission to the M.S. in ETM program or consent of instructor. Benchmarking as an effective approach to study and adopt or adapt methodologies representing best specific practices from any industry; or identify and assess performance based on equivalent and common measures, usually from those in the same or similar industries, including competitors.

5241*
Strategic Project Management. Prerequisite: admission to the M.S. in ETM program or consent of instructor. Overview of traditional project management concepts and techniques (i.e., Gantt charts, PERT, CPT) along with several technical issues related to their effective use. Fundamental nature of the problems associated with several technical issues related to their effective use. Fundamental nature of the problems associated with effectively managing and coordination of multiple discrete projects within an overall systems integration initiative. A framework for addressing these problems.

5251*
Problem Solving and Decision Making. Prerequisite: admission to the M.S. in ETM program or consent of instructor. Patterns utilized by successful managers for decision making. Organizational skills, investigation through questioning and logic, decision making among alternatives, and ensuring the success of decision. Analyzing problems and decisions, appraising situations, managing problems of human performance, and implementing processes.

Engineering Technology

(See specific technology programs listed alphabetically)

English (ENGL)

0003
Composition for International Graduate Students. Lab 2. Review of complex sentence structure and organizational patterns, with an emphasis on documented research paper writing and oral presentation. Graded on a satisfactory-unsatisfactory basis.

0123
Basic Composition. Intensive instruction in grammar and error avoidance (especially the differences between spoken and written English), paragraph structure, and essay writing. May be used for skills remediation or to satisfy high school curricular deficiency in English. Graded on a satisfactory-unsatisfactory basis.

1010
Studies in English Composition. 1-2 credits, maximum 2. Special study in composition to allow transfer students to fulfill general education requirements as established by Regent's policy.

1113
Freshman Composition I. The fundamentals of expository writing with emphasis on structure, development and style.

1123
International Freshman Composition I. Lab 2. Restricted to students whose native language is not English. Expository writing with emphasis on structure and development. Special attention to problems of English as a second language. This course may be substituted for 1113.

1213
Freshman Composition II. Prerequisite: 1013 or 1113. Expository composition with emphasis on technique and style through intensive and extensive readings.

1223
International Freshman Composition II. Prerequisite: 1113 or 1213. Restricted to students whose native language is not English. Expository composition with emphasis on technique and style in writing research papers. May be substituted for 1213.

1313
Critical Analysis and Writing I. Prerequisites: English ACT score of 30 and 3.50 overall high school or transfer GPA. Review of fundamentals as necessary. Individualized instruction in writing on topics based on discussion of student's interests. Class size limited. This course may be substituted for 1113.

1413
Critical Analysis and Writing II. Prerequisites: "A" or "B" in 1113 or 1313, English ACT score of 30 and consent of course director. Individually directed writing growing from discussions of books and ideas. Class size limited. This course may be substituted for 1213.

1923
(H)Masterpieces of Literature. Readings in the great works of the most important writers of Britain and America, such as Shakespeare, Dickens, Twain, Faulkner, and others.

2333
Introduction to Technical Writing. Prerequisite: 1113. Does not meet any part of the six-hour composition requirement for the bachelor's degree. Technical literature and publications in the student's area of specialization. Emphasis on clarity, simplicity and careful organization.

2413
(H)Introduction to Literature. Fiction, drama/film and poetry. Written critical exercises and discussion.

2443
Languages of the World. A comprehensive survey of world languages. The essential structural and historical organization of languages. The process of languages as a basic human function. Same course as FLL 2443.

2453
(H)Introduction to Film. Lab 2. How motion pictures shape identity. How the elements of film-editing, cinematography, and sound may be "read."

2513
(H)Introduction to Creative Writing. Literary composition with emphasis on techniques and style through readings and writings in fiction, poetry and drama.

2543
Survey of British Literature I. The beginnings through the Neo-Classic Period.

2653
Survey of British Literature II. The Romantic Period to the present.

2773
Survey of American Literature I. The Puritans through the Romantic Period.

2883
Survey of American Literature II. The Romantic Period to the present.

3033
Fiction Writing. Prerequisite: 2513. Directed readings and practice in writing fiction with special attention to techniques.

3043
Poetry Writing. Prerequisite: 2513. Directed readings and practice in writing poetry with special attention to techniques.

3053
Scriptwriting. Prerequisite: 2513. Directed readings and practice in writing scripts with special attention to techniques.

3123
(H)Classical Mythology. The heritage of classical Greek and Roman myths as revealed in selected examples of British and American literature.

3163
(H)World Literature I. Selected literary masterpieces exemplifying ideals and values in Western cultures.

3173
(H,I)World Literature II. Selected literary masterpieces exemplifying ideals and values in non-Western cultures. Emphasis on the study of non-Western literature available in English.

3183
(H)Native American Literature. Origins and development of a literary tradition in its historical and cultural context.

3193
(H)African-American Literature. Origins and development of a literary tradition in its historical and cultural context.

3200
Special Problems in Language and Literature. 1-3 credits, maximum 3. Prerequisite: 9 credit hours of English. Specialized readings and independent study.

3203
Advanced Composition and Rhetoric. Prerequisite: 9 hours of English. Theories of regulative grammar and rhetoric as applied to the writing process.

3240
Criticism. 3 credits, maximum 6. Study and application of principal critical theories in literature, film or technical writing.

3323
Technical Writing. Prerequisites: 1113, 1213, and junior standing. Applied writing in areas of specialization. Intensive practice in professional writing modes, styles, research techniques and editing for specialized audiences and/or publications. This course may be substituted for 1213 with an "A" or "B" in 1113 and consent of the student's college.

3333
(H)Short Story. Origins, development, theory and craft of the short story.

3353
(H)Film as Literature. Film and literature as narrative forms.

3363
(H)Drama. Origins, development, theory and craft of drama.

3410
(H)Popular Fiction. 3 credits, maximum 6. Study of certain popular genres of fiction including science fiction, detective fiction, Western fiction, horror and the grotesque, the romance, American humor. Course content varies by semester. Exploration of the characteristics and evolution of the genre while developing skills in reading, writing and thinking critically.

- 3453**
(H)History of American Film. Lab 2. Introduction to the history of the American cinema, the principal eras in American film history, key directors, and the main genres. Basic approaches to film history and key theorists.
- 3603**
(H)British Literature to 1600. Historical development. Major writers and their works.
- 3633**
(H)British Literature 1600-1800. Historical development. Major writers and their works.
- 3643**
(H)British Literature 1800-1900. Historical development. Major writers and their works.
- 3653**
(H)British Literature Post 1900. Historical development. Major writers and their works.
- 3703**
(H)American Literature to 1800. Historical development. Major writers and their works.
- 3713**
(H)American Literature 1800-1900. Historical development. Major writers and their works.
- 3723**
(H)American Literature Post 1900. Historical development. Major writers and their works.
- 4003***
History of the English Language. The growth of the English language.
- 4013***
English Grammar. The traditional terminology and concepts of English grammar leading or evolving into the several current systems of description.
- 4063***
Descriptive Linguistics. The methodology of linguistic analysis.
- 4083***
Applied Linguistics. The study of topics in psycholinguistics, including language and the brain, animal communication and language acquisition.
- 4093***
Language in America. Historical development of American English. Regional, social and cultural language differences.
- 4263***
(H)Aesthetics of Film. Major theoretical approaches to the art of cinema: auteurism, semiotics, structuralism, historicism.
- 4303***
(H)British Drama 1500-1660. Genre development. Major writers and their works.
- 4313***
(H)British Drama 1660-1800. Genre development. Major writers and their works.
- 4323***
(H)British Drama Post 1800. Genre development. Major writers and their works.
- 4333***
(H)American Drama. Genre development. Major writers and their works.
- 4403***
(H)American Poetry to 1900. Genre development. Major writers and their works.
- 4413***
(H)American Poetry Post 1900. Genre development. Major writers and their works.
- 4433***
(H)British Poetry Post 1900. Genre development. Major writers and their works.
- 4453***
(H)Contemporary Literature. Genre development. Major writers in the novel, poetry, or drama and their works.
- 4520***
Problems in English. 1-3 credits, maximum 6. Prerequisite: 12 credit hours of English. Specialized readings and independent studies.
- 4523***
Technical Writing Internship. Prerequisite: 6 credit hours of English including 3323. Practice in writing resumes, proposals, abstracts and articles. Concentrated review of mechanics, proofreading, editing and interviewing techniques. Second eight weeks will include internship experience.
- 4533***
Advanced Technical Writing. Prerequisite: 6 credit hours of English including 3323. Specialized writing projects growing out of areas of specialization with emphasis on practical and marketable skills.
- 4543***
Technical Editing. Prerequisite: 9 credit hours of English. Scientific and technical editing skills; emphasis on editing project.
- 4553***
Document Design. Prerequisite: six credit hours of English, including 3323. Design theories and practice for hard copy, computer screens and visuals. Students will learn about design standards, page layout, instructional design, desktop publishing, typography, reading theory, and current research in visual design.
- 4563***
(H)Scientific and Technical Literature. Prerequisite: 6 credit hours of English. Scientific and technical style.
- 4633***
Advanced Fiction Writing. Prerequisite: 3033. Student practice and composition.
- 4643***
Advanced Poetry Writing. Prerequisite: 3043. Student practice and composition.
- 4653***
Advanced Scriptwriting. Prerequisite: 3053. Student practice and composition.
- 4703***
(H)Chaucer. *The Canterbury Tales* in Middle English.
- 4713***
(H)Milton. The more notable minor poems, prose selections and the major poems-*Paradise Lost*, *Paradise Regained* and *Samson Agonistes*-studied critically in context of the 17th century.
- 4723***
(H)Shakespeare. Major plays and selected criticism.
- 4730***
Single Author or Work. 3 credits, maximum 6. The works of a single author such as Hawthorne, Coleridge, or Faulkner or a single work and selected criticism such as *The Bible*, *The Prelude*, *Moby Dick*, *Ulysses*.
- 4773***
(H)Literature by Women. The collection of literature written by women in England and America, classical and modern figures.
- 4803***
(H)British Romantic Poetry. Genre development. Major writers and their works.
- 4813***
(H)British Victorian Poetry. Genre development. Major writers and their works.
- 4823***
(H)British Novel 1700-1800. Genre development. Major writers and their works.
- 4833***
(H)British Novel 1800-1900. Genre development. Major writers and their works.
- 4843***
(H)British Novel Post 1900. Genre development. Major writers and their works.
- 4853***
(H)American Novel to 1900. Genre development. Major writers and their works.
- 4863***
(H)American Novel Post 1900. Genre development. Major writers and their works.
- 4901***
Tutor Training. Lab 3. Training to become effective writing tutors and teachers through face-to-face conferences with writing students, weekly seminar presentations, and discussions of current writing center theory and practice.
- 4933***
(H)Regional Literature. Literature of a nation such as Ireland or Canada, or of a region such as the American Southwest. Topic varies by semester.
- 4963**
Issues in English: Senior Seminar in Creative Writing. Prerequisite: senior standing. A capstone course for creative writing majors. Issues and professions related to the degree. A cross-genre workshop and seminar designed to aid in understanding the whole of progression as writers and thinkers. Aids student in the completion of required creative thesis.
- 4973**
Issues in English: Technical Writing. Prerequisite: senior standing. A capstone course for technical writing majors. Issues and professions related to the degree.
- 4993**
Senior Honors Thesis. Prerequisites: admission to Arts and Sciences Honors Program and 3.50 cumulative GPA. For Honors students in their final semester. Thesis written on a topic of student's choice and directed by a faculty member. Final approval of thesis requires oral defense.
- 5000***
Thesis. 1-6 credits, maximum 6. M.A. thesis.
- 5013***
Introduction to Graduate Studies. Principles and procedures in scholarly research.
- 5023***
Old English. Major works in Old English.
- 5043***
Traditions in Literary Criticism and Theory. A survey of the major documents in literary theory and criticism from Plato to 1965.
- 5063***
Seminar in Shakespeare. Intensive study of a limited number of plays. Assignment of problems to individual students.
- 5073***
Old English Poetry. Prerequisite: 5023. Beowulf in Old English and selected criticism.
- 5083***
Seminar in Chaucer. *The Canterbury Tales* in Middle English; language study, criticism.
- 5093***
Seminar in Milton. Poetry, major prose, and criticism.
- 5120***
Studies in Teaching English as a Second Language. 1-3 credits, maximum 6. Selected topics in teaching English as a second language; e.g. cross-cultural communication, materials preparation, bilingual education.

5123*
Social and Psychological Aspects of Language. An introduction to language acquisition, processing, and production, and their interaction with social contexts.

5130*
Studies in English Grammar. 3 credits, maximum 6. Selected study of current topics in grammatical theory as it applies to the teaching of English.

5140*
Seminar in Linguistics. 3 credits, maximum 6. Selective study of current topics in linguistics.

5143*
Seminar in Descriptive Linguistics. An introduction to phonology, morphology, syntax and semantics.

5163*
Middle English Literature. Major works in Middle English.

5210*
Seminar or Directed Study. 1-6 credits, maximum 9. Specialized readings or independent studies.

5213*
Teaching Freshman Composition. Materials and methods of instruction in freshman composition.

5223*
Teaching Technical and Business Writing. Materials and methods of instruction in teaching technical and business writing.

5243*
Teaching English as a Second Language. Theories of second language acquisition. Materials and methods of instruction.

5293*
Interdisciplinary Uses of English. Interdisciplinary study with emphasis on multiple uses of literature and writing: for example film, new media, popular culture, American studies.

5313*
Internship, Teaching English as a Second Language. Supervised teaching of beginning through advanced English as a second language courses.

5333*
Seminar in TESL: Testing. Standardized testing for teaching English as a second language.

5353*
Studies in the History of Rhetoric. An exploration of selected topics and texts in the history of Western rhetoric from Plato to the present.

5410*
Seminar in British Literature of the 16th Century. 3 credits, maximum 6. Selected writers and their works, themes and literary developments of the 16th century.

5420*
Seminar in British Literature of the 17th Century. 3 credits, maximum 6. Selected writers and their works, themes and literary developments of the 17th century.

5440*
Seminar in British Literature of the 18th Century. 3 credits, maximum 6. Selected writers and their works, themes and literary developments of the 18th century.

5460*
Seminar in British Literature of the 19th Century. 3 credits, maximum 6. Selected writers and their works, themes and literary developments of the 19th century.

5480*
Seminar in Modern Literature. 3 credits, maximum 6. Selected writers and their works, themes and literary developments of modern literature.

5520*
Internship in Technical Writing. 1-6 credits, maximum 6. Practice in writing appropriate documents such as proposals, manuals (software, hardware, reference, training), articles, functional specifications in job-simulation situations. Review of academic materials as appropriate.

5533*
Seminar in Advanced Technical Writing. Specialized writing projects growing out of student's special interests and emphasizing the student's career preparation. Coverage of manuals, proposals, and visual aids used to communicate technical information.

5543*
Seminar in Scientific and Technical Editing. Managing technical documentation production; developing scientific and technical editing skills; special emphasis on editing project.

5563*
History of Scientific and Technical Literature. Structural, stylistic and rhetorical analysis of selected scientific and technical works.

5573*
Theories of Communication. Survey of a broad range of theories of communication and application of those theories to technical communication.

5630*
Seminar in Early American Literature. 3 credits, maximum 6. Selected writers and their works, themes and literary developments of the 17th and 18th centuries.

5660*
Seminar in American Literature of the 19th Century. 3 credits, maximum 6. Selected writers and their works, themes and literary developments of the 19th century.

5680*
Seminar in Contemporary Literature. 3 credits, maximum 6. Selected writers and their works, themes and literary developments in contemporary literature.

5730*
Seminar in Fiction Writing. 3 credits, maximum 6. Writing fiction at the professional level.

5740*
Seminar in Poetry Writing. 3 credits, maximum 6. Writing poetry at the professional level.

5750*
Seminar in Scriptwriting. 3 credits, maximum 6. Scriptwriting at the professional level.

5990*
Special Problems. 1-3 credits, maximum 6. Investigation into a designated area of English leading to material for creative component option (M.A.). Graded on a pass-fail basis.

6000*
Dissertation. 1-6 credits, maximum 20. Ph.D. dissertation.

6110*
Seminar in Single Author or Work. 3 credits, maximum 9. A study of one text and its various readings; or a study of the development and range of a writer's work in the English language.

6130*
Studies in Fiction Writing. 3 credits, maximum 6. Prerequisite: 5730. Individual projects in fiction.

6140*
Studies in Poetry Writing. 3 credits, maximum 6. Prerequisite: 5740. Individual projects in poetry.

6150*
Studies in Scriptwriting. 3 credits, maximum 6. Prerequisite: 5750. Individual projects in scriptwriting.

6210*
Seminar or Directed Study. 1-6 credits, maximum 9. Specialized readings or independent studies.

6220*
Seminar in Genre. 3 credits, maximum 9. The development, traditions, concerns or characteristics of genre in selected texts. Major genres and subgenres considered.

6250*
Seminar in Race, Region or Gender. 3 credits, maximum 9. A study of the complex relations between race, region or gender and the texts that represent them.

6253*
Studies in New Media. Selected work in new media, for example film, literary adaptation to film, film and television.

6260*
Studies in Literary Criticism. 3 credits, maximum 9. Selected work in literary criticism, for example ancient and neo-classical, 19th century, 20th century.

6350*
Topics in Rhetorical Theory. 3 credits, maximum 6. Study of advanced topics in rhetorical theory and research. May focus on an important thinker, or a specific theme, or some combination of thinkers and themes.

6410*
Topics in Linguistics. 3 credits, maximum 9. Prerequisite: 5143. Study of advanced topics in linguistic theory and research.

6420*
Topics in Second Language Acquisition. 3 credits, maximum 9. Prerequisite: 5243. Study of topics in second language theory and research.

6500*
Studies in Technical Writing. 1-3 credits, maximum 9. Selected topics in technical writing.

Entomology (ENTO)

2003
(N)Insects and Society. A course for non-majors that emphasizes the impact of insects on society. Influence of arthropods in beliefs, culture and fears and the view of insects in folklore and mythology from ancient times to present. Focus on the use of insects as model systems in biological research. Exposure to the use of insects in teaching, music, art, literature and the cinema.

2023
Introduction to the Science of Entomology. Lab 2. Basic structure, function and classification of insects and closely related animals. Coverage of insects in ecosystems and development of control programs that reduce reliance on chemical pesticides.

3003
Livestock Entomology. Lab 2. Economic importance, biology and control of pests affecting domestic animals.

3021
Postharvest Insect Pests. Lab 2. Prerequisite: 2023 (or concurrent enrollment) or 3003. The biology and management of insect pests of bulk-stored grains, flour, feed, dried fruits and nuts, and those of quarantine significance for export of fresh fruits and vegetables within food processing plants, warehouses, wholesale and retail distribution systems.

- 3043**
Insect Physiology. Prerequisites: 2023; one course in organic chemistry, nine credit hours of biology. Functions of the organ systems of insects. Lecture-demonstrations of selected insect physiology techniques. Same course as 5043.
- 3331**
Insect Pests of Agronomic Crops. Lab 2. Prerequisite: 2023 or concurrent enrollment. Sampling and decision-making processes for evaluation and control of insect pest populations in agronomic crops. Coverage of identification of pests and beneficials and damage symptoms resulting from insect feeding in crops.
- 3421**
Horticultural Insects. Prerequisite: 2023 or concurrent enrollment. Identification, biology and control of pests attacking horticultural crops. Emphasis on pests injurious to vegetables, fruits, pecans, greenhouse plants, turf and ornamental trees and shrubs.
- 3461**
Insects in Forest Ecosystems. Lab 2. Prerequisite: concurrent enrollment in 2023. Identification and seasonal life history of insect pests and beneficial insects on shade trees in urban settings, in commercial forests, and in forest products.
- 3644**
Insect Morphology. Lab 4. Prerequisite: 2023. Insect development and comparative morphology. Same course as 5644.
- 4223***
Ecological Methodology. Lab 2. Prerequisite: one course in either ecology or general biology. Use of insects and other invertebrates for describing and evaluating interactions of individuals and populations with their environments. Coverage of behavioral and physiological ecology on consequences to individuals; population and community ecology considered in dynamics of groups of organisms in ecosystems.
- 4464***
Systematic Entomology. Lab 4. Prerequisite: 2023 or equivalent. Classification and comparative biologies of insects.
- 4800**
Undergraduate Traineeship. 1-5 credits, maximum 5. Prerequisite: consent of instructor. Participation in research or extension pest management programs of departmental faculty.
- 4854***
Medical and Veterinary Entomology. Lab 4. Prerequisite: 3553. Biology and control of insects affecting public health.
- 4922***
Applications of Biotechnology in Arthropod and Pathogen Control. Prerequisites: introductory biology and chemistry or equivalent. Applications of biotechnology in controlling arthropod pests of plants and animals and plant pathogens. Introduction to underlying technology, products being deployed, their effectiveness and associated problems or concerns resulting from their use. Same course as PLP 4922.
- 5000***
Master's Research and Thesis. 1-6 credits, maximum 6. Research in entomology.
- 5003***
Insect Biochemistry. Prerequisite: consent of instructor. Biochemical processes in insects and closely related arthropods with emphasis on metabolic pathways unique to this group. Biochemical aspects of arthropod host interactions.
- 5020***
Special Problems. 1-8 credits, maximum 8. Prerequisite: graduate standing. Selected studies in the area of entomology, acarology or araneology.
- 5043***
Insect Physiology. Prerequisites: one course in organic chemistry and nine credit hours of biology. Functions of the organ systems of insects. Lecture-demonstrations of selected insect physiology techniques. Same course as 3043.
- 5330***
Advanced Systematic Entomology. 1-5 credits, maximum 5. Prerequisite: 5464. Special problems in advanced systematic entomology.
- 5332***
Principles of Proposal Writing and Review. Prerequisite: consent of instructor. Mechanics of proposal development and the peer review system. Effective use of scientific literature, and the development of hypotheses, objectives, and experimental design and methods through intensive writing and discussion.
- 5513***
Biological Control. Lab 2. Prerequisite: 2023 or equivalent or consent of instructor. The ecological principles and applied practices of biological control of insects, weeds and plant pathogens. Epizootiology including the scientific basis of biological control; natural enemies and their biology; biological control methods; and biological control in integrated pest management programs.
- 5523***
Integrated Management of Insect Pests and Pathogens. Lab 2. Prerequisites: 2023 and PLP 3344 or equivalent or consent of instructor. Modern theory and practices for management of insect pests and pathogens in plant production systems, emphasizing an ecologically-based, integrated approach. Basic concepts of pest management, decision-making, cost/benefit analysis, and risk/benefit analysis. Same course as PLP 5523.
- 5550***
Advanced Agronomic Entomology. 1-5 credits, maximum 5. Prerequisite: 4523. Special problems in advanced agronomic entomology.
- 5613***
Host Plant Resistance. Lab 2. Prerequisites: 2023 and PLP 3344 or equivalent and a general genetics course; or consent of instructor. Interactions of plants and the herbivorous insects and pathogenic micro-organisms that attack them. Development and deployment of multiple-pest resistant cultivars in crop management systems. Same course as PLP 5613.
- 5644***
Insect Morphology. Lab 4. Prerequisite: 2023. Insect development and comparative morphology. Same course as 3644.
- 5660***
Readings in Integrated Pest Management. 1-2 credits, maximum 2. Prerequisite: 4523 or equivalent. Reading and discussion of current publications relating to biological and economic theories that form the basis for integrated pest management (IPM) programs.
- 5710***
Advanced Medical and Veterinary Entomology. 1-5 credits, maximum 5. Prerequisite: 4854. Special problems in methods of disease transmission, animal parasite control and the relationships existing between parasite and host.
- 5733***
Natural Chemical Mediators in Ecology. Prerequisites: BIOL 1114, CHEM 3015 or equivalent. Interactions among organisms mediated by naturally produced chemicals. An interface of ecology, behavior, physiology and chemistry with examples from animals, plants and microorganisms. Origin, function, significance and utilization of semichemicals.
- 5753***
Insecticide Toxicology. Prerequisite: organic chemistry or 15 credit hours biology. Properties and mode of action of the major insecticidal materials. Assessment of their impact on the environment.
- 5850***
Epidemiology of Arthropod-borne Diseases. 1-4 credits, maximum 4. Lab to be arranged. Prerequisite: 4854 or equivalent. The relationships existing between the hosts, arthropod vectors and causal agents of disease and the principles of disease prevention or suppression by the intelligent use of biological principles.
- 5870***
Seminar. 1 credit, maximum 5. Prerequisite: consent of instructor. Written and oral reports and discussion of recent developments in entomology.
- 6000***
Doctoral Research and Dissertation. 1-10 credits, maximum 30. Prerequisite: M.S. in entomology or consent of major professor. Independent investigation under the direction and supervision of a major professor.
- 6100***
Advanced Insect Physiology. 1-5 credits, maximum 5. Prerequisite: 4043. Special problems in advanced insect physiology.

Environmental Science (ENVR)

- 1113**
Elements of Environmental Science. Application of biology, chemistry, ecology, economics, geology, hydrology, mathematics, physics, and other agricultural sciences to environmental issues. Addressing environmental problems from the standpoint of ethics, risk, and scientific and social feasibility. Emphasis on agricultural systems and natural resources.
- 4010**
Internships in Environmental Science. 1-6, maximum 6. Prerequisite: junior standing in environmental science or consent of instructor. Supervised internships with business, industry, or governmental agencies in environmental assessment and remediation.
- 4813**
Environmental Science Applications and Problem Solving. Lab 2. Prerequisites: AGEC 3503, BISC 3034, FOR 4813, GEOL 3073, POLS 4363, senior standing, or consent of instructor. Integrated problem solving applied to environmental issues using physical, biological, economic, quantitative, policy and administrative principles. Primarily for environmental science majors.
- 5000***
Research for Thesis or Report. 1-6 credits, maximum 6. Prerequisites: approval of advisory committee and departmental steering committee. Research leading to master's thesis or report.

5100*
Environmental Problem Analysis. 3 credits, maximum 6. Required for environmental science option. Multidisciplinary team investigation of environmental problems. Problem formulation, review of applicable theory from different disciplines, data collection from field, library and laboratory, mathematical modeling and application of appropriate techniques of analysis to selected environmental problems and environmental impact assessments.

5200*
Special Topics in Environmental Science. 1-4 credits, maximum 10. Prerequisite: graduate standing. Topics and issues in the broad field of environmental science. Group discussions and projects not covered by existing courses such as ecological risk assessment, water chemistry and environmental law.

5300*
Seminar in Environmental Science. 1-3 credits, maximum 6. Selected environmental problems, individual research, seminar reports and group discussion of reports.

5500
Environmental Management Problem Analysis. 1-3, maximum 6. Prerequisite: consent of director. Finding sustainable solutions to complex environmental, safety and health problems using an integrated team approach. Problem formulation and analysis integrated from different disciplines using technical, legal, economic and sociopolitical approaches. May be substituted for ENVR 5100 on plan-of-study. Required for environmental management specialization.

5600*
Environmental Management Internship and Report. 1-6 credits, maximum 12. Prerequisites: 5500 and consent of director. Internships on environmental problem solving project(s) and submission and approval of a formal report. Course must be completed within three consecutive semesters from date of initial enrollment.

6000*
Research for Dissertation. 1-12 credits, maximum 24. Prerequisite: approval of advisory committee and departmental steering committee. Research leading to the Ph.D. dissertation.

6200*
Seminar in Environmental Problems. 3 credits, maximum 6. Multidisciplinary investigations of a current environmental problem that may be either global or local in nature.

Family Relations and Child Development (FRCD)

2003
Dynamics of Family Relationships. An ecological approach to interpersonal relationships through study of the processes in the family that influence the way members relate to each other throughout their lives. Practice in application of principles is included.

2100
Preprofessional Laboratory Experience. 1-4 credits, maximum 4. Lab 2-8. Realistic experiences in different career areas, acquainting students with the diversity of roles and responsibilities as applied to the variety of audiences served. Professional behavior and ethics.

2113
(S)Human Development Within the Family: A Lifespan Perspective. Human development within the family described from a lifespan perspective. The principles of development and dynamics of behavior and relationships.

2213
Human Sexuality and the Family. Sexual development emphasizing personal adjustment and interaction with family and culture.

2413
Resource Management for Individual and Family. Principles and procedures of management and their relationships to human and material resources. Emphasis given to the consumer in the marketplace, financial management and time and energy management.

2613
The Professional in Individual, Family and Community Services. Skills in decision-making, priority-setting, self-assertion, and self-assessment. Volunteer and field experience options available in the field of family services.

3013
(S)Early Adulthood. Study of the unique characteristics of development during early adulthood. Theories of adult development with emphasis on application to program development and providing services for adults.

3023*
Child and Parent in Social Context. Parenting philosophies and styles; programs for children, families, and caregivers; emphasis on effective ways for the home, school, workplace and community to work together to provide for optimum development of children of various cultures and ethnic groups.

3112
Parent-Child Relationship. For parents, teachers or others who expect to be responsible for young children. Increases understanding of the needs and feelings of both the developing child and the adult caregiver. A wide variety of philosophies and techniques explored out of which individuals can devise their own comfortable, effective parenting styles.

3143
(S)Marriage. Consideration of courtship and marriage with special emphasis on building a healthy paired relationship; communication and decision making; and coping with such problems as money, sex, role taking, in-laws and children.

3213
(S)Social, Emotional and Language Development in Early Childhood. Study of appropriate experiences in social, emotional, and language development.

3233
Early Childhood Education Program Development. Introduction to history of early childhood education. Creation of learning environments that facilitate children's development. Planning, implementation and evaluation of developmentally appropriate integrated learning experiences.

3253
Child Development and Guidance: School Age. Influence of family, schools, peers, and the community on the physical, cognitive, social and emotional development of children in the school years. Education as a profession, cultural pluralism in the schools, and school organization. Observation and application of principles of child development and guidance in experiences with school-age children.

3303
Development of Creative Expression, Play and Motor Skills in Early Childhood. Prerequisite: one course in child development. Consideration of appropriate experiences in the areas of play, art, music and motor skills for children. Observation and participation with children groups.

3333
(S)Child Development and Guidance: Adolescence. Development of the adolescent physically, socially, intellectually and emotionally with emphasis on the search for identity, sexuality, vocational choice and interpersonal relations. Observation of adolescents.

3403
Literature and Literacy in Early Childhood. Consideration of appropriate experiences in the areas of literature and language arts.

3413
Family Economic Decision Making. Helping individuals make more effective choices as consumers. Relevant concepts, theories, and research from economics, family economics, marketing, and statistics. Information-imperfect markets, assessing consumer information, seeking redress, bargaining, inflation, decision-making models, the concept and measurement of quality and assessment of the performance of markets.

3433
Family Finance. Prerequisite: junior standing. Problems faced by consumers in the changing economy; impact of family financial decisions on a consumption-oriented society. Management of family resources including financial planning, credit, insurance, savings, investments, tax and estate planning.

3503
Cognitive Development in Early Childhood. Prerequisite: 2113 or equivalent. Study of major theories of cognitive development. Application to appropriate experiences in physical and natural sciences, mathematics and social studies.

3613
Professional Services for Children and Families. Study of current major issues and selected services for children and families.

3623
Fundamentals for the Helping Professional. Prerequisites: 2613, 3613. Development of fundamental skills and techniques used by those in various helping professions as viewed from the systems theory perspective. Observation and interviewing techniques, problem-solving and advocacy skills, and introduction to grant writing.

3753
(S)Family Development. Relationships over the life course within the American family. Variations in form and function of the family system related to cultural, economic, and social contexts.

3810
Practicum in FRCD. 1-9 credits, maximum 9. Prerequisites: 3213 and 3233, or 3613 and 3623. Observation and participation in programs for children, youth, adults and families. Supervision by FRCD faculty members or their designated representatives.

4000
Senior Thesis. 1-6 credits, maximum 6. Prerequisites: 4743, STAT 2013, senior standing, consent of instructor. Supervised research for the bachelor's degree.

4103
Managing Career Decisions. Applications of decision making models for career and life planning. Self-assessment, career alternatives, career mobility, work/family issues and resource identification. Student seeking teacher certification will complete a module on methods of teaching career education.

- 4113 Professionalism, Issues and Actions.** Prerequisite: senior standing. Current issues and strategies for professional development, integration of core concepts and theories, and involvement in public policy.
- 4123* Observation and Assessment of Family Interaction.** Examination of family interaction through observation and assessment techniques. Focus on whole family functioning and the functioning of multiple family relationships.
- 4133 Organizing and Administering Programs for Families and Individuals.** Development, management, and evaluation of programs serving families and individuals.
- 4203 Strategies for Teaching.** Learning theories and strategies for planning, teaching and evaluating formal and nonformal programs. Not applicable for teaching licensure.
- 4213 Media, Materials and Techniques in Presentations.** Lab 2. Application of educational principles to specific subject matter. Experience with a variety of technological aids for presentation, including multimedia and distance learning, computers and a variety of teaching aids. Development of proficiency in use of various media.
- 4220 Field Experience Preparation for Kindergarten and Primary.** 1-4 credits, maximum 4. Prerequisite: admission to Teacher Education. Decision-making, priority-setting, self-assessment, classroom organization and management, selection of appropriate content, and teaching strategies in public schools and state accredited programs.
- 4252 History and Philosophy of Early Childhood Education.** Prerequisites: courses in child development and early childhood education and senior or graduate standing. History of early childhood education; theoretical foundations and methods of early childhood curriculum models, including multicultural and nonsexist approaches; and current major issues in early childhood education.
- 4353 Strategies for Working with Adults in Community Services.** Theories of adult development as they affect learning activities of adults in family-related programs. Implications are analyzed in relation to planning and selecting programs, media, and teaching strategies.
- 4413* Management of Volunteer Programs.** Prerequisite: junior, senior or graduate standing. For family and human service professionals who will have responsibility for utilizing volunteer personnel in achieving program goals. Overview of issues in volunteering, management and leadership strategies for maximizing volunteer effectiveness and strategies for evaluating volunteer service.
- 4420 Internship in Early Childhood Education.** 1-7 credits, maximum 12. Lab 3-21. Prerequisites: 2100, 3213, full admission to Teacher Education with written consent of the coordinators of Early Childhood Education and certification offices. Teaching experience in both infant-kindergarten and grades 1-3. Graded on a pass-fail basis.
- 4423 Family Resource Management.** Analysis of the time, human, environmental and financial resources of the family. Practical application of management principles in the development and utilization of family resources. Emphasis on professional competence.
- 4463 Child Development and Guidance: Infancy and Toddlerhood.** Development and behavior of infants and toddlers. Directed observation with children of this age.
- 4523 Critical Issues in Family Relations and Child Development.** Prerequisite: senior standing. An examination of the place of family relations and child development in the context of broader themes. An exploration of the students' specialization and its implications for an educated life.
- 4533* (S)Adulthood: Middle Years.** Study of the unique characteristics of life between young adulthood and the later years. Special emphasis on physical, intellectual, personal, family and career development in middle age.
- 4543* (S)Adulthood: Later Years.** Analysis of the aging process. Interrelation between physical, psychological and social development in later years. Special emphasis on multigenerational family issues and relationships.
- 4553 Families in Crisis.** Study of family responses to normative and unpredictable stress. Emphasis on using current literature on selected family stresses to identify issues and community resources that promote adaptation to family crisis.
- 4610 Internship.** 1-8 credits, maximum 8. Lab 4. Prerequisites: 2100, 2613, 3613, 3623; completion of application form requiring consent of adviser or consent of instructor. Supervised observation and participation in programs for individual, family, and community services.
- 4663 Theories and Issues in Child Development.** Prerequisites: 2113; six additional hours in FRCD, or consent of instructor. Current research and issues related to child development; theories and philosophical bases underlying development.
- 4673 (S)Theories and Issues in Family Relationships.** Prerequisite: 3753. Introduction to family theories. Current research and issues related to family dynamics, relationships, and crises within the context of the family system.
- 4743 Fundamentals of Research Methodology in Family Relations and Child Development.** Prerequisite: STAT 2013 or equivalent. Understanding research processes and development of skills needed to be consumers of scientific literature in FRCD. Practice in reading research and statistics, introduction to how computers are used in this research and demonstration of basic principles of assessment in children and families.
- 4750 Special Problems in FRCD.** 1-6 credits, maximum 6. Prerequisite: consent of instructor. Various units of work related to specific issues in family relations and child development.
- 4793* (S)The Family: A World Perspective.** Family structure and interaction that transcend specific cultures or nationalities; examination of specific cultural and international family forms, their social issues and relevant services to meet their needs.
- 4811 Seminar in Family Services.** Pre-employment seminar. Individual competencies related to family services, career options, and the process of seeking employment.
- 4823* Family Life Education.** Philosophy and principles of family life education. Planning, implementing, and evaluating family life programs in community and education settings.
- 4850 Special Unit Courses in Family Relations, Child Development and Early Childhood Education.** 1-6 credits, maximum 6. Various units taught by specialists in the field.
- 4900 Honors Creative Component.** 1-3 credits, maximum 3. Prerequisite: College of Human Environmental Sciences Honors Program participation, senior standing. Guided creative component for students completing requirements for College Honors in College of Human Environmental Sciences. Thesis, creative project or report under the direction of a faculty member in the major area, with second faculty reader and oral examination.
- 5000* Master's Thesis.** 1-6 credits, maximum 6. Research in FRCD for M.S. degree.
- 5110* Directed Study in FRCD.** 1-9 credits, maximum 9. Prerequisites: 5223 or 5523 and consent of instructor. Directed individual study in human development and family sciences.
- 5112* Computer Applications in FRCD Research.** Creating variable codebooks, coding data for input and inputting data for computer analysis using the SPSS-X package. No computer experience necessary.
- 5133* Research Methods in Family Relations and Child Development.** Current problem areas and methodologies of research in human development and family sciences, followed by experiences in identifying researchable problems, planning a proposal, selecting appropriate procedures for carrying out studies and interpreting findings.
- 5140* Methods of Teaching Child Development and Guidance.** 1-3 credits, maximum 3. Prerequisites: 2113 and 3213 or equivalents. Content-related materials, learning experiences and methods of teaching child development in classes for youth and adults in secondary schools and colleges.
- 5190* Teaching Practicum.** 1-3 credits, maximum 3. Prerequisites: six hours of graduate course work and consent of instructor. Teaching human development and family sciences; content and techniques.
- 5213* Child Behavior and Development.** Prerequisite: consent of instructor. Current issues in child development beyond infancy explored within the context of recent research. Contrasting theoretical and methodological approaches critically evaluated.
- 5223* Theories of Child Behavior and Development.** Prerequisite: 6 credit hours at graduate level in child development or related areas. Major theories and supportive research that contribute to the understanding of child behavior and development.
- 5243* Infant Behavior and Development.** Prerequisite: 5223 or consent of instructor. Survey of research and theory pertaining to infant development, including behavioral genetics, perception, cognition and learning, social and emotional development, and assessment.

- 5273***
Assessment of Infant and Child Development. Prerequisite: consent of instructor. Study and application of formal evaluative methods for the investigation of infant and child development. Supervised practice in administration, scoring, and interpretation of individual tests of cognitive ability, adaptive behavior, language development, and psychomotor development.
- 5290***
Practicum. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Supervised experience in various settings relevant to human development and family sciences.
- 5333***
Early Childhood Education: Curriculum. Implications of child development theory and research for planning educational programs and learning experiences appropriate for young children.
- 5353***
Advanced Concepts in Early Childhood Programming. Prerequisites: 5213; 5223 or consent of instructor. Exploration and critical review of the state of early childhood programming with emphasis on research, theory, and policy making that bear on current practice. Topics include anti-bias curriculum, family participation in early education, multi-cultural issues, and programs for infants and toddlers.
- 5363***
Early Childhood Theory, Practice and Evaluation. Prerequisites: 5213, 5223 or consent of instructor. Curriculum development and program models for children under six emphasizing individual differences, equipment and materials, physical facilities and space, teacher roles, and philosophical objectives.
- 5373***
Early Childhood Administration, Policy Analysis and Advocacy. Prerequisites: 5213, 5223 or consent of instructor. Examination of the administration of programs for young children as well as policy evaluation and advocacy. Legal, social and economic conditions as they affect the welfare of individuals and families.
- 5423***
Research Literature in Gerontology. Current research knowledge related to gerontology and the aging process. Critical study of classic and current research.
- 5470***
Developments and Innovations in Family Relations, Child Development and Early Childhood. 1-9 credits, maximum 9. Analysis of current developments and innovative practices in one or more of the specified areas. Emphasis upon evolving concepts with implications for programs serving societal needs in these areas.
- 5513***
Issues in Family Science. Current and classic literature in family studies. Consideration of philosophical bases and current research issues relevant to the family as a field of study.
- 5523***
Theoretical Frameworks in Family Science. Theoretical configurations and current conceptual frameworks in family relationships. Overview of theory construction.
- 5543***
Coping with Family Crises. Strategies for helping families deal with various family crises including illness, death and divorce. Focus on dealing with these from a family systems approach.
- 5553***
Marital and Premarital Enrichment Education. Analysis of educational models and processes that relate to enriching couple relationships. Approaches to facilitating premarital and marital enrichment, emphasizing program development, implementation and evaluation.
- 5573***
Adolescent in Family Context. Physical, social, emotional and intellectual development of adolescents within the context of family relationships. Exploration of research and theory as it relates to adolescent development and parent-adolescent relationships.
- 5583***
Human Sexuality. Multiple aspects of human sexuality including physiological and psychosexual development and response, sexual relationships, and sexual dysfunction.
- 5611***
Marriage and Family Therapy Pre-practicum. Pre-clinical experience for students in the marriage and family therapy (MFT) specialization, emphasizing counseling skills and structured observations.
- 5613***
Introduction to Marriage and Family Therapy. Prerequisite: graduate standing or consent of instructor. Historical context of family therapy. Overview of the major schools of family therapy and basic clinical skills necessary for the formation of a helping relationship.
- 5623***
Systems Theory and Applications to the Family. Examination of the cybernetic roots and terminology used with general systems theory providing an understanding, appreciation and integration of the role of "systems" approaches to family theory and clinical practice.
- 5643***
Models and Strategies in Marriage and Family Therapy. Exposure to the dominant models used in marriage and family therapy. Emphasis on theoretically appropriate strategies of intervention applied to the treatment of couples and families from an ecosystemic perspective.
- 5653***
Diagnostic Assessment in Marriage and Family Therapy. Prerequisites: 5623; admission to marriage and family therapy specialization or consent of instructor. Recognition of the most relevant dimensions of family, systems, the array of diagnostic tools available, and measurement theory to enhance the probability of meeting the therapeutic needs of troubled couples and families.
- 5663***
Professionalism and Ethics in Marriage and Family Therapy. Prerequisites: graduate standing and consent of instructor. The development of the professional attitude and identity of a marriage and family therapist. The AAMFT Code of Ethics, family law, ethnicity, and gender issues, as related to the practice and profession of marriage and family therapy.
- 5690***
Marriage and Family Therapy Practicum. 1-3 credits, maximum 18. Prerequisite: admission to marriage and family therapy specialization. Supervised clinical experience for students in the marriage and family therapy specialization.
- 5743***
Management of Family and Community Service Programs. Prerequisites: graduate standing and one year work experience. Planning, personnel development, resource development, management and evaluation of community service.
- 5750***
Seminar in Child Development and Family Relationships. 1-8 credits, maximum 8. Current research in child development and family relationships. Critical study of classic and current research.
- 5843***
Family Policy Issues. Prerequisite: senior or graduate standing. Identification and assessment of the effects of federal and state legislation on families and consumers. Effects of policies in areas of income maintenance, housing, health, education, social services, employment and contract law.
- 5933***
Evaluation Design. Fundamental principles of evaluation, emphasis on instrumentation.
- 6000***
Doctoral Thesis. 1-12 credits, maximum 30. Prerequisite: consent of instructor. Research in human environmental sciences for the Ph.D. degree under supervision of a graduate faculty member.
- 6110***
Directed Study in FRCD. 1-9 credits, maximum 9. Prerequisites: 5523 or 5223 and consent of instructor. Doctoral level directed individual study in human development and family sciences.
- 6133***
Advanced Research Methods in Family Relations and Child Development. Prerequisites: one course in research methods and one in statistics. Research design and analysis of data appropriate to the areas of family relations and child development.
- 6190***
Research Internship. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Special research studies under the supervision of a graduate faculty member.
- 6223***
Analysis and Application of Child Development Theory. Prerequisite: 5223. Critical analysis of selected child development theories using primary source material with demonstration of application to development, research and practice.
- 6243***
Theory and Research in Early Cognitive Development. Prerequisites: 5213, 5223 or consent of instructor. Critical examination of the concepts and principles derived from cognitive development theory with special emphasis on research and methodological literature.
- 6250***
Seminar in Child Development. 1-6 credits, maximum 6. Prerequisite: 5223 or equivalent. Selected topics in child development with special attention given to recent research literature and current theory.
- 6253***
Theory and Research in Early Social Development. Prerequisites: 5213, 5223 or consent of instructor. Research and theory pertaining to social and emotional development, including attachment, social interaction, friendships and temperament.
- 6363***
Theories and Research in Early Communication Development. Prerequisites: 5213, 5223 or consent of instructor. Recent theories and research in language communication development, including receptive and active language and the relationship of language to early social and cognitive development.

6373*
Theory and Research in Developmental Disabilities. Prerequisites: 5213, 5223 or consent of instructor. Recent theories and research related to developmental disabilities, including both physical and mental handicapping conditions and their impact on human development.

6523*
Analysis and Application of Family Theory. Prerequisite: 5523. Family theory process, including logic, theory construction, and relating conceptual orientations to current research areas.

6580*
Seminar in Family Sciences. 1-6 credits, maximum 6. Prerequisite: 5513 or consent of instructor. Current research and theory in the family area; selected topics.

6613*
Contemporary Issues in Marriage and Family Therapy. Prerequisite: admission to marriage and family therapy specialization. Critical issues facing students in the marriage and family therapy (MFT) specialization, while taking advantage of the unique expertise of clinical faculty. Professional seminar on dialogue with participants taking an active role in the learning process.

6843*
Economic and Social Foundations of Family Economics. Prerequisites: graduate standing, consent of instructor. The lives, times and ideas of great economic and social thinkers and how their influence on the economic and social development of our society affects the economics of family living.

Finance (FIN)

2123
Personal Finance. A first course in the management of the individual's financial affairs. Budgeting, use of credit, mortgage financing, investment and estate planning.

3113
Finance. Prerequisites: ACCT 2203, ECON 2023, STAT 2023. Operational and strategic financial problems including allocation of funds, asset management, financial information systems, financial structure, policy determination and analysis of the financial environment.

3613
General Insurance. Introduction to the theory and general principles of insurance. A broad analysis of the elements and operation of property, casualty, health and life insurance.

3623
Property and Casualty Insurance. Prerequisite: 3613. Emphasis on loss and the insurance contract from fire, marine, property damage, automobile and other liability and loss adjustment. Rate formulation, social implications, government regulations and government regulation of the insurance industry.

3633
Life and Group Insurance. Prerequisite: 3613. Principles of insurance applied to life and human values. Group plans in industry, with coverage emphasizing the managerial point of view.

3713
Real Estate Investment and Finance. Prerequisite: 3113. An introductory course in real estate investment and finance. Financing real estate, financial leverage and financial planning, the institutional structure of mortgage lending, managing risks, investment strategies and decisions.

4113*
Financial Markets and Institutions. Prerequisites: 3113, ECON 3313. Money and capital markets, flow-of-funds, commercial banks and other financial intermediaries.

4213*
(I)International Financial Management. Prerequisite: 3113. Financial problems of multinational corporations. Designed to develop a sound conceptual understanding of the environmental factors that affect decisions of financial managers; to extend the current developments in the theory of financial management to incorporate variables peculiar to international operations; and to formulate financial strategies under different business systems and ideologies.

4223
Investments. Prerequisite: 3113. Various approaches to selecting and timing investment opportunities, e.g., common stocks, bonds, commodities and options. Modern concepts of portfolio theory.

4333*
Financial Management. Prerequisite: 3113. Theories and practice applicable to the financial administration of a firm. A variety of teaching methods used in conjunction with readings and cases to illustrate financial problems and techniques of solution.

4443*
Banking Strategies and Policies. Prerequisites: 3113 and ECON 3313. Theories and practices of bank asset management; banking markets and competition.

4453
Bank Decision Simulation and Analysis. Prerequisite: 4443. Student teams assume the roles of senior bank officers, making decisions regarding bank assets, funding, product pricing, financial leverage, profit enhancement, risk management, and staffing. Decisions implemented through computer simulation, incorporating the decisions into an environment where the decisions of competing management teams and the local economy determine bank profitability and shareholder value. Evaluation of students' abilities to create shareholder value and effectively communicate planning and analysis through written and spoken reports.

4550*
Selected Topics in Finance. 1-6 hours credit, maximum 6. Prerequisite: 3113. Advanced topics in finance. Topics are updated each semester.

4613*
Risk Management. Prerequisite: 3113. Elements of corporate risk control and management.

4763*
Financial Futures and Options Markets. Prerequisite: 3113. Foundation in financial futures and options markets. A balance of institutional detail necessary to understand the structure of these markets and the theoretical developments necessary to apply the contracts to various uses. The use of financial futures and options to manage price risk.

4813*
Portfolio Management. Prerequisite: 4223. Overview of portfolio management from the point of view of a trust officer, mutual fund manager, pension fund manager, or other manager of securities. Emphasizes the need of financial managers for an understanding of problems, trends, and theory of portfolio management.

5013*
Business Finance. Prerequisite: graduate standing. An introduction to the major areas of business finance: the financial environment in which business decisions are made and the institutions found therein, the financial management practices of a firm securing financing and allocating resources among competing alternatives, and the valuation of financial assets available to the firm and individuals. Not available for MBA credit.

5053*
Theory and Practice of Financial Management. Prerequisite: ACCT 5103. Concepts and theories applicable to the financial administration of a firm. Cases, problems and readings to illustrate various financial problems and techniques of solution.

5213*
International Business Finance. Prerequisite: 5053. Theories and financial management practices unique to business firms which operate in, or are influenced by, an increasingly global economy.

5223*
Investment Theory and Strategy. Prerequisite: 5053. Selected investment topics and advanced portfolio management techniques.

5243*
Financial Markets. Prerequisite: 5053. An analysis of the structure of financial markets, the determination and behavior of interest rates, the functioning of and the flow of funds.

5550*
Special Topics in Finance. 1-6 credits, maximum 6. Prerequisite: 5053. Theoretical and applied aspects of specialized financial areas. Evaluation of models, current trends and problems.

5613*
Corporate Financial Planning. Prerequisite: 5053. Financial planning in a systems framework. An integration of existing financial theory and practice. Financial planning systems allowing the manager to acquire an overview of the various functions of the firm; to examine alternative courses of action with speed and thoroughness; to reduce the response time in reacting to change in the environment and to improve future decisions by learning from feedback of previous decisions.

5763*
Derivative Securities and the Management of Financial Price Risk. Prerequisite: 5053. Differing amounts of financial price risk for individuals and corporations in volatile financial environment. The development of arbitrage-based models for the pricing of derivative securities, and the use of a full range of derivative securities to manage exposure to financial price risk.

6513*
Theory of Finance. Prerequisite: 5053. Development of theoretical structure of financial decisions beginning with case of certainty and moving to uncertainty models. Fundamental decisions of investment, financing, and production within the context of economic theory of choice and capital market equilibrium.

6660*
Seminar in Finance. 3-6 credits, maximum 12. Prerequisite: consent of instructor. Advanced research with emphasis on theoretical problems and solutions. Selected topics covered.

Fire Protection and Safety Technology (FPST)

1213

Fire Safety Hazards Recognition. Lab 3. "The Fire Problem." Physical, chemical and electrical hazards and their relationship to loss of property and/or life. Safe storage, transportation and handling practices to eliminate or control the risk of fire in the home, business and industry.

1373

Fire Suppression and Detection Systems. Lab 3. The design, installation, maintenance and utilization of portable fire-extinguishing appliances and pre-engineered systems. Operational capabilities and utilization requirements of fire detection and signaling systems. Fire detection and suppression applied in practical laboratory problems.

2023

Introduction to Occupational Safety Techniques. Lab 3. Occupational facilities, equipment and operations and their inherent hazards. Directed toward worker, machine and environmental control.

2050

Studies in Loss Control. 1-4 credits, maximum 6. Prerequisites: consent of instructor and adviser. Problems in applied fire protection technology, occupational safety, industrial hygiene or hazardous materials management of particular interest to the loss control specialist.

2153

Fire Protection Management. Applied human relations, technical knowledge and skills for achieving optimum effectiveness from a fire protection organization.

2243

Design and Analysis of Sprinkler Systems. Lab 3. Prerequisites: 1373, 2483, ENGR 1322 or GENT 1153. Detailed current standards for selection, design, installation, operation and maintenance of automatic fire suppression systems. Laboratory problems on applicable technological principles.

2344

Elements of Industrial Hygiene. Lab 3. Prerequisite: CHEM 1225. Toxic or irritating substances, physical, biological, ergonomic and other occupational stress factors causing employee illness or discomfort. Environmental pollution sources and controls.

2483

Fire Protection Hydraulics and Water Supply Analysis. Lab 3. Prerequisites: 1373 and MATH 1513. Fluid flow through hoses, pipes, pumps and fire protection appliances. Water supply and distribution analysis using hydraulic calculations. Testing techniques to detect anomalies in design or performance capabilities.

2650

Technical Problems and Projects. 1-4 credits, maximum 4. Special problems or projects assigned by advisers with the approval of the department head. A comprehensive written report or equivalent creative effort.

3013

Industrial Safety Organization. Survey course. Recognition, evaluation and control of occupational health and safety hazards. Accident prevention, accident analysis, training techniques, workman's compensation insurance, guarding and personal protective equipment.

3113

Advanced Extinguishing Systems Design and Analysis. Prerequisites: 2483, 2243. Automatic fixed fire-extinguishing systems and water supply systems. Emphasis upon computer assistance through use of existing design programs.

3143

Structural Designs for Fire and Life Safety. Lab 3. Prerequisites: 1213, 1373, 2243. Building construction standards and codes to assure maximum life and property safety from fires, explosions and natural disaster. Egress design specifications, occupancy and construction classifications and fire protection requirements for building construction and materials.

3233

Radiological Safety. Lab 2. Ionizing radiation problems: detection and measurement, shielding and exposure limiting, radiation health aspects, storage, handling and disposal.

3713

Hydraulic Design of Automatic Sprinkler Systems. Prerequisites: 1373, 2483, MATH 1513. Hydraulic calculation technique for the design and analysis of automatic sprinkler fire extinguishing systems.

3723

Industrial Fire Pump Installations. Prerequisites: 2483, MATH 1513. Applications, design and analysis of industrial fire pump installations. Graphical analysis of fire pump contributions to existing fire protection water supply systems emphasized.

3733

Sprinkler System Design for High Piled and Rack Storage. Prerequisites: 2243, MATH 1513. Specific design techniques for sprinkler system protection of commodities stored in solid piles or racks over 12 feet in height.

4050

Special Problems in Loss Control. 1-4 credits, maximum 6. Prerequisite: consent of department head. Special technical problems in fire protection and safety.

4133

Industrial Hygiene Instrumentation. Lab 3. Prerequisites: 2344, CHEM 1225, PHYS 1114. Description, operation and application of quantitative instruments in general use in industrial hygiene.

4153

Issues in Local Government and Fire Services. Prerequisites: 2153, MGMT 3013. Issues relating to the proper operation of a fire department and the fire department's role within the structure of local government.

4333

System Safety Management. Lab 3. Prerequisites: 2344, 3013, 3143 and STAT 4013 or 4033. Fire/safety techniques to recognize, evaluate and control potential occupational hazards. Critical path, LAD, PERT and human factors concepts.

4373

Fire Dynamics. Prerequisites: CHEM 1515 or 1225 and ENSC 2213 or MPT 3433. Fundamental thermodynamics of combustion, fire chemistry and fire behavior. The physical evidence left by fire for investigation. Use of computer models to study fire behavior.

4403

Hazardous Materials Incident Management. Lab 3. Prerequisites: 3013, CHEM 1225. An interdisciplinary approach to hazardous materials incident management. Legislative requirements. Emphasis on comprehensive safety and health program compliance relating to hazardous materials incidents or waste sites. Regulatory code activities, transport-related inspections, incident modeling, and use of environmental safety software for problem solving and documentation.

4684

Industrial Loss Prevention. Lab 3. Prerequisites: prior or concurrent enrollment in all other required FPST courses and ENGL 3323 or consent of instructor. Specific industrial processes, equipment, facilities and work practices for detecting and controlling potential hazards.

4993

Advanced Fire and Safety Problems. Prerequisites: prior or concurrent enrollment in all other required FPST courses. Selected problems in the fire, occupational safety, occupational health and industrial security areas. Research or state-of-the-art technologies to prevent or correct such problems.

Foreign Languages and Literatures (FLL)

The Department of Foreign Languages and Literatures offers courses under the prefix FLL, and in the following languages each of which has its own prefix: Chinese, French, German, Greek, Japanese, Latin, Russian and Spanish. These languages are listed in alphabetical order.

1000

Special Studies in Foreign Languages and Literatures. 1-10 credits, maximum 10. Special studies in areas not regularly offered; basic level.

2000

Special Study in Foreign Languages and Literatures: Intermediate. 1-5 credits, maximum 10. Prerequisite: 10 hours or equivalent in target language (applies only to language course). Special study in areas other than those offered in regular program; intermediate level.

2103

(H)Masterworks of Western Culture: Ancient and Medieval. Ideas and values of Western culture as revealed through literary, artistic, historical, and philosophical contexts from Greek, Roman, and Medieval periods.

2203

(H)Masterworks of Western Culture: Modern. Ideas and values of Western culture as revealed through literary, artistic, historical, and philosophical contexts from the Renaissance to the Modern period.

2443

Languages of the World. A comprehensive survey of world languages. The essential structural and historical organization of languages. The process of languages as a basic human function. Same course as ENGL 2443.

3500

Specialized Study in a Modern Foreign Language. 1-20 credits, maximum 20. Lab 1-5. Prerequisite: consent of instructor. Instruction and/or tutorial work in a modern foreign language other than those offered in a major program.

3503

(H)Asian Humanities: China and Japan. The many-faceted cultures of China and Japan from the first expression in poetry and philosophy through popular stories, plays and novels of later times, with continuing attention to music and art.

4000

Specialized Studies in Foreign Languages and Literatures. 1-9 credits, maximum 9. Lab 1-9. Prerequisite: junior standing or consent of instructor. Individual guided study, tutorial or seminar on specially selected topics in a foreign language or literature.

4993

Senior Honors Thesis. Prerequisites: departmental invitation, senior standing, Honors Program participation. A guided reading and research program ending with an honors thesis under the direction of a senior faculty member with second faculty reader, both of whom will be present at an oral defense of the thesis. Required for graduation with departmental honors in any foreign language major.

5210*

Graduate Studies in Foreign Languages. 1-6 credits, maximum 20. Prerequisite: 15 upper-division hours in the language. Graduate studies in foreign languages.

Forestry (FOR)

1123

Elements of Forestry. Lab 3. Survey of forestry as an art, science and profession including forestry and natural resource management theory, forest resource distribution and ownership, historical development, administrative agencies, forest protection, wildlife interactions, forest recreation, and career opportunities; lab fieldwork in wood science, tree identification, land and tree measurements, and mapping. One required three-day field trip.

1211

History and Issues of Forest Policy. Introduction to forest resources policy development in the United States and the effects of policy on the administration and management of forest resources. Discussion of policy implications of some current resource management issues.

2002

Timber Harvest Planning. Theory and strategies of planning and management of timber harvesting operations, including methodology, techniques, equipment, environmental quality and safety elements.

2003

Forest Mensuration I. Lab 3. Prerequisites: 1123; MATH 1715 (or MATH 1513 and 1613); STAT 2013 (or concurrent). An introduction to the measurements of forests, forest products, standing trees, growth, and the application of mensurational techniques to timber valuation and analysis. Measurement techniques of non-timber components of forest resources.

2134

Dendrology. Lab 4. Identification, taxonomy and distribution of forest trees and shrubs of the United States; their environmental requirements and utilization.

3001

Multiple Use and Values of Forest Resources. Lab 3. One-week segment of an eight-week summer field session. Use, values and management of forests and associated natural resources including wildlife, watershed, recreation, range, wilderness, minerals and timber. Visits to natural resource agency lands and projects.

3003

Forest Mensuration II. Lab 8. Prerequisite: 2003. Three-week segment of an eight-week summer field session. Field study emphasis on use and care of measurement equipment, the statistical and physical design of forest sampling methods, and special topics in individual tree and stand-level mensuration.

3011

Logging and Milling Operations. Lab 3. Prerequisite: 2002. One-week segment of an eight-week summer field session. Analysis of systems, methodology and linkages of logging and forest product manufacturing operations.

3013

Silvics and Field Silviculture. Lab 8. Prerequisites: 2134; BIOL 1403. Three-week segment of an eight-week summer field session. Field study of forest ecological relationships; examination and measurement of site productivity and stand dynamics; natural role and behavior of fire in forest ecosystems; use of fire as a management tool and control of wildfire; concepts of forest watershed management; examination of silvicultural practices in major forest regions of North America.

3213

(N)Forest Ecology. Lab 3. Prerequisites: BIOL 1304 and 1403 or consent of instructor. Study of the forest ecosystem, its structure and function, physical environment, biotic component and change over time and its management implications. Two weekend field trips required.

3223

Silviculture. Lab 3. Prerequisite: 3213. Principles and techniques of natural and artificial regeneration, intermediate cultural treatments, and silvicultural systems applicable in various forest cover types. Two-day field trip may be required.

3553

Wood Properties. Lab 2. Structure, properties, identification, utilization and preservation of wood.

3643

(N)Forest Environmental Science. Overview and analysis of forests, their related environments, their associated natural resources, and their tangible and intangible values, emphasizing basic principles of scientific forest management, the use of forest resources by society, natural resource administration and policy, and current issues in forestry. No credit for forestry majors.

3663

Forest Biometrics. Lab 2. Prerequisites: 3003; MATH 2103. The application of statistical methods to forestry problems including stand volume estimation, growth measurement, and volume table construction. Introduction to the use and significance of forest yield tables in forest management. Applications of microcomputing to analysis of forestry data.

3883

Aerial Photogrammetry and Information Systems. Lab 3. Prerequisite: MATH 1613. Principles and techniques of aerial photogrammetry, remote sensing, aerial photo interpretation, and geographic information systems. Emphasis on applications to management of natural resources utilizing photogrammetric instrumentation and geographic information system software.

3993

Forest Economics and Finance. Prerequisites: 3223 or concurrent enrollment, 3663; AGECE 1114; MATH 2103. Economic factors and analytical methods influencing decisions in forest resource management; factors affecting the production of wood products; arithmetic of interest and investment criteria; economics of nonmarket goods.

4113*

Forest Products. Lab 2. Prerequisite: 3553. Diversity, uses and distribution of forest products. Manufacture and processing of solid wood, wood-derivative and paper products.

4223*

Timber Management. Lab 2. Prerequisites: 3223, 3993. Regulation of forest growing stock to meet management objectives. Land and timber appraisals. Organization of the forest enterprise to meet financial objectives of management. Four-day field trip may be required.

4333*

Forest Resource Management: Planning and Decision Making. Lab 2. Prerequisites: 3223, 4223, any computer science course, senior standing or consent of instructor. Integrated problem solving, to apply biological, quantitative, economic, political, and administrative principles in solving forest resource management problems.

4443*

Forest Administration and Policy. Prerequisite: senior standing. Forest policy and legislation; personnel matters, organization, supervision and financing of federal, state and private forest enterprises.

4500*

Forest Problems. 1-3 credits, maximum 3. Prerequisites: upper-division standing, GPA of 2.50 or better and consent of instructor. Selected problems in forestry.

4553*

Forest Recreation. An analysis of planning, management, administration and use of forests and related wildlands for recreation, including an overview of public agency and private sector recreation resources, programs, and policy; social foundations of recreation; measurement and evaluation of recreation resource settings, activities, experiences, and use-impact; resource operations and interpretive services; and wilderness management. One required three-day field trip.

4563*

Forest Ecophysiology. Prerequisite: BIOL 1403. The growth and response of trees and forests to environmental, cultural and genetic factors. Application of physiological principles in predicting the effects of cultural practices on tree growth.

4601*

Contemporary Issues in Forestry and Natural Resources. Prerequisite: senior standing. Exploration and discussion of current issues related to the values, use, and management of forests, natural resources, and the natural environment.

4613*

Advanced Forest Biometrics. Lab 2. Prerequisite: 3663. Application of mathematical and statistical methods to the unique characteristics of forest trees and stands. Development of models for individual tree taper and volume. Theory and development of growth and yield models.

4773*

Forest Genetics and Tree Improvement. Prerequisite: 3213, BIOL 3034, or consent of instructor. A review of mechanisms and principles of inheritance, study of natural variation in forest populations, variation patterns, types and uses of variation, and application of this knowledge to forest tree improvement methods and programs as part of forest and nursery management systems.

4811*

Forest Hydrology Laboratory. Lab 2. Prerequisite: 4813, previous or concurrent. Techniques to evaluate the hydrologic processes and characteristics of forest and other wildland water sheds; precipitation, runoff, infiltration, erosion processes. Water quality assessment in wildland settings.

4813*

Forest Hydrology and Watershed Management. Lab 2. Prerequisite: senior standing. Hydrologic processes and characteristics of forest watersheds, effects of forest practices on water quantity and quality, management techniques for improving and protecting water resources, measurement techniques for obtaining hydrologic data. One required field trip.

4823*

Land Use and Water Quality. Lab 2. Prerequisite: senior standing. The effects of land use on basic watershed hydrology, nutrient cycling, soil erosion and nonpoint source pollution from forest, range, agricultural and urban land uses. Discussions of current water quality legislation. Lab focused on water quality monitoring and prediction techniques. One three-day field trip required.

5000*

Research and Thesis. 1-6 credits, maximum 6. Open to students working for a Master of Science degree in forest resources.

5003*

Productivity of Forest Stands. Lab 2. Prerequisites: 3223, AGRON 2124, STAT 5013 or equivalent. Integrated study of the ecological, and genetic factors controlling the productivity of forest stands. Analysis of natural, economic and social factors influencing silvicultural treatment of forest stands. Tree and stand response to silvicultural manipulation.

5010*

Graduate Seminar. 1 credit, maximum 2. Presentation of current and new concepts in forest land management and research techniques for their investigation. Required for the Master of Science degree.

5030*

Advanced Forestry Problems. 1-3 credits, maximum 9. Individual problems in advanced forestry subject-matter appropriate to students with capability at the master's level.

5033*

Quantitative Forest Management and Biometrics. Prerequisites: 3663 or equivalent; STAT 5013 concurrently or equivalent. Quantitative description of forest populations and modeling of the dynamics of forest growth, quantitative timber management including applications of linear programming and related techniques for management of forest populations.

5043*

Forestry Research Methods. Methods used in forestry research; choice of biological materials and species; experimental design in forestry, analysis of forest data and interpretation of results for integrated forest.

5623*

Advanced Plant Biotechnology Methods. Lab 4. Prerequisites: BIOC 3653, BIOL 3024 or equivalent or consent of instructor. Overview of current theory and principles of biotechnology and laboratory experience with contemporary techniques and experimental methods used in plant biotechnology, including genome analysis, gene transfer, identification and isolation of genes and their products, and regulation of gene expression in plants.

6000*

Research and Thesis. 1-9 credits, maximum 30. Prerequisites: admission to program and consent of major professor. Research and preparation of thesis required of candidates for the Ph.D. in crop science, environmental science, plant science or associated Ph.D. programs.

French (FREN)

1115

Elementary French I. Lab 1 1/2. Main elements of grammar and pronunciation, with work on the four basic skills of listening comprehension, speaking, reading and writing.

1225

Elementary French II. Lab 1 1/2. Prerequisite: 1115 or equivalent. Continuation of 1115.

2002

Accelerated Intermediate French. Prerequisite: departmental placement test. Rapid overview of basic French grammar. Designed for incoming first-year students with enough previous French to test out of 1115, but not ready for second-year courses.

2112

(I)Intermediate Reading and Conversation I. Lab 1. Prerequisite: 1225 or equivalent competence. (May have been gained in high school.) Reading and discussion of simpler French texts, mostly cultural. May be taken concurrently with other 2000-level French courses.

2113

(I)Intermediate French I. Lab 1. Prerequisite: 1225 or equivalent competence. (May have been gained in high school.) Review and further presentation of grammar and pronunciation; consolidation of basic skills, with additional emphasis on writing. May be taken concurrently with other 2000-level French courses.

2232

(I)Intermediate Reading and Conversation II. Lab 1. Prerequisite: 2112 or equivalent competence. (May have been gained in high school.) Reading and discussion of more advanced French texts, mostly literary. May be taken concurrently with other 2000-level French courses.

2233

(I)Intermediate French II. Lab 1. Prerequisite: 2113 or equivalent competence. (May have been gained in high school.) Continuation of 2113. May be taken concurrently with other 2000-level French courses.

3073

(I)French Conversation. Prerequisite: 20 hours of French or equivalent. Colloquial speech, with discussion of French newspapers and magazines. Practice in brief public address in French.

3203

(I)Advanced Written Expression. Lab 1. Prerequisite: 20 hours of French or equivalent. Practice in composition and stylistics, designed to bring students up to a high level of proficiency in writing. May be taken before or after 3213.

3213

(I)Advanced Grammar. Lab 1. Prerequisite: 20 hours of French or equivalent. May be taken before or after 3203.

3343

(I)Business French. Prerequisite: 20 credit hours of French or equivalent. Applied French for students in commercial and technical fields. Overview and strategies of business and economic climate in France.

3463

(I)Advanced Diction and Phonetics. Lab 1. Prerequisite: 20 credit hours of French. Required course for teacher certification. French speech sounds and intonation patterns, with practice to improve the student's pronunciation.

3853

(H,I)Introduction to Analysis of French Literature. Prerequisite: 20 hours of French or equivalent. Close reading of shorter texts in a variety of literary genres, with presentation of French versification and literary terminology.

3902

(I)Orientation to Internship Abroad. Prerequisites: 12 hours of French or equivalent proficiency. Preparatory course for summer practicum in French-speaking country.

3903

(I)Internship Abroad. Prerequisite: 3902. Practical studies in a French-speaking country. Supervised research papers and reports, and oral testing, during and following the practicum.

4153

(H,I)History of French Literature I. Prerequisite: 20 credit hours of French or equivalent. Historical survey of French literature before 1700, with reading of representative texts.

4163

(H,I)History of French Literature II. Prerequisite: 20 credit hours of French or equivalent. Historical survey of French literature of the eighteenth century, with reading of representative texts.

4173

(H,I)History of French Literature III. Prerequisite: 20 credit hours of French or equivalent. Historical survey of French literature of the nineteenth century, with reading of representative texts.

4183

(H,I)History of French Literature IV. Prerequisite: 20 credit hours of French or equivalent. Historical survey of French literature of the twentieth century, with reading of representative texts.

4333

(H,I)Background of Modern French Civilization. Prerequisite: 20 credit hours of French or equivalent. Capstone course.

4550

(I)Directed Studies in French. 1-3 credits, maximum 9. Lab 1-2. Prerequisite: 20 credit hours of French or equivalent. Individual or group study of French language or literature.

4573

(H,I)Modern French Theater. Prerequisite: 20 credit hours of French or equivalent. Analysis of French plays from the 19th and 20th centuries.

5110*

Advanced Studies in French. 1-3 credits, maximum 9. Prerequisite: 15 credit hours of upper-division French. Discussion or research in specialized topics.

General Engineering (GENG)

4010

Senior Design Project. 2-4 credits, maximum 4. Prerequisite: senior standing in general engineering. Capstone design project through independent application of engineering principles and concepts from the disciplines covered in earlier course work.

5000*

Thesis. 1-6 credits, maximum 6. Prerequisite: approval of major professor. Thesis or report.

5030*

Engineering Practice. 1-12 credits, maximum 12. Professionally supervised engineering problem involving authentic projects for which the student assumes a degree of professional responsibility. Activities must be approved in advance by the student's adviser and may consist of engineering experience on-campus or off-campus or both. Periodic reports both oral and written required as specified by the adviser.

5110*

Seminar. 1-6 credits, maximum 6. Prerequisite: approval of major professor. Independent or guided study in a topic area selected to enhance a student's program.

6000*

Research and Thesis. 1-30 credits, maximum 30. Prerequisites: consent of graduate committee and approval of student's advisory committee. Independent research under the supervision of a member of the graduate faculty for students pursuing work beyond the master's level.

6110*

Advanced Study. 1-12 credits, maximum 12. Prerequisite: approval of the student's advisory committee. Advanced study and investigation under the supervision of a member of the graduate faculty parallel in interest and advanced to and supported by the 5000-series courses.

General Technology (GENT)

1153

Engineering Graphics. Lab 6. Sketching, manual drafting and CAD generation of engineering drawings to ANSI standards. Interpretation of typical industrial drawings. Students with two years high school or one year practical ANSI drafting/CAD may substitute an advanced course in mechanical engineering technology with consent of their advisers.

1223

Manufacturing Processes. Lab 3. Basic methods and processes of fabrication including metrology, conventional machining, casting, hot and cold forming, and include machining and metrology.

2050

Advanced Technological Problems. 1-4 credits, maximum 6. Prerequisites: consent of instructor and adviser. Problems in applied engineering science that are of particular interest to the engineering technician.

2323

Statics. Prerequisites: MATH 1613 and PHYS 1114. Forces acting on bodies at rest; forces, moments of force, distributed forces, reactions, free-body diagrams, friction, internal forces and moments of inertia. Applications.

2650

Technical Projects. 1-4 credits, maximum 4. Prerequisite: completion of three semesters' work in a technical institute curriculum. Special projects assigned by advisers with the approval of the director. A comprehensive written report must be prepared and an oral examination may also be required.

3113

Principles of Supervision. Prerequisite: junior standing. A study of the fundamental principles of organizing, planning, staffing, controlling and directing as applied to first-line supervisory roles in industry.

3123

Applied Analysis for Technology. Prerequisite: MATH 2133 or equivalent. Applications of elements of matrix algebra, ordinary differential equations, and infinite series to problems in engineering technology.

3323

Strength of Materials. Prerequisites: GENT 2323 and MATH 2123. Stress and strain and their relation to loads. Axial, torsional and bending loads, beam deflection, columns and combined stresses. Applications emphasized.

3433

Basic Thermodynamics. Prerequisite: MATH 2123. Basic scientific principles of energy and the behavior of substances as related to engines and systems. Gas laws, vapors and engine cycles.

4433

Heat Transfer. Prerequisites: MATH 2133. Conduction, convection, radiation, condensation and boiling heat transfer. Heat exchangers. Prediction of heat transfer rates. Retardation and enhancement of heat transfer.

Genetics (GENE)

5102*

Molecular Genetics. Prerequisites: BIOC 3653 or BIOL 3014 and one course in genetics or consent of instructor. An introduction to molecular genetics on the graduate level.

Geography (GEOG)

1113

(I,S)Introduction to Cultural Geography. A thematic approach to the study of human groups and activities around the world, including agricultural practices, demographic trends, political behavior, religious beliefs, language patterns, folk and popular cultures, ethnicity and ethnic landscapes, urbanization, and industrialization.

1114

(L,N)Physical Geography. Distribution and analysis of natural features of the earth. Landforms, soils, minerals, water, climates, flora and fauna. Emphasis on human-environment relations where appropriate.

2253

(I,S)World Regional Geography. The world's major culture regions, with emphasis on geographic aspects of contemporary economic, social and political relationships with the physical environment.

2343

Introduction to Geographic Information Systems. Lab 2. Survey of a variety of resource management and socioeconomic applications using geographic information systems (GIS) technology.

3023

(N)Climatology. Characteristics and distribution of world's climate. Patterns and associations of temperature, precipitation, pressure and winds. Regional climates of Earth. Climate change.

3033

(N)Meteorology. A non-quantitative introduction to weather. Physical elements which cause and influence weather. Interpretation of weather maps and satellite imagery.

3123

(S)Urban Geography. Locational aspects of urbanization; functions of and relations among cities and between cities and rural areas; internal structure of urban areas.

3133

(I,S)Political Geography. Political structures, relationships and geopolitical implications of location, boundaries, culture and the natural environment of nations and states. Global patterns of political behavior, political history, international law and geostrategy.

3153

(S)Conservation of Natural Resources. Problems and corrective methods of conservation of land, water, forests, wildlife, minerals and people.

3163

(S)Economic Geography. Processes significant to the spatial structure of economic systems. Production, consumption and exchange activities examined in regard to location, distribution, aerial differentiation and spatial interaction patterns. Attention given to processes of change as well as to steady states.

3173

(S)Cultural Geography. Geographic impact of human cultures. Emphasis on the concepts of social space, density, crowding, territoriality, diffusion, migration, environmental perception and cultural landscape.

3333

Spatial Analysis. Prerequisite: STAT 2013. The utility and application of modeling and statistics to spatial problem solving. The role of quantitative methods in geographic research.

3703

(S)Geography of Oklahoma. Geographic interpretation of physical, economic, historical and scenic features.

3713

(S)Geography of the United States and Canada. A regional analysis of the United States and Canada, including physical and cultural landscapes, population and migration trends, regional development, natural resources, US-Canada relations and global relations.

3723

(I,S)Geography of Europe. Analysis of the physical and human geography of Europe, including the distribution of physical features and natural resources, patterns of population change, and the geographic background to Europe's major contemporary social, political, economic, and environmental problems.

3733

(I,S)Geography of Russia and its Neighbors. A regional analysis encompassing cultural, economic and physical features.

3743

(I,S)Geography of South America. Areal distribution and analysis of physical, cultural and economic features of South America.

3753

(I,S)Geography of Asia. Systematic interpretation of significant spatial patterns of man and natural environment. (Exclusive of the USSR.)

3763

(I,S)Geography of Africa. General patterns and impact of population, cultural heritage, and natural resources in Africa. Historic and contemporary relationships between Africa and Western civilization. Divergent perspectives (debate) on development, government and conflict in Africa.

3773

(I,S)Mexico, Central America and the Caribbean. A real distribution and analysis of physical, cultural, and economic features of Mexico, Central America and the Caribbean.

3783

(I,S)Geography of the Middle East and Southwest Asia. A regional analysis of the Arab, Persian and Turkic lands, including the biophysical environment, agriculture, resource use, cultural patterns, urbanization, economic development, hydrogeology and conflict.

3793

(I,S)Geography of Australia and the Pacific Realm. Systematic survey of Australia, New Zealand, and the island regions of Micronesia, Melanesia, and Polynesia including a study of human and environmental relations, factors affecting the spatial distribution of human groups and the activities, cultural diversity, and the way in which external involvement, both in the past and present, has shaped this region.

3910

Applied Geographical Topics. 1-3 credits, maximum 6. Specialized physical, human, regional, or technical issues and trends in geography.

4043*

Applied Climatology. Prerequisite: 3023, 3033 or consent of instructor. Applications of atmospheric knowledge to human endeavors such as agriculture, water management, and architecture. Use of real-time atmospheric data to solve problems.

- 4053***
Geography of Biotic Resources. Prerequisites: 1114 or BIOL 1404, 1604. Distribution of plants and animals and processes causing distribution. Human impact on biotic resources considered along with policy and management practices.
- 4103**
(H)Historical Geography of the United States. Examination of the spatial dynamics of frontier encounter and settlement, regional development, and cultural landscape evolution in the United States from pre-European to modern times.
- 4113***
Cultural Ecology. Prerequisite: junior or senior standing or consent of instructor. A study in human-environment interaction addressing the processes and patterns of human coping behavior from prehistoric to contemporary periods. Framework for understanding the transformation of cultural and natural landscapes by systematically exploring how culture works to socially and technologically adapt to environmental opportunities and limitations in arctic, alpine, grassland, arid, and tropical environments.
- 4123***
Geographic Aspects of Urban Planning. Prerequisite: 3123. Spatial aspects of urban planning: development of planning theory, various planning tools, and specific problem areas such as urban renewal and urban transportation.
- 4133***
Land and Resource Regulation. Private and public land use controls, water law, mineral law, public land law and legal issues related to resource development.
- 4143***
Geography of Travel and Tourism. A systematic and comprehensive analysis of the geographical dimensions of tourism, illustrating the relevance of a spatial perspective to tourism planning, development, and management. Economic, social, and environmental impact of both domestic and international tourism considered.
- 4153***
Geography of Outdoor Recreation. Analysis of patterns of outdoor recreation with an emphasis on land-use planning in park and wildland areas. Demand forecasting methods, the analysis of the socioeconomic and spatial impacts of recreation facilities provision and visitor management practices.
- 4213**
(S)Geography of Sport. Spatial analysis of sport: its origin and diffusion, geographical organization and regional variation. Geographical movements and interaction associated with sport. Application of geographical solutions for reorganization and reform. Focus on both U.S. and international scene.
- 4223**
(H)Geography of Music. Geographical and historical analysis of music as a cultural trait. The cultural significance of music and how it varies from place to place as well as how it helps shape the character of a place.
- 4243***
(I,S)Geography of the World's Indigenous Peoples. A regional survey of indigenous assertions of cultural, political, and economic self-determination outside the United States. Native land claims, impact of regional development and environmental issues upon indigenous communities, and their efforts to establish geopolitical autonomy.
- 4313***
Field Techniques and Geodata Collection. Modern concepts and techniques for geographical analysis and research including data acquisition and manipulation from field and secondary sources. Field trips.
- 4323***
Computer Cartography. Lab 2. Fundamentals of map compilation and design using computers. Thematic mapping of both socioeconomic and natural resource information. Discussion and application of various map input techniques involving digitizers, scanners, and global positioning system receivers. 2-D and 3-D terrain representation.
- 4333***
Remote Sensing. Lab 2. Prerequisite: junior standing. Use of several types of sensors and imagery in solving problems. LANDSAT imagery use. Uses and limitations of data extraction techniques, manual and computer-assisted. Applications to a variety of specific problems.
- 4343***
Geographic Information Systems: Resource Management. Lab 2. Prerequisite: 2343 or 4333 or consent of instructor. Theory and principles of geographic information systems (GIS) applied to resource management problems using both raster and vector data structures. GIS and remote sensing integration.
- 4353***
Geographic Information Systems: Socioeconomic Applications. Lab 2. Prerequisite: 2343 or 4323 or consent of instructor. Theory and principles of geographic information systems (GIS) applied to socioeconomic problems including location-allocation, market area determination, network analysis, and analysis of demographic characteristics.
- 4413**
History and Philosophy of Geography. Historical research questions and techniques, the structure of contemporary geography and its relations to other fields of study, and future prospects of geography.
- 4510**
Senior Project. 1-3 credits, maximum 3. Lab 1-3. Prerequisites: senior standing and consent of instructor. Individually designed projects involving laboratory work, field work, library research, or a combination of these.
- 4700***
Geographic Regions. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Specialized study of specific local and foreign regions.
- 4910***
Topics in Geography. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Specialized physical, social and methodological topics in geography.
- 4930***
Readings in Geography. 1-3 credits, maximum 6. Prerequisite: consent of instructor. Directed readings on selected topics, regions or methods in geography.
- 4940**
Undergraduate Cooperative Education Internship. 1-3 credits, maximum 3. Prerequisites: consent of departmental adviser and consent of instructor. Practical experience in applying geographical concepts to societal problems. Students work with both agency representatives and faculty members.
- 4993**
Senior Honors Thesis. Prerequisites: departmental invitation, senior standing, Honors Program participation. A guided reading and research program ending with an honors thesis under the direction of a senior faculty member, with second faculty reader, both of whom will be present at an oral defense of the thesis. Required for graduation with honors in geography.
- 5000***
Thesis. 1-6 credits, maximum 6. Open only to students working on the master's degree in geography.
- 5130***
Resource Geography Seminar. 1-3 credits, maximum 9. Prerequisite: consent of instructor. The utility and impact of resource analysis and resource management at national and international scales.
- 5140***
Cultural and Historical Geography Seminar. 1-3 credits, maximum 9. Prerequisite: consent of instructor. Development and critical analysis of research and theory in cultural and historical geography.
- 5150***
Geography of Sport, Recreation and Leisure Seminar. 1-3 credits, maximum 9. Prerequisite: consent of instructor. Spatial perspectives of topics selected in sport, recreation and leisure geography.
- 5313***
Geographical Analysis. Prerequisite: one course in statistics. Application of models and statistics to geographic problem solving.
- 5343***
Advanced Geographic Information Systems. Lab 3. Prerequisite: 4343 or 4353. Theory and methods of design, development, implementation, and applications of geographic information systems.
- 5403***
Current Geographic Research. Prerequisite: graduate standing in geography. Review of recent literature in light of current human and physical geography research themes.
- 5413***
History and Philosophy of Geography. Prerequisite: graduate standing in geography. Identification and evaluation of major themes in geographical research and teaching.
- 5433***
Geographic Education. For both prospective and experienced teachers of geography. Geography's role in the social and behavioral sciences; analysis of geography curricula, comparison of various instructional approaches (traditional and experimental); and examination of current research in geographic education.
- 5450***
Seminar in Geography. 1-6 credits, maximum 6. Prerequisite: graduate standing in geography or consent of instructor. Specialized topics in geography.
- 5510***
Research Problems in Geography. 1-3 credits, maximum 6. Prerequisite: consent of instructor.
- 5940***
Graduate Cooperative Education Internship. 1-6 credits, maximum 6. Prerequisites: consent of departmental adviser and consent of instructor. Practical experience in applying geographical concepts to societal problems. Emphasis on programs in planning and geographic education.
- 6000***
Doctoral Dissertation Research. 1-12 credits, maximum 30. Prerequisites: admission to candidacy and consent of major professor.

Geology (GEOL)

- 1014**
(L,N)Geology and Human Affairs. Lab 2. The influence of geology and related earth sciences on the human environment. Energy and material resources, beneficial and hazardous natural processes, and the planetary and biological evolution of earth. Lab investigations environmentally oriented.
- 1114**
(L,N)Physical Geology. Lab 2. Composition and structure of the earth and the modification of its surface by internal and external processes. Mineral resources, sources of energy, and environmental aspects of geology. A background in precollege science and math is recommended. Field trip required.
- 1224**
(L,N)Prehistoric Life and Development of the Continents. Lab 2. Earth formation and the development of continents and oceans through time including the origin and evolution of life. Field trips required.
- 1613**
(L,N)Inquiry-based Earth Science. Lab 3. Prerequisites: CHEM 1413 and PHYS 1313 recommended. Natural earth systems and their influence on the human environment. Essential aspects of astronomy, meteorology, hydrology and geology. Taught using inquiry methods. Intended for prospective elementary teachers as a model that can be adapted for use in the classroom. Field trip required.
- 2031**
Geologic Field Investigation. Prerequisite: introductory geology. One week of required field study at sites of geological interest and significance.
- 2253**
Practical Mineralogy. Lab 3. Prerequisite: 1014 or 1114. Hand-specimen identification of minerals. Society's dependence on and utilization of mineral resources. Field trips required.
- 2364**
Elementary Petrology. Lab 3. Prerequisite: 2254. Origin, occurrence and classification of rocks; hand-specimen identification. Field trips required.
- 3004**
Earth Science for Teachers. Prerequisite: 1114. Teaching natural earth systems and their environmental impact. Use of an adaptation approach in organizing, presenting, and evaluating earth science concepts in the curriculum.
- 3014**
Structural Geology. Lab 3. Prerequisites: 1224, PHYS 1114 or consent of instructor. Behavior of earth materials during various deformational processes and analysis of the resulting structural features such as folds, faults and fractures. Field trips required.
- 3033***
Stratigraphy. Lab 3. Prerequisite: 1224. Principles of stratigraphy and their applications. Laboratory emphasizes realistic practical problems undertaken in the field and in the laboratory. Field trips required. Nonmajors may receive graduate credit.
- 3043**
(N)Scenic Geologic Regions. Prerequisite: 1014 or equivalent recommended. The geologic characteristics of national parks and scenic regions in North America and throughout the world.
- 3073***
Geomorphology. Lab 2. Prerequisite: 1114 or consent of instructor. Study of land forms and the processes that form them, using topographic maps, air photos, remotely-sensed images, soils maps and field techniques. Field trips required.
- 3103**
(N)Paleontology. Lab 3. Prerequisite: 1224 or consent of instructor. Basic principles of paleontology involving invertebrates, vertebrates and plants. Lab focused on the morphology, identification, paleoecology and biostratigraphy of marine invertebrates. Field trips required.
- 3353***
Methods in Mineralogy. Lab 2. Prerequisite: 2253. Identification of rock-forming minerals using the petrographic microscope. X-ray diffraction and other modern methods of mineral identification.
- 3503**
Environmental Geology. Prerequisite: 1114 or consent of instructor. Application of geologic principles to environmental issues, including human use of the surface and subsurface of the earth and human interaction with extreme natural events such as earthquakes, floods and landslides. Field trip is required.
- 3546***
Field Geology. Lab 6. Prerequisites: 2364, 3014, 3033, 3073. Six weeks of field methods in geology. Required of all geology majors. Transportation and room and board fees required.
- 4023***
Petroleum Geology. Prerequisites: 3014 and 3033. Origin, migration and accumulation of petroleum, requirements for source rock, reservoir rock and traps. Structure and stratigraphy of selected oil fields. Field trips required.
- 4213***
Plate Tectonics. Prerequisite: 1114. Principles and major concepts of plate tectonics, the unifying theory of earth sciences. Geology and plate tectonics evolution of the major mountain chains of North America; Ouachitas, Appalachians, and Cordillerans. Field trip required.
- 4403***
Geochemistry. Prerequisite: general chemistry. Application of chemical principles to geological processes. Processes affecting the composition of surface and ground waters.
- 4453***
Hydrogeology I. The water cycle and ground-water systems as well as general problems related to ground-water occurrence, quantity, quality and pollution. Field trip required.
- 4463***
Hydrogeology II. Lab 3. Prerequisite: 4453 or consent of instructor. Physical ground-water systems. Realistic problems to acquaint students with ground-water occurrence and movement. Geologic, geophysical, hydraulic testing and modeling techniques used to define an actual ground-water system. Ground-water regulations. Field trips required.
- 4563***
Sedimentology. Lab 3. Prerequisites: 3546, senior standing. Sediments, sedimentary processes and sedimentary environments, geometry and internal features of sediments. Field trips required.
- 4663***
(I)Global Geologic Resources. Distribution and analysis of global mineral, energy and water resources. Economic, environmental, social and political impact of selected resources on local to global scales.
- 4990***
Special Problems in Earth Science. 1-8 credits, maximum 8. Prerequisites: 25 hours of geology and permission of instructor. Individually designed study projects involving assigned reading, library work, field work, laboratory work or a combination of these. Field trips may be required.
- 4993**
Senior Honors Thesis. Prerequisites: departmental invitation, senior standing, Honors Program participation. A guided reading and research program ending with an honors thesis under the direction of a senior faculty member, with second faculty reader and oral examination. Required for graduation with departmental honors in geology.
- 5000***
Thesis. 1-6 credits, maximum 6. Prerequisite: approval of graduate committee. Work toward master's thesis in geology.
- 5050***
Problems in Economic Geology. 1-3 credits, maximum 6. Prerequisite: consent of instructor. Individually-designed problems in economic geology. Field trips may be required.
- 5100***
Problems in Hydrogeology. 1-4 credits, maximum 8. Prerequisite: 4453. Advanced problems in hydrogeology with emphasis on quantitative methods. Field trips may be required.
- 5150***
Problems in Engineering Geophysics. 1-3 credits, maximum 3. Prerequisite: consent of instructor. Advanced problems in engineering geophysics with emphasis on problem solving. Field trips may be required.
- 5183***
Advanced Paleontology. Lab 3. Prerequisite: 3103 or equivalent. In depth study of selected fossil groups with emphasis on marine micro-paleontology. Student projects on assigned fossil groups with presentation of results both orally and in writing. Field trips required.
- 5203***
Advanced Structural Geology. Lab 3. Prerequisite: 3014. The theoretical, experimental and descriptive approach to structural geology; formation and analysis of rock fractures, and structural geometry. Field trips required.
- 5223***
Advanced Methods in Structural Geology. Lab 3. Prerequisite: 3014. Advanced geometric techniques and analysis of complex structural terrains. Elucidation of geometry and history of geological structures by interpreting seismic reflection profiles and constructing balanced cross-sections. Field trips required.
- 5233***
Trace Elements in Hydrogeology. Lab 2. Prerequisite: CHEM 1515. Examination of the behavior of various trace elements in the aqueous environment. Availability and mobility of selected trace elements, the characterization of geochemical environments, pe-pH stability fields, adsorption and other parameters that affect element mobility. Introduction to thermodynamic water-equilibrium computer programs.
- 5253***
Characterization of Clastic Rocks. Lab 3. Prerequisites: 2253, 2364. Examination of petrology and depositional facies of sandstones and shales. Identification of detrital and diagenetic constituents and determination of paragenetic sequence of diagenetic events. The effect of burial and thermal history on reservoir quality. Field trips required.
- 5283***
Subsurface Geologic Methods. Lab 3. Prerequisites: 3014, 3033. Use of subsurface geologic information from cores and well logs to prepare maps and identify oil and gas prospects. Field trips required.
- 5303***
Applied Geophysics. Lab 3. Prerequisite: PHYS 1214. Principles of exploration geophysics with emphasis on the petroleum and mineral industries. Field trips required.

5353*

Advanced Well Log Analysis. Lab 3. Prerequisite: 3033. The geologic interpretation of a variety of well logs, emphasized, as well as quantitative methods. Some exercises involve concurrent interpretation of well logs and core samples, or well logs and bit cuttings.

5363*

Sedimentary Petrography of Nonclastic Rocks. Lab 3. Prerequisite: 2364. Systematic classification of nonclastic marine and nonmarine sedimentary rocks. Recognition of evidence of depositional environments and diagenesis, using petrographic methods. Field trips required.

5383*

Sequence Stratigraphy. Lab 2. Prerequisites: 5253, 5353, 5363. Principles of sequence stratigraphy including carbonate and siliciclastic dominated intracratonic basins. Integration of surface and subsurface data in projects. Field trips required.

5443*

Engineering Geophysics. Lab 3. Prerequisites: 1114 or 3024; PHYS 1214 or equivalent. Geological aspects of problems associated with environmental engineering, ground-water pollution and regional and urban planning. Problem assessment and field methods. Two required field projects include geophysical surveys using resistivity and seismic refraction methods. Field trip required.

5453*

Advanced Hydrogeology. Lab 3. Prerequisites: 4453, CS 2113 or equivalent, MATH 2145 and 2155 or equivalent. Advanced quantitative techniques used to address ground-water management and pollution. Advanced field and laboratory techniques as well as management and chemical transport models applied to actual field problems and case studies. Field trips required.

5503*

Advanced Environmental Geology. Prerequisite: 3503 or consent of instructor. Utilization of geologic principles to resolve environmental issues in land use, land management and development. Methods of acquiring, compiling, and applying geologic information for site assessment and environmental impact. Application of these methods to an interdisciplinary project. Field trips required.

5523*

Organic Geochemistry. Lab 3. Prerequisite: introductory chemistry. Introduction to some environmental aspects of organic geochemistry. Soils and sediments as pollutant receptors, sources of pollutants and selected aspects of environmental health.

5553*

Environmental Geochemistry. Lab 3. Prerequisite: introductory chemistry. Origin and evolution of natural water quality. Distribution and mobility of elements in the secondary environment. Computational methods for the interpretation of water analyses.

5603*

Basin Analysis. Lab 1. Prerequisites: 3546, 5203, 5223, 5253, 5363. Team-taught course. Interpretations of the evolution of selected sedimentary basins. Emphasis on facies analysis, petrography, diagenesis, and structural evolution. Field trips required.

5710*

Advanced Studies in Geology. 1-4 credits, maximum 8. Prerequisite: consent of instructor. Individual library, laboratory and/or field projects on facets of geology not covered by existing courses. Field trips may be required.

German (GRMN)

1115

Elementary German I. Lab 1 1/2. Main elements of grammar and pronunciation, with work on the four basic skills of listening comprehension, speaking, reading and writing.

1225

Elementary German II. Lab 1 1/2. Prerequisite: 1115 or equivalent. Continuation of 1115.

2112

(I)Intermediate Conversation and Composition I. Lab 1. Prerequisite: 1225 or equivalent competence. (May have been gained in high school.) Colloquial speech patterns and grammar. May be taken concurrently with other 2000-level German courses.

2113

(I)First Readings in German. Prerequisite: 1225 or equivalent competence. (May have been gained in high school.) Selections from German newspapers and other contemporary material. May be taken concurrently with other 2000-level German courses.

2222

(I)Intermediate Conversation and Composition II. Lab 1. Prerequisite: 2112 or equivalent competence. (May have been gained in high school.) Continuation of 2112, with further work in composition, conversation and grammar. May be taken concurrently with other 2000-level German courses.

2223

(I)Introduction to German Literature. Prerequisite: 1225 or equivalent competence. (May have been gained in high school.) Reading and analysis of prose, drama and poetry; literary appreciation. May be taken concurrently with other 2000-level German courses.

3013

(I)German for Reading Requirements I. Reading in the humanities and the sciences. Translation from German to English.

3023

(I)German for Reading Requirements II. Prerequisite: 3013 or equivalent. Intermediate and advanced reading in the humanities and sciences. Translation from German to English.

3343

(I)Business German. Lab 1. Prerequisite: 20 credit hours of German or equivalent. Introduction to business practices and economic environment in Germany. Study of specialized vocabulary.

3463

(I)Advanced Diction and Phonetics. Lab 1. Prerequisite: 15 credit hours of German or equivalent. Required course for teacher certification. German speech sounds and intonation patterns. Practice to improve the student's pronunciation.

3803

(I)Advanced Conversation. Lab 1. Prerequisite: 20 credit hours of German or equivalent. Colloquial speech forms and sentence structure. Practice in brief public address in German.

3813

(H,I)Advanced Grammar and Composition. Lab 1. Prerequisite: 20 credit hours of German or equivalent. Practice in original composition in German. Problematic points of German grammar and stylistics.

3902

(I)Orientation to Internship Abroad. Prerequisite: 20 hours of German or equivalent. Preparation for residential internship in a German-speaking country. Culture, civilization, and contemporary conditions, and communication for students accepted for international cooperative education program.

3903

(I)Internship Abroad. Lab TBA. Prerequisite: 3902. Practical studies in a German-speaking country. Supervised research papers and reports, and oral testing, during and following the practicum.

4153

(H,I)Survey of German Literature I. Prerequisite: 20 credit hours of German or equivalent. German literature from the beginning to 1785.

4163

(H,I)Survey of German Literature II. Prerequisite: 20 credit hours of German or equivalent. German literature from 1785 to the present.

4333

(H,I)Backgrounds of Modern German Civilization. Prerequisite: 20 credit hours of German or equivalent. Historical, cultural, political and literary trends in the formation of German civilization. Capstone course.

4513

(H,I)The Age of Goethe. Prerequisite: 20 credit hours of German or equivalent. Principal figures of German Classicism and Romanticism.

4523

(H,I)19th Century German Theater. Prerequisite: 20 credit hours of German or equivalent. Kleist, Buchner, Grillparzer, Hebbel, Hauptman and others.

4533

(H,I)19th Century German Novelle and Lyric. Prerequisite: 20 credit hours of German or equivalent. Prose and lyric from Romanticism to Naturalism.

4543

(H,I)20th Century German Literature. Prerequisite: 20 credit hours of German or equivalent. Main currents in German literature from Naturalism until present day.

4550

(I)Studies in German. 1-3 credits, maximum 9. Prerequisite: 20 credit hours of German or equivalent competence. Reading and discussion of vital subjects in German.

Graduate (GRAD)

5880*

Graduate Traveling Scholar. 1-24 credits, maximum 24. Prerequisite: graduate degree candidate. Credit will vary depending on the program of each traveling scholar. Enrollment of graduate traveling scholars in academic or research courses.

5883*

Orientation to Gerontology. Prerequisite: graduate standing. Interdisciplinary introduction to the field of gerontology with particular focus on biological, psychological and sociological theories of aging.

5990*

Graduate Research and Teaching Practicum. 1-6 credits, maximum 12. Prerequisite: graduate standing. Graduate-level instructional program in research and teaching techniques and procedures. Graded on pass-fail basis.

6010*

Research or Intern Practicum. 1-9 credits, maximum 12. Prerequisite: graduate standing. Graduate-level internship program for public administration, service or research. Blends the theoretical and absolute phase of the academic with practical on-the-job experience.

Greek (GREK)

1113

Elementary Classical Greek I. Grammar and vocabulary of ancient Greek.

1223

Elementary Classical Greek II. Prerequisite: 1113 or equivalent. A continuation of 1113. Grammar and readings of classical Greek authors.

2113

Elementary Classical Greek III. Prerequisite: 1223 or equivalent. A continuation of 1223. Grammar and readings of classical Greek authors.

2213

Intermediate Readings. Prerequisite: 2113 or equivalent. An introduction to a variety of classical authors to increase reading facility and grammatical comprehension.

3330

Advanced Readings. 1-6 credits, maximum 9. Prerequisite: 2213. Prose authors, epic poetry, drama, Koine Greek and religious texts.

Health and Human Performance (HHP)

1753

Introduction to Physical Education. The nature, scope and significance of physical education. Historical and philosophical foundations, major sub-disciplines and their interrelationships, and career opportunities.

1812

Pedagogy of Outdoor Activities. Prerequisite: HHP and LEIS majors and minors only. Introduction of selected motor skills, activities, methods and theories within outdoor activities. Analysis of skills concepts, terms, safety issues, teaching strategies and developmental appropriateness.

1822

Pedagogy of Rhythm and Movement. Prerequisites: HHP and LEIS majors and minors only. Introduction of basic fundamentals and methods of movement skills for rhythms including social, creative, developmental, and multicultural dance and activities. Analysis of skills, concepts, terms, safety issues, teaching strategies and developmental appropriateness.

1832

Pedagogy of Sports Skills. Prerequisite: HHP and LEIS majors and minors only. Introduction of selected motor skills, activities, methods and theories of individual, dual and team sports. Analysis of skills, concepts, terms, safety issues, teaching strategies, and developmental appropriateness.

1842

Pedagogy of Fitness and Wellness. Prerequisite: HHP and LEIS majors and minors only. Introduction of concepts, technologies and teaching methods for strength training, aerobic conditioning, fitness assessment and stress management. Analysis of skills, concepts, terms, computer applications, safety issues, teaching strategies, and developmental appropriateness.

2052

Sports Officiating. Current rules and techniques. Students who perform satisfactorily may apply for official ratings.

2213

Principles in Health Education and Health Promotion. Introduction to the field of health education and health promotion focusing on health principles, theories, career opportunities and a field experience.

2480

Clinical Experience in Health and Human Performance I. 2-4 credits, maximum 6. Directed observation in supervised laboratory and clinical experiences in appropriate health and human performance areas. Graded on a pass-fail basis.

2602

First Aid. Lab 2. A competency- and performance-based first aid course.

2603

Total Wellness. Overview of individual, interpersonal, and socio-cultural issues that have an impact on health. Behavioral decision making, social relations, cultural diversity and environmental sensitivity.

2653

Applied Anatomy. Action and location of individual muscles and muscle groups. Anatomy as applied to a living person. Common anatomical injuries and diseases will be presented with each joint structure.

2663

Care and Prevention of Athletic Injuries. Prerequisite: 2653. Symptoms of common athletic injuries, their immediate treatment and care.

2712

Psychomotor Development. Prerequisite: HHP and LEIS majors and minors only. Fundamental aspects of motor development for infants, children, youth and adults.

3010

Health and Human Performance Workshop. 1-3 credits, maximum 6. Concentrated study of selected areas of health and human performance, including problems in instruction and administration not usually addressed in the undergraduate curriculum.

3114

Physiology of Exercise. Lab 2. Prerequisite: MATH 1513. A study of the various bodily systems, including major organs and tissues, and how they respond to acute and chronic exercise of varying intensity, duration and frequency.

3223

Motor Learning. An in-depth study of motor learning and motor performance. Special emphasis on skilled performance, motor learning theory, motor abilities and individual differences in motor learning.

3430

Early Laboratory and Clinical Experiences in Physical Education. 1-2 credits, maximum 4. Prerequisites: 1753 and declaration of intention to pursue a program in Teacher Education. The initial preprofessional clinical experience for schools, kindergarten through grade twelve with primary duties including instruction in physical education. Required for full admission to Teacher Education. Graded on a pass-fail basis.

3480

Clinical Experience in Health and Human Performance II. 1-4 credits, maximum 6. Prerequisite: 2480. Directed observation in supervised laboratory and clinical experiences in appropriate health and human performance areas.

3613

Community Health. A survey of issues impacting the health of populations from a community health perspective.

3623

School Health Programs. Prerequisite: 2603. The identity and relationships of school health instruction, services and environments.

3653

Advanced Care and Prevention of Athletic Injuries. Lab 2. Prerequisite: 2663. Advanced techniques applied to athletic injuries.

3663

Biomechanics. Prerequisite: 2653. The study of anatomical mechanical phenomena underlying human motion. Application of biomechanical concepts to a wide variety of exercise, fundamental movement, sport and physical activity.

3713

Principles of Epidemiology. Prerequisites: 2213, 2603. Survey of epidemiological principles as they relate to the planning of both community and consumer-focused health promotion and disease prevention programs.

3753

Methods in Teaching Elementary Physical Education. Prerequisites: 1753, 2712. Theory and practical experience of physical education in the elementary school. Teaching styles and activities needed to meet the needs of children from kindergarten through grade five.

3763

Health and Physical Education for Elementary Age Children. Methods of teaching health and physical education to elementary age children. Theory and practical experience of health behaviors, movement skills and physical fitness.

3773

Methods in Teaching Secondary Physical Education. Lab 2. Prerequisites: 1812, 1822, 1832, 1842, 3663, and 3753; or consent of department head. Instructional styles, implementation of behavioral goals and objectives through unit and lesson preparation, teaching methods, and classroom management.

4010

Directed Study. 1-3 credits, maximum 6. Prerequisite: written approval by department head. Supervised readings, research or independent study of trends and issues related to the area of health, physical education or leisure services.

4033*

Alcohol and Drug Education. Prerequisites: 2603, junior standing or consent of instructor. Examination of pathological and socio-behavioral aspects of drug use, misuse and abuse across an array of populations and social contexts.

4433*

Program Design in Health Promotion. Prerequisites: 2603, 3613. A survey of program design principles including theoretical foundations, planning, marketing, delivering and evaluating.

4480

Internship in Health and Human Performance. 1-12 credits, maximum 12. Prerequisites: last semester senior standing with cumulative GPA of 2.50 and consent of instructor. Supervised experience in school (physical education and health), community, worksite or athletic training settings in order to qualify or prepare for appropriate teaching and professional certification. Graded on a pass-fail basis.

4503*

Applied Health Behavior. Prerequisite: senior standing or consent of instructor. Health assessment and intervention strategies with focus on diet, weight management, stress, substance abuse, consumer health and other current health issues.

4533

Psychosocial Issues in Health Promotion. Prerequisites: 2213, 2603. Survey of psychosocial issues as they relate to the practice of health promotion.

4643

Methods in School and Community Health Education. Prerequisites: 3623; full admission to Teacher Education. Conceptual approach to health education through a variety of teaching methodologies.

4702

Pre-internship Seminar. Prerequisite: junior standing. Capstone course for the health promotion program. Preparation for the health internship experience.

- 4723 Measurement and Evaluation in Health and Physical Education.** Prerequisite: full admission to teacher education. Evaluation techniques commonly used by physical educators and health professionals to measure knowledge, attitudes, sport skill proficiency, and physical fitness.
- 4733 Administration and Program Design in Physical Education and Athletics.** Prerequisites: 3753, 3773 or concurrent enrollment; full admission to teacher education. Design and management of physical education (K-12) and athletic programs.
- 4773 Principles of Exercise Testing and Prescription.** Prerequisite: 3114. Study of principles of exercise testing including submaximal and maximal tests, exercise and basic electrocardiography, and guidelines for recommending exercise as related to health promotion and exercise science.
- 4783* Health and Aging.** Prerequisite: 2603. An in-depth study of physiological aspects, special health needs, chronic illnesses, delivery systems and services for the aging.
- 4793* Adapted Physical Education.** Prerequisite: 3663, 3753, full admission to Professional Education or consent of program head. Cognitive and psychomotor characteristics of disabling conditions, needs and challenges of educating the exceptional learner in the regular physical education program.
- 4863 Theory of Coaching.** Prerequisite: junior standing or 45 hours with 3.25 GPA. The role of coaching, including practical aspects of performance, management and relationships, and management concerns such as drug abuse, stress, academic requirements and legal issues.
- 4903 Therapeutic Modalities for Athletic Injuries.** Lab 1. Prerequisite: 2663. Discussion and application of common electronic and physiologic devices used in the treatment of acute and chronic athletic injuries to the musculoskeletal systems.
- 4923* Rehabilitation of Athletic Injuries.** Lab 1. Prerequisite: 2663. Scientific methods used in therapeutic exercise and rehabilitation of injured athletes. Investigation of mechanisms of injury, anatomical structures involved and methodological approach in designing rehabilitative programs.
- 4933 Administration and Organization of Athletic Training Programs.** Prerequisites: 3653, 4902, 4922. The administration and organization of athletic training programs including planning and implementation, certification procedures, code of professional practice, safety standards, and resource management.
- 4983* Current Issues in Athletic Training.** Prerequisites: 3663 and admission to athletic training program. Development of competencies set by the National Athletic Trainers Association Board of Certification. Current issues facing athletic trainers and the role in today's health care systems.
- 4993* Health and Human Sexuality.** Prerequisite: 2603 or consent of instructor. The study of human sexuality as it relates to the health and well-being of individuals in the community, worksite, college and school setting.
- 5000* Master's Thesis.** 1-6 credits, maximum 6. Independent research required of candidates for master's degree. Credit awarded upon completion of thesis.
- 5010* Seminar.** 1-2 credits, maximum 4. Selected topics from the profession not covered in other courses. Presentation and critique of research proposals and results.
- 5020* Health and Human Performance Workshop.** 1-3 credits, maximum 6. Workshop in selected areas of health and human performance.
- 5023* Legal Aspects of Health, Physical Education and Leisure Sciences.** The law: its application and interpretation as it applies to teachers, coaches and administrators of health, physical education and leisure sciences programs.
- 5030* Field Problems in Health and Human Performance.** 1-3 credits, maximum 6. Individual investigations of issues in the areas of health and human performance.
- 5043* Trends and Issues in Health and Human Performance.** Major trends and issues in health and human performance.
- 5073* Sport: Psychological Aspects.** Psychological foundations of sport emphasizing performance enhancement by athletes through psychological training techniques.
- 5143* Health Promotion Program Implementation and Evaluation.** Prerequisite: 4433 or consent of instructor. An intensive overview of principles of health promotion program planning, implementation, and evaluation, with special emphasis on application.
- 5523* Current Readings in Health.** Contemporary research, literature, projections and views as applied to total health and well-being.
- 5553* Psychomotor Development and Assessment.** Analysis and assessment of typical and atypical psychomotor development. Theoretical knowledge and practical experience in understanding and assessing psychomotor development and function.
- 5593* Human Electrocardiographic Interpretation.** Prerequisites: 3114 and 4773 or consent of instructor. Knowledge concerning the collection and interpretation of the electrocardiogram (EKG) and its relationship to heart anatomy, physiology and electrophysiology.
- 5613* Cardiac Rehabilitation.** Prerequisites: 2653 and 3114 or equivalent. Factors involved in cardiovascular disease. History, implementation and administration of cardiac rehabilitation programs.
- 5663* Physical Education for Students with Learning Disabilities.** Characteristics, psychomotor development and functioning of students with learning disabilities. Knowledge base and practicum experience for providing assessment, prescription and programming services for exceptional learners.
- 5723* Curriculum Development in Health and Physical Education.** Identification and analysis of curriculum theories with emphasis on traditional and innovative approaches to curriculum design for programs in health and physical education.
- 5733* Motor Learning.** Research in psychology and physical education relevant to the understanding of the nature and basis of motor skill learning.
- 5763* Administration of Health, Physical Education, Leisure and Sports Programs in Higher Education.** Essential elements of administration and management including organizational structure and management styles, considerations and functions.
- 5773* Physical Education for Students with Physical Disabilities.** Characteristics, psychomotor development and functioning of students with physical disabilities. Knowledge base and practicum experience for providing assessment, prescription and programming services for learners with physical disabilities.
- 5793* Mechanical Analysis of Physical Education.** Application of physical laws to physical education activities.
- 5823* Advanced Applied Anatomy.** Prerequisite: 2653. Structure and movement of the human body with emphasis on the relationship of physical activity to musculoskeletal and neurological factors.
- 5833* Methods in Physical Education.** Prerequisites: 3753 and 3773. Differentiation between teaching methods in physical education; advantages of the application of the individual methods to particular situations in teaching physical education.
- 5843* Quantitative Biomechanics and Kinesiology.** Prerequisite: 5823. Analytical approach to the study of human motion as applied to kinesiological description and kinematic and kinetic evaluation.
- 5853* Stress Testing and Exercise Prescription I.** Lab 2. Prerequisite: 3114 or equivalent. Theory and practice in resting and exercise EKG, stress test protocols and exercise prescription.
- 5863* Stress Testing and Exercise Prescription II.** Prerequisite: 5853. Theoretical aspects of evaluating functional capacity through stress testing with the development of exercise prescription for special populations with physiological limitations imposed by age, disease, heredity and environment.
- 5873* Human Bioenergetics.** Prerequisite: PE 3114 or equivalent. Human energy production, utilization and storage in response to exercise.
- 5883* Program Development for Adapted Physical Education.** Strategies for designing and implementing adapted physical education programs in public schools. Inclusion of students with disabilities into the regular physical education program.
- 6000* Doctoral Dissertation.** 1-10 credits, maximum 10. Independent research required of candidates for the Ed.D. in applied educational studies. Credit awarded upon completion of the thesis.
- 6010* Independent Study in Health and Human Performance.** 1-3 credits, maximum 6. Prerequisite: consent of instructor. Supervised readings, research or independent study of trends and issues related to the areas of health and human performance.

6020*
Research Colloquium. 1-3 credits, maximum 3. Exploration and presentation of selected topics and research in health and human performance.

6053*
Advanced Research in Health and Human Performance. Prerequisite: graduate elementary statistical methods course. In-depth study of selected surveys and experimental research in HHP, including questionnaire development, survey methodology and analysis of data.

6060*
Statistical Computing and Proposal Writing. 1-3 credits, maximum 3. Prerequisite: consent of instructor. Instruction in the use of SPSS using a personal computer. Preparation of research proposals.

History (HIST)

1010
Studies in American History. 1-2 credits, maximum 2. Special study in American history to allow transfer students to fulfill general education requirements as established by Regents' policy.

1103
Survey of American History. Meaning, vitality, and uniqueness of United States history since 1492 through a thematic examination of the nation's past. Satisfies, with POLS 1113, the State Regents requirement of six credit hours of American history and American government before graduation. No credit for students with prior credit in HIST 1483 or 1493.

1483
American History to 1865. From European background through the Civil War. Satisfies, with POLS 1113, State Regents requirement of six credit hours of American history and American government before graduation. No credit for students with credit in HIST 1103.

1493
American History Since 1865. May be taken independently of HIST 1483. Development of the United States including the growth of industry and its impact on society and foreign affairs. Satisfies, with POLS 1113, State Regents requirement of six credit hours of American history and American government before graduation. No credit for students with credit in HIST 1103.

1613
(H)Western Civilization to 1500. Lab 1. History of western civilization from ancient world to Reformation. Laboratory discussion sessions on interpretation of primary sources in translation.

1623
(H)Western Civilization After 1500. Lab 1. History of western civilization from Reformation to present. Laboratory discussion sessions on interpretation of primary sources in translation.

1713
(H)Survey of Eastern Civilization. History of three eastern civilizations (East Asia, South Asia and West Asia) from pre-history to the 18th century. Special attention to their origins, development, and contributions to the evolution of world civilization.

2323
Oklahoma History. Early exploration and establishment of Indian Territory; the rise and demise of the Five Indian Nations; and the organization and development of the 41st state to the present. Required of all candidates for teacher's licensure/certification in social studies.

3003
(I,S)Soviet Union: History, Society and Culture. A comprehensive view of the Soviet Union, stressing those issues in the political economic, technological, geographical and cultural spheres which are most relevant to the current situation. Accessible to beginning undergraduates. Same course as POLS 3003 and RUSS 3003.

3013
(H)Ancient Near East. The Ancient world from the beginnings of recorded history through the Egyptian, Mesopotamian, Hebrew and Persian civilizations, in addition to the minor civilizations of the area.

3023
(H)Ancient Greece. The Greek world from the Bronze Age through Alexander the Great with special emphasis on politics, culture and institutions of Classical Greece.

3033
(H)Ancient Rome. Political, social, economic and cultural history of the Roman Republic and Empire.

3053
(I,S)Introduction to Central Asian Studies. A comprehensive view of newly-emerged Central Asian states examining the history, politics, economics, geography, and culture of Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan as reflected in their thoughts, religion, literature, and architecture, in the past, and the strategic importance of their natural wealth for the present and future. Same course as POLS 3053 and RUSS 3053.

3113
(I,S)Germany Since 1815. Creation of a centralized state in Germany; impact of World War I and the subsequent failure of the Weimar Republic; rise of national socialism, totalitarianism, and the Third Reich; German experience in WWII, repression of minorities, and the Holocaust; post-war Germany and modern reunification.

3153
(H)Russia to 1861. Political, institutional, societal and economic development of Russia from the Kievan period to the Great Reforms.

3163
(H,I)Russia Since 1861. Modernizations of Russia in the 19th and 20th centuries. Great reforms and their effects and the 1917 revolutions and their consequences.

3173
(H)Eastern Europe, 1000-1800. Formation of the eastern European nations and the influence of Rome, Byzantium, the Ottoman Empire, Russia, Austria and Prussia on them.

3183
(H,I)Eastern Europe Since 1800. Formation and impact of nationalism, industrialization, and power politics on the peoples of eastern Europe.

3203
(H)Early Middle Ages, 325-1000. Economic, social, cultural and religious developments in Byzantium, Islam, and the Germanic West, which succeeded imperial Rome.

3233
(H)Medieval Europe, 1000-1350. High and Late Middle Ages in the West with emphasis on political, social, economic and intellectual development.

3243
(H)Renaissance and Reformation, 1350-1618. Social, cultural, intellectual, political, economic and religious developments which led to the flowering of modern western civilization.

3253
(H)Early Modern Europe, 1618-1815. Economic, social, political, cultural, intellectual and religious transformation of Europe from the opening of the Thirty Years War to the Congress of Vienna.

3263
(H)Modern Europe, 1815-1914. Impact of modernization on the character of European society. Factors that transformed the Continent into a battle ground in the 20th century.

3273
(H,I)Modern Europe Since 1914. Origins, character and impact of the first World War; emergence and consequences of the totalitarian state; nature of political and intellectual terrorism. Effects of worldwide economic depression; dilemmas of modern democracies; political collapse of Europe as a consequence of World War II.

3313
(H)The Old Regime and the French Revolution, 1559-1815. History of France from the outbreak of the religious civil wars in 1559 to the Revolution and Napoleon. Evolution of an agrarian, fragmented society into a strong nation-state.

3323
(H)Modern France, 1815-Present. French politics, economy, society, and culture from the defeat of Napoleon to France's post-World War II "rebirth."

3333
(I,S)History of the Second World War. Problems leading to World War II with their international implications and consideration of the war years.

3343
(H,I)World War I in Modern European Culture. Analysis of the war as the principal event determining the course of twentieth century European history; battles, home fronts, personal, literary, and artistic expression.

3353
(H)Imperial Spain, 1450-1800. The rise and fall of the world's first modern imperial power, from Spain's emergence under the "Catholic kings" to its rejuvenation under the Bourbons, with topics on political, artistic, and cultural history.

3373
(S)Medieval England: 55 B.C.-1485 A.D. English History from Roman Britain to the beginning of the Tudor period. Development of the English constitution from the early Germanic state through feudalism to the New Monarchy.

3383
(S)Tudor-Stuart England. History of England from the War of the Roses through the coming of the House of Hanover in 1714. Development of the centralized state, parliamentary reaction, reorientation of the English society and economy, and the English Reformation.

3393
(S)Modern England: 1714-Present. English history from the arrival of the house of Hanover through the decline of British influence following the Second World War. Political, social, and economic problems encountered as a result of the creation of the first modern industrialized state.

3403
(H)East Asia to 1800. Traditional Chinese civilization and its impact on Japan, Korea and Southeast Asia.

3413
(H,I)East Asia Since 1800. Impact of the Occident on China, Japan and Southeast Asia. Problems of trade and diplomacy; political and industrial transformation of Japan; revolutionary process in China; the rise of nationalism in Southeast Asia.

- 3423**
(H,I)Modern Japan. Modernization process in Japan since 1868.
- 3433**
(H,I)Modern China. Response of China to the West since 1840, with stress on economic, social and intellectual currents.
- 3453**
(H)Colonial Latin America. Impact on the Indian cultures of Spanish and Portuguese conquerors, priests, administrators and entrepreneurs in the creation of a new society. Class structure, 18th century reforms, and independence movements.
- 3463**
(H,I)Modern Latin America. Latin America republics emphasizing the dictators and the liberal reform movements of the 19th century. U.S. involvement and the recent social revolutions of the 20th century.
- 3473**
British Empire and Commonwealth of Nations. Growth and transformation of the British Empire between the Elizabethan Age and World War I. Causes and consequences of the dissolution of the Empire after 1945.
- 3503**
(S)Islamic Civilization 600-1800. Rise of Islam in Arabia and subsequent spread to Africa, Asia and Europe. Nature of Islamic civilization through discussion of political, social, cultural and economic institutions established in the Middle Ages as well as diversity of Islamic traditions.
- 3513**
(I,S)Modern Middle East Since 1800. Main political events, social institutions, cultural and economic developments, as well as various aspects of everyday life in the Middle East since 1800. Transformation of traditional society, imperialism and independence, Arab nationalism, Arab-Israeli conflict, the impact of oil, westernization, the rise of militant Islam, and the prospects of democratization.
- 3523**
(S)South Asia 1200-1947. Development of early modern South Asia from formation of the Delhi Sultanate to India's independence from British colonialism.
- 3613**
(S)American Colonial Period to 1750. Colonization of British and French North America: colonial political, social, cultural, intellectual and economic development; international rivalries; the imperial structure.
- 3623**
(S)Era of the American Revolution. British imperial problems; the American Revolution; political, cultural, economic, social and religious change; the War for Independence; the Articles of Confederation; the critical years.
- 3633**
(S)Early National Period, 1787-1828. Drafting and adopting the Constitution, organizing the government, Jeffersonian Republicanism, the War of 1812, territorial expansion, the new West, nationalism and sectionalism.
- 3643**
(S)The Jacksonian Era, 1828-1850. Development of a modern political system and an entrepreneurial economy; social reform; territorial expansion; and sectionalism.
- 3653**
(S)Civil War and Reconstruction, 1850-1877. Causes, decisive events, personalities and consequences of the disruption and reunion of the United States.
- 3663**
(S)Robber Barons and Reformers: U.S. History, 1877-1919. The impact of industrialization upon American society and politics. America's rise to world power, the Progressive movement and World War I.
- 3673**
(S)United States History, 1919-45. The political, economic, social and cultural changes in the United States from 1919 to 1945, the 1920s, the Depression, the New Deal, WWII, and domestic impact of the war.
- 3683**
(S)United States History since 1945. The United States since WWII; the 1950s and the Cold War, Vietnam, 1960s counter culture, Great Society, Nixon presidency, 1970s "malaise," the Reagan years.
- 3743**
(S)Trans-Appalachian West. Settlement and development of the frontier east of the Mississippi River including the French and Spanish provinces, British occupation, Indian resistance and American conquest through the Jacksonian Era.
- 3753**
(S)Trans-Mississippi West. Emergence of the modern West from Spanish and French settlement and exploration, the Rocky Mountain fur trade, the settlement of Texas, Oregon, California, and Utah, the mining, ranching and farming frontiers, the Indian Wars and transportation.
- 3763**
(S)American Southwest. Southwestern states of Texas, Arizona, New Mexico and California from the Spanish colonial period to the present. Mining, ranching, farming frontiers, Indian wars of the Apache, Comanche and other southwestern tribes, and the emergence of the modern Southwest.
- 3773**
(S)Old South. Social, political and industrial conditions in the South before the Civil War.
- 3783**
(S)New South. Recent history and major current social and economic problems of the southern regions of the United States.
- 3793**
(S)Indians in America. American Indian from Columbus to the present, emphasizing tribal reaction to European and United States cultural contract and government policy.
- 3913**
(S)History of Medicine. Historical growth of medicine and its relationship to the society in which it develops. Scientific problems, cultural, religious, and medicine.
- 3953**
(H,I)Religion in Modern Europe. Religious thought and experience as influences on the politics, economy, and general culture of European nations from the 17th century to the present.
- 3973**
Historical Methods and Interpretations. Required of all history majors. Introduction to historical methods and interpretations.
- 3980**
Studies in History. 1-3 credits, maximum 9. Presented for general audiences. Not intended for history majors.
- 3983**
Historians and the Study of History. Prerequisite: 3973. An exploration of how the craft and theory of history has evolved over the centuries. Special emphasis on the controversies over purposes, methods, and meanings, especially in the 20th century.
- 4063**
Historic Preservation. Focuses on the United States and examines the history and theory of the preservation movement, the legal basis for preservation of the built environment, and the methodology of preservation.
- 4253**
(S)American Foreign Relations to 1917. American experience in foreign relations from colonial times to World War I.
- 4273**
(S)American Foreign Relations Since 1917. America's emergence as the decisive factor in the world balance of power.
- 4353**
(S)American Military History. Civil-military relations, the military implications of American foreign policy, and the impact of technological advances on warfare since colonial times.
- 4463**
(H)American Social and Intellectual History to 1865. American society in nonpolitical aspects: sections, classes, national culture and social structure, immigration, education, religion, reform, world influences; ends with Civil War.
- 4483**
(H)American Social and Intellectual History Since 1865. Continuation of 4463: may be taken independently. Emphasis on nonpolitical aspects of American society and thought and on world influences.
- 4503**
(S)American Urban History. Impact of urbanization upon American communities from 1865 to the present. Evolving political and social institutions, social change, technological innovations and planning theories.
- 4513**
(S)American Economic History. Economic development and economic forces in American history; emphasis upon industrialization and its impact upon our economic society since the Civil War. Same course as ECON 3823.
- 4523**
(S)American Environmental History. Examination of the changing ways society (from Native American to post-industrial) has defined, interpreted, valued, and used nature.
- 4533**
(S)Blacks in America. Achievements of blacks in America and their participation in the development of the United States.
- 4553**
(S)Women in America. Women in pioneer American life, politics, family, work and modern society.
- 4573**
(H)Women in Western Civilization. Women in the development of Western Civilization from the earliest times to the present.
- 4980***
Topics in History. 1-3 credits, maximum 9. For students interested in pursuing either a research or a reading project. Open to honors students in history and to others by permission of the department head.
- 4993**
Senior Honors Thesis. Prerequisites: departmental invitation, senior standing, Honors Program participation. A guided reading and research program ending with an honors thesis under the direction of a faculty member, with second faculty reader and oral examination. Required for graduation with departmental honors in history.
- 5000***
Thesis. 1-6 credits, maximum 6.

5023*
Historical Methods. Methods of historical research and the writing of history.

5030*
Applied History Internship. 3-6 credits, maximum 6. Prerequisite: consent of graduate committee. Supervised practical experience in applied history.

5120*
Reading Seminar in American History. 3 credits, maximum 15. Historiographical and bibliographical study of special areas of American history.

5140*
Reading Seminar in European and World History. 3 credits, maximum 15. Historiographical and bibliographical study of special areas of European and World history.

5220*
Research Seminar in American History. 3 credits, maximum 15. Research in selected problems in American history.

5240*
Research Seminar in European and World History. 3 credits, maximum 15. Research in selected problems in European and World history.

6000*
Doctoral Dissertation. 1-19 credits, maximum 30. Prerequisite: admission to candidacy. Advanced research in history.

6023*
Historiography. Major writers of history, historical schools and patterns of developments in historical interpretation from the earliest times to present.

6120*
Special Studies in History. 1-3 credits, maximum 36. The meaning and operation of the historical processes and develop capabilities for clarity of statement, investigation, and creative, critical attitude. Areas studied vary from semester to semester.

Honors (HONR)

1000
Introductory Honors Topics. 1-3 credits, maximum 6. Prerequisite: Honors Program participation. Introduction to topics in various disciplines by faculty from the undergraduate colleges for freshman and sophomore students in the University Honors Program.

1013
(H)The Ancient World. Prerequisite: Honors Program participation. Interdisciplinary study of art, history, philosophy and literature from ancient Greece and Rome as well as the religious ideas central to Judaism and Christianity. Team-taught by faculty from appropriate disciplines in a lecture and discussion format. For the Honors student. No credit for students with prior credit in HONR 2113.

1023
(H)The Middle Ages and Renaissance. Prerequisite: Honors Program participation. Interdisciplinary study of art, history, philosophy and literature from the Middle Ages to the early Renaissance. Team-taught by faculty from appropriate disciplines in a lecture and discussion format. For the Honors student. No credit for students with prior credit in HONR 2113.

1033
(H)The Early Modern World. Prerequisite: Honors Program participation. Interdisciplinary study of art, history, philosophy and literature from the late Renaissance to the mid-19th century. Team-taught by faculty from appropriate disciplines in a lecture and discussion format. For the Honors student. No credit for students with prior credit in HONR 2223.

1043
(H)The Twentieth Century. Prerequisite: Honors Program participation. Interdisciplinary study of art, history, philosophy and literature from the late 19th century to the present. Team-taught by faculty from appropriate disciplines in a lecture and discussion format. For the Honors student. No credit for students with prior credit in HONR 2223.

1093
Patterns and Symmetry in Mathematics. Prerequisite: Honors Program participation. Tessellations, or repetitive patterns in the plane and in space, and the symmetries, or rigid motions, that preserve them. Illustrations from art, architecture, science, and nature. For the Honors student.

2013
(S)Honors Law and Legal Institutions. Prerequisite: Honors Program participation. An introduction to law in American society with reference to its European origins; its political, economic, psychological, and sociological dimensions; and the substantive law in selected areas. Introduction to legal reasoning and legal research techniques. For the Honors student.

2063
(H)Ethical Issues Across Cultural Perspectives. Prerequisite: Honors Program participation. An introduction to reasoned methods of evaluating ideas and arguments as they pertain to ethical issues from a global perspective. Concepts including obligation, justice, and ethnicity from Lao Tzu, Maimonides, Kant, and Indian wisdom stories. Environmentalism, technology, and cultural knowledge. Team-taught by faculty from appropriate disciplines in a lecture and discussion format. For the Honors student.

2514
(L,N)Honors Scientific Inquiry. Lab 2. Prerequisite: Honors Program participation. A team-taught interdisciplinary course dealing with philosophy of science and the application of the scientific method in the natural and social sciences. Selected topics that involve interdisciplinary scientific inquiry. For the Honors student.

3000
Advanced Honors Topics. 1-3 credits, maximum 6. Prerequisites: Honors Program participation, junior standing. Topical study in various disciplines taught by faculty from the undergraduate colleges for junior and senior students in the University Honors Program.

3013
(H)Holocaust Studies Seminar. Prerequisites: junior standing, Honors Program participation. An interdisciplinary study of one of the problematic events of human history—the Holocaust. Addresses questions of good and evil, divinity and humanity, and truth and responsibility that arise from this event. For the Honors student.

4993*
Honors Creative Component. Prerequisites: Honors Program participation, senior standing. A guided creative component for students completing the requirements for college or departmental honors awards leading to an honors thesis, project or report under the direction of a faculty member from one of the undergraduate colleges, with a second faculty reader and oral examination.

Horticulture (HORT)

1003
Home Horticulture. Offered by correspondence only. An introduction to horticultural practices for the home gardener. Planning and care of home grounds, home orchards and vegetable gardens; selection, use and care of indoor plants. Non-majors only. Credit will not substitute for required courses.

1013
(N)Principles of Horticultural Science. Lab 2. Basic physical and physiological processes responsible for plant dormancy, growth, flowering, fruiting, and senescence with respect to the science and art of production, cultivation, utilization, and/or storage of horticultural plants. Current research associated with various horticultural commodity groups.

2010
Internship in Horticulture. 1-6 credits, maximum 6. Prerequisites: 24 credit hours and consent of adviser. Supervised work experience with approved public and private employers in horticulture and related fields. Credit will not substitute for required courses. Graded on a pass-fail basis.

2112
Indoor Plants and Interior Plantscaping. Lab 2. Identification, cultural requirements and use of ornamental foliage and flowering plants for indoor gardens.

2212
Herbaceous Ornamental Plants. Lab 2. Identification, cultural requirements and landscape value of ornamental flowering herbaceous plants. Discussions of design and installation of herbaceous beds and borders.

2313
Landscape Plant Materials I. Lab 2. Prerequisite: BIOL 1114 or 1403. Identification, adaptation, tolerance and use of deciduous trees, shrubs, vines and ground covers in the landscape.

2413
Landscape Plant Materials II. Lab 2. Prerequisites: 2313. Identification, adaptation, tolerance and use of evergreen trees, shrubs, vines and ground covers in the landscape.

2652
Basic Floral Design. Lab 2. Fundamentals of floral arrangement and design for the home and the retail shop: basic skills useful to flower shop employment and operation.

3014
Business and Practice of Arboriculture. Lab 2. Prerequisites: 3312 and 3322 or FOR 2134, and SOIL 2124. Theory and practice of selecting, planting and maintaining trees, shrubs and vines. Basics of the landscape management business, including estimates for labor, equipment and plant materials; bidding; costs and record keeping; and employee safety.

3084
Plant Propagation. Lab 2. Prerequisites: 1013, SOIL 2124 and BIOL 1403. Principles and practices involved in propagation of plants. Anatomical, morphological and physiological aspects of sexual and asexual methods of regeneration and their importance.

3113
Greenhouse Management. Lab 3. Prerequisites: 1013, 2112, BIOL 1403 and MATH 1213. Commercial greenhouse operation with emphasis on floricultural plant production aspects: environment, growing media, fertilizers and application methods, watering, pest and disease control, chemical growth regulators, production costs.

3153
Turf Management. Prerequisites: 1013, SOIL 2124 and 2 hours plant science. Selection, establishment and maintenance of grass species and other plant materials for special use areas.

3213
Fruit and Nut Production. Prerequisite: BIOL 1403. Commercial production of fruits and nuts, with emphasis on pecan, apple, peach, strawberry, blackberry and blueberry. A two-day field trip is required.

3433*
Commercial Vegetable Production. Prerequisites: 1013, SOIL 2124 and BIOL 1403. Commercial production and marketing of vegetable crops.

3544*
Nursery Production. Lab 2. Prerequisites: 3312 and 3322, SOIL 2124, BOT 3463, PLP 3344 and any course in entomology. The propagation, production, management and marketing of commercial nursery stock.

3553
Advanced Floral Design and Marketing. Lab 2. Prerequisite: 2652. Preparation, arrangement, care and marketing of floral products in the retail shop, advanced designing, pricing, wholesale purchasing and retail selling.

4313*
Commercial Flower Production and Marketing. Lab 3. Prerequisite: 3113. Commercial production of cut flower, pot plant and bedding plant crops. Application of plant physiological principles to crop culture, crop production costs and marketing.

4453*
Turfgrass Science. Lab 3. Prerequisite: 3153. Investigation of environmental stresses imposed on turfgrass and the interrelationship between stress and the cultural practices of turfgrass.

4671*
Horticultural Seminar. Prerequisite: junior standing or above. Contemporary problems and topics in horticulture, individual seminar reports, group discussion, career exploration, state, national and global horticultural issues and job placement.

4713*
Public Garden Management. Lab 4. Prerequisite: 1013. Issues and methods in public garden management including database management of collections, conservation of native species, grant writing, volunteer coordination, computerized mapping systems, master planning, and other topics pertaining to a career in public horticulture. Field trips required.

4774
Landscape Contracting and Planning. Lab 6. Prerequisite: 3312 or 3322 or consent of instructor. Concepts of landscape contracting and planning. Preparation of specifications, estimates and bids. Emphasis on residential landscapes and use of plant materials. No credit for students in the landscape architecture (BLA) program.

4990*
Horticultural Problems. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Problems related to pomology, olericulture, nursery production, landscape design, or the culture, sales and arrangement of flowers.

5000*
Research and Thesis. 2-6 credits, maximum 6. Research on thesis problems required of master's degree candidates.

5110*
Advanced Horticultural Problems. 1-12 credits, maximum 20. Selected research problems in horticulture, floriculture, landscape design; nursery production, olericulture, and pomology.

5123*
Horticulture Science. Prerequisites: BOT 3463, BOT 3460 or equivalent or senior standing. The basics of applied physiological responses of plant growth as related to horticulture plants. Includes hormonal, genetic and environmental influences on horticultural plant growth and production.

5133*
Temperature Stress Physiology. Prerequisite: BIOC 3653, BOT 3463 or consent of instructor. Effects of heat, chilling and freezing stress on plants. Responses to temperature extremes at the molecular to whole plant levels, with emphasis on mechanisms of injury and resistance.

5233*
Experimental Horticulture. Methods of conducting research with horticultural crops including organization and plans, field plot techniques and analysis of data.

5412*
Mineral Nutrition in Horticultural Crops. Prerequisites: BOT 3463, SOIL 4234. Fertilizer use and plant response in horticultural crops.

5422*
Flowering and Fruiting in Horticultural Crops. Prerequisite: BOT 3463. Environmental, chemical and cultural factors affecting the flowering and fruiting of horticultural crops.

5433*
Postharvest Physiology. Prerequisites: BOT 3463 and 3460. Physiological causes for postharvest changes in horticultural crops (ripening and senescence) and the basis for certain postharvest treatments (precooling at harvest, controlled atmosphere storage, refrigeration, and packaging techniques). Commodity-specific postharvest phenomena.

6000*
Research and Thesis. 1-12 credits, maximum 20. Research on thesis problems required of candidates for the Ph.D. in crop science.

Hotel and Restaurant Administration (HRAD)

1103
Introduction to the Hospitality Industry. Career opportunities and the scope, development and history of the hospitality industry. The lodging and food service segments of the industry. Ethical issues for the industry.

1114
Introduction to Professional Food Preparation. Lab 3. Functions of the nutrients in the human life process. Nutrient relationships based on food preparation systems. Techniques and theories of food preparation including use and selection of equipment, sanitation for quality, controls and guest accommodations.

2125
Service Management in Hospitality Operations. Lab 4. Prerequisite: 1114 or NSCI 2114. Analysis and development of service management skills, including leadership behavior, motivation, communication, training, staffing and professional service staff behavior.

2850
Special Topics in Hotel and Restaurant Administration. 1-3 credits, maximum 6. Study of specific issues or topics in hotel and restaurant administration.

3133
Science of Food Preparation. Lab 3. Prerequisites: 1114, CHEM 1014 or 1215. Application of scientific principles to food preparation. Same course as NSCI 3133.

3213
Management in Hospitality and Food Service Systems. Prerequisite: a course in economics. Function and methods of management as related to the hospitality and food service industries. Same course as NSCI 3213.

3223*
Concepts and Practices in the Tourism Industry. Lab 2. Travel industry financial management, technology, economics, planning and policy formulation for the tourism industry. Economic impact of tourism on related hospitality industry operations. Lab experiences with tourism agencies.

3363
Lodging Front Office Systems. Lab 2. Prerequisites: 2125, ACCT 2103. Various jobs in the lodging front office and the procedures involved in registering, accounting for, and checking out guests. The organization, duties and administration of the front desk.

3440
Hospitality Industry Internship. 1-6 credits, maximum 6. Prerequisites: 3213, consent of instructor. Supervised experience in an approved work situation related to a future career in the hospitality industry.

3473
Mechanical Equipment and Building. Prerequisite: 2125. Illumination, electric wiring, plumbing, heating, ventilation, air conditioning, food preparation and food service equipment utilized in the hospitality industry will be evaluated. Emphasis on maintenance, repair, how it works and what it does. Energy utilization and conservation stressed.

3553
Purchasing in Hospitality and Food Service Systems. Prerequisite: 3133 or concurrent enrollment. Procurement of food and nonfood materials in hospitality and related industries. Same as NSCI 3553.

4103*
Legal Aspects of Hotel and Restaurant Management. Prerequisites: 3213 and BUSL 3213. Examination of the laws regulating the lodging and food service industry. Development of an appreciation of the interrelationships between law and industry. Exploration of how legal principles apply in a global environment.

4213*
Hotel and Restaurant Promotion and Sales. Prerequisite: 3213. Fundamentals of sales promotion, the sales department, publicity types, methods of soliciting group business. Versatility, cost, timing and results of use of the advertising media.

4333*
Food, Beverage and Labor Cost Controls. Prerequisites: ACCT 2203, junior standing. Menu analysis and food/beverage/labor cost controls associated with hospitality industry operations. Same course as NSCI 4333.

4365*
Quantity Food Production Management. Lab 5. Prerequisites: 2125, HRAD or NSCI 3553, and a course in accounting or mathematics or consent of instructor. Organizing, purchasing, costing, preparation and service of food in a quantity food production setting. Same course as NSCI 4365.

4413*
Lodging Operation Systems Analysis. Prerequisite: 3363 or consent of instructor. Conceptual analysis of hospitality operation systems such as food and beverage service, housekeeping, sales, properties management, properties feasibility, personnel, accounting and front office. Investigation of inter- and intra-departmental functions.

4475*
Hospitality Layout, Equipment and Furnishings. Prerequisite: 3473. The use of the AutoCad system in the planning process, space allocation and arrangement of furnishings, equipment and utilities in a hospitality facility. Time and motion efficiency and equipment specifications.

4523*
Critical Issues in the Hospitality Industry. Prerequisite: senior or graduate standing. Breadth of vision and broad perspective of contemporary issues in the management of hospitality industry organizations. Awareness of societal issues and their application to the industry.

4573*
Institution Organization and Management. Lab 3. Prerequisites: 3553, 4365 or NSCI 3553, 4365. Organization of personnel and resources in a food service institution and the techniques required by the manager. Lab consists of work experiences in Residence Halls Food Services. Same course as NSCI 4573.

4723*
Survey of Beverages in the Hospitality Industry. Lab 2. Prerequisite: must be 21 years of age. History, classifications, production techniques and quality factors of beverages such as wines, distilled spirits, beers, and non-alcoholic beverages. Emphasis on responsible alcohol beverage service and management techniques.

4850*
Special Unit Course in Hotel and Restaurant Administration. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Special unit of study related to specific problems in the hospitality industry.

4883*
Multi-unit Food Service Management. Lab 2. Prerequisites: 3213, 4333, 4365, FIN 3113. Study of policy and procedure influencing the human side of hospitality management. Management decisions of multi-unit franchising, finance, menu strategy and marketing.

4900
Honors Creative Component. 1-3 credits, maximum 3. Prerequisite: College of Human Environmental Sciences Honors Program participation, senior standing. Guided creative component for students completing requirements for College Honors in College of Human Environmental Sciences. Thesis, creative project or report under the direction of a faculty member in the major area, with second faculty reader and oral examination.

4983*
Conference and Meeting Planning. Prerequisite: senior or graduate standing. Planning and implementing conferences, teleconferences, conventions, special events, seminars and symposia. Designing, promoting, managing and evaluating educational events, contract management.

5000*
Master's Thesis. 1-6 credits, maximum 6. Prerequisites: graduate standing and consent of adviser. Individual research interests in hospitality administration fulfilling the requirements for the M.S. degree.

5030*
Master's Creative Component and Independent Study. 1-3 credits, maximum 3. Prerequisites: graduate standing and consent of instructor. Individual research and study having relevance to the hospitality field and a positive impact on the hospitality industry.

5213*
Hospitality Technology Applications. Conceptual analysis of the different systems used in the hospitality industry: food, beverage, catering, banquets, marketing, accounting, housekeeping, sales, property management, front office, and human resources. Investigation of technology applications, ethical implications of technology and system development and practices.

5223*
Hospitality Procurement Administration. Principles related to the procurement of food and nonfood products in the hospitality industry. Administrative functions, cost controls, inventory, specifications, price, quantity and quality issues applied to foods.

5243*
Retailing and Franchising in the Hospitality Industry. Entrepreneurial perspective of growth and performance of commercial and noncommercial food service and health care organizations. Challenges relative to operations management, convenience stores, quick service operations, procurement, price analysis, communication, efficient customer response, capital and human resources, competition, governmental influence, and decision making process.

5413*
Leadership in a Diverse Society. Comparing and critiquing leadership and diversity research, theories and practices in multiple aspects of society using an historical perspective. Utilization of case studies, focus groups, and experts from government, education, volunteerism, and the workplace to facilitate the development of models for future professional practice that integrate leadership and diversity principles.

5453*
Total Quality in Hospitality Management. Study of contemporary management principles in the hospitality industry. Service improvement and customer satisfaction in the hospitality industry through the use of total quality management. How service industries such as hospitality can use business techniques such as continuous improvement, employee involvement, measurement and organizational change to improve unit operations.

5513*
Hospitality Customer Development Strategies. Examination of the role of the customer in planning of hospitality organizations. The concepts and strategies of hospitality customer development.

5523*
Critical Issues in Hospitality Administration. Prerequisite: graduate standing. Major issues confronting the hospitality and tourism industry. Solutions, decision-making skills, and interpretation of impact on the environment, functional groups and organizations within the industry. Synthesis of information.

5643*
Hospitality Development and Investment. Theories and practices related to the acquisition, development and investment in hospitality-oriented real estate. The undertaking of site analysis, feasibility studies and building construction. Acquisitions, financing alternatives and management contract options. Current trends in hotel investing.

5813*
Research Methods in Hospitality Administration. Use of scientific methods and current research methodologies as applied to problems in hospitality administration. Development of knowledge in identifying researchable problems, proposal planning, experimental design, statistical use and interpretation, and research reporting.

5850*
Special Topics in the Hospitality Industry. 1-3 credits, maximum 9. Special topics related to the hospitality industry. A problem-solving technique to design the research model and investigative procedures. Presentations to faculty, students and industry professionals at specialized workshops with research, instructional and industry project components.

5870*
Problems in the Hospitality Industry. 1-3 credits, maximum 9. Special recurring problems in the hospitality industry. Broad perspective of these issues and their application to the industry. Critical thinking skills to solve operational dilemmas.

6000*
Doctoral Thesis. 1-12 credits, maximum 30. Prerequisite: consent of major professor. Research in hospitality administration for the Ph.D. degree.

6123*
Tourism Policy and Planning. Overview and examination of current international and national tourism policies and an examination of the tourism site planning process for tourism and hospitality development perspective. The economic impacts of policy and planning issues to the tourism and hospitality industry.

6433*
Employee Development Issues in the Hospitality Industry. Prerequisites: two years hospitality work experience and a course in human resources or personnel management. Developing and maintaining a productive workforce in the hospitality industry. Recent theories and research of training, development of internal customers, and the labor issues affecting the hiring and development process.

Human Environmental Sciences (HES)

1001
Seminar in Human Environmental Sciences. Mission of the College as a basis for value exploration and problem solving. Investigation of the integrative nature of the profession and general education. Required of all students in the College of Human Environmental Sciences.

1111
Exploration in Human Environmental Sciences. Exploration of majors and careers in the field of human environmental sciences. Designed to introduce students to campus resources and enhance students' study skills. Graded on a pass-fail basis.

2001
Professionalism and Ethics. Ethical issues and strategies for developing professionalism in content areas of the profession. Required of all students in the College of Human Environmental Sciences.

3001
Contemporary Issues Within the Global Community. Awareness of global interdependence as it affects individuals and families. Exploration of the impact of public policy on these issues. Required of all students in the College of Human Environmental Sciences.

3002
Contemporary Issues in Human Environmental Sciences. Exploration of the mission of the College of Human Environmental Sciences and subject matter interrelationships; ethical issues and professionalism in the field; effect of global interdependence and public policy on individuals, families and professionals. Required of all students in the College of Human Environmental Sciences.

3090
Study Abroad. 12-18 credits, maximum 36. Prerequisites: consent of the Office of International Programs and associate dean of the College. Participation in a formal study abroad program spending a semester or year in full-time enrollment at a university outside the U.S.

4003
Honors Seminar in Human Environmental Sciences. Prerequisites: junior standing and admission to the Honors Program. In-depth interdisciplinary seminar focused on a current national or international issue having an impact on quality of life. Exploration of the issue utilizing various strategies and national resources. Dialogue and debate from multiple perspectives with emphasis on verbal and written expression.

6180*
Research Seminar. 1-3 credits, maximum 3. Prerequisite: graduate course in research methods or consent of instructor. Research in human environmental sciences with emphasis on problems involving a multidisciplinary approach. Methodological analysis of research. Development and evaluation of research focused on current problems.

6990*
Graduate Seminar in Human Environmental Sciences. 1-3 credits, maximum 3. Prerequisite: consent of instructor. Analysis of philosophy, critical issues, current developments and interrelationships among elements in human environmental sciences.

Human Resources and Adult Education (HRAE)

3143
Introduction to Career Education. Current and prospective teachers introduced to the fundamental concepts and operational practices of career education. Historical development, needs assessment, goals, implementation strategies, evaluation, developmental concepts, curriculum planning and articulation.

3901
Seminar in Teacher Education. Procedures for gaining admission to Teacher Education and student teaching. Requirements for certification and graduation, and course planning to meet those requirements. Documentation and completion of 45 clock hours of observations in various school settings. Graded on a pass-fail basis.

4010*
Occupational and Adult Education Workshop. 1-3 credits, maximum 6. Professional workshops of various topics and lengths. Each workshop focused on a particular topic from such areas as the development, use and evaluation of instructional methods and materials.

5000*
Thesis or Report. 2-10 credits, maximum 10. Students studying for a master's degree may enroll in this course for a total of two credit hours if they write a report or six hours if they write a thesis. Students working on a specialist's degree may earn a maximum of 10 hours credit.

5010*
Seminar. 1-3 credits, maximum 6. Graduate student seminars focusing on current and critical issues and common problems relevant to occupational and adult education.

5123*
Program Evaluation in Occupational and Adult Education. The purpose of evaluation in occupational and adult education programs with specific attention given to the evaluation of program development in laboratory and shop instruction.

5203*
Foundations of Adult and Continuing Education. Societal trends, issues and institutions which have influenced the development and current status of adult and continuing education. Analyses and critiques of contemporary adult and continuing education activities, materials and clientele groups served, and their implications for new and existing programs in the field.

5213*
Characteristics of Adult Learners. Learning patterns, interests and participation patterns among adults in a variety of educational settings. Theories of learning and behavior modification for adults, with implications for adult and continuing education programs. Particular attention given to learners in occupational, adult basic, community junior college, extension and proprietary program settings.

5223*
Organization and Administration of Adult Education. Organizational procedures and administrative practices for effective planning, implementation and management of adult and continuing education programs. Analyses of legislation, finances and community groups that influence and impact upon adult and continuing education programs.

5233*
Needs Analysis. Techniques of conducting organizational analyses of human performance problems, including surveys, interviews, records analysis, group interaction, and task analysis.

5243*
Advanced Project in Needs Analysis. Prerequisite: 5233. The conduct of an analysis of human performance problems in an organizational, agency, institutional or community setting, including need or problem identification, investigation, clarification and resolution, and the development of a formal report and a presentation to management.

5253*
Instructional Strategies for Adults. Prerequisite: graduate standing. An analysis and application of the various techniques and materials available to facilitate the learning process for adults. Concentration on the process of designing effective learning experiences for adults and developing competencies of the facilitators of group and self-directed learning.

5313*
History and Organization of Vocational and Technical Education. Prerequisite: graduate standing. Social, political, and economic forces acting upon vocational and technical education studied in depth for leadership development.

5340*
Special Problems. 1-6 credits, maximum 6. Directed independent study of special topics involving assigned readings, library research, field work or a combination of these.

5433*
Instructional Design for Training. Design and development of training to address performance problems in organizations, business and industry. In-depth study of a systematic approach to training for performance. Same course as TCED 5433.

5480*
Modern Technology in Occupational Education. 1-6 credits, maximum 6. Technical developments in specialized occupational areas examined and analyzed for educational curriculum and program implications.

5533*
Human Resource Development. Introduction to training and development, including history and nature of the field, trainer roles, needs analysis, program development, evaluation, and techniques of conducting training.

5720*
Workshop. 1-3 credits, maximum 10. Professional workshops of various topics and lengths. Each workshop designed to meet unique or special needs of individuals concerned with adult education and human resource development.

5880*
Internship. 3-6 credits, maximum 6. Supervised experience working in business, industry, human service, or education settings.

5912*
Organization and Administration of Adult Basic Education Programs. Organizing and administering adult basic education for occupational programs.

6000*
Doctoral Dissertation. 2-10 credits, maximum 15. Required of all candidates for the Doctor of Education degree in adult education and human resource development.

6110*
Graduate Reading in Adult Education and Human Resource Development. 1-6 credits, maximum 6. Supervised readings of significant literature not included in regularly scheduled courses.

6213*
Aging, Learning and Work. An analysis of the nature of adult learning and work performance and their relationships to the aging process.

6333*
Strategic Planning and Policy Development. Prerequisites: 5123, 5223 or 5333, master's degree. Theoretical and practical aspects of the concepts and implementation processes. Articulation among various public and private sector organizations involved with human resource development.

6533*
Critical Issues in Human Resource Development. Issues of concern to training directors and other human resource development (HRD) practitioners are researched, including managing HRD, consulting, organization, development, productivity, and managing change.

6871*
Doctoral Seminar: Level 1. Orientation to doctoral program in HRAE. May be taken prior to program application; required of all applicants.

6880*
Internship in Adult Education and Human Resource Development. Directed Field experiences related to the participant's area of concentration. Provides opportunities for an individual to put into practice and test ideas, theories and concepts learned in graduate study.

6881*

Doctoral Seminar: Level 2. Preparation of the required tentative proposal for dissertation and the comprehensive doctoral examination. Required for HRAE doctoral candidates.

Industrial Engineering and Management (IEM)

2903

Introduction to Industrial and Systems Engineering. Lab 1. Prerequisites: ENGR 1111; MATH 2145. Industrial engineering concepts and techniques in production control, quality control, layout, methods engineering, material handling, mathematical programming, and engineering economy. Laboratory sessions provide additional learning experiences with these topics and with computer software used in industrial engineering analyses.

3303

Industrial Processes I. Lab 3. Prerequisites: ENGR 1322 and ENSC 3313. Manufacturing processes used to transform raw materials including metals and non-metals into finished goods. Near-shape processing and basic metal cutting theory, process selection, and planning. Field trips to manufacturing plants.

3313

Industrial Processes II. Lab 3. Prerequisite: 3303. Manufacturing processes in joining, finishing, metrology, nontraditional machining, tool design, electronics manufacturing assembly and numerical control. Field trips to manufacturing plants.

3503

Engineering Economic Analysis. Prerequisite: MATH 2155. Development and use of time value of money interest formulas. Bases for comparison of alternatives, including present worth, annual worth, rate of return and payout period methods. Decision making among independent, dependent, capital-constrained and unequal-lived projects. Replacement, break-even and minimum cost analyses. Depreciation and depletion methods and their effect on corporate income taxes, leading to after-tax cash flow analysis.

3513

Economic Decision Analysis. Prerequisite: MATH 2123. Quantitative evaluation of investment alternatives for non-engineering majors. The role of interest in economic equivalence and in formulating economic comparisons based on present worth, annual equivalent, rate of return and payout criteria. Accounting, depreciation and income tax considerations. Benefit-cost and cost-effectiveness analysis. Cost estimation and allowance for variance in estimates. Not available for credit in industrial engineering curriculum.

3523

Engineering Cost Information and Control Systems. Prerequisite: MATH 2145. Basic cost measurement and control concepts. How to measure and interpret cost data and define its use in planning, control and estimating. Role of accounting in cost control.

3703

Engineering Computation and Interactive Modeling. Prerequisites: ENGR 1412, MATH 2145. Using the computer for engineering problem solving through analysis, design and pseudocode. Applications using computer languages, spreadsheets, statistical packages and equation solvers.

3813

Work Performance: Analysis and Design. Lab 3. Productivity improvement through job design. Productivity planning, measuring and improvement. Major emphasis on measuring, evaluating and redesigning work processes.

4010*

Industrial Engineering Projects. 1-3 credits, maximum 6. Prerequisite: consent of school head. Special undergraduate projects and independent study in industrial engineering.

4014*

Operations Research. Prerequisites: 3703, MATH 3263, STAT 4033. Fundamental methods, models, and computational techniques of operations research. Linear programming including transportation and assignment models. Network models, dynamic programming, decision theory, and queueing theory.

4023*

Operations Research II. Prerequisites: MATH 2233, STAT 4033 and FORTRAN. Continued study of the fundamental methods of operations research; computational techniques on nonlinear programming, dynamic programming, inventory theory and analysis, queueing theory and analysis and simulation.

4103*

Industrial Quality Control. Prerequisite: STAT 4033. Principles and practice of industrial control. Modern quality philosophy, including a process improvement strategy incorporating charter, documentation of knowledge and improvement cycle. Theory and use of statistical process control (SPC) tools for problem solving and continuous improvement. Variables and attributes control charts for both discrete and continuous flow/batch processes. Process capability and performance analysis including strengths and weaknesses of Cpk and Ppk indices. Introduction to acceptance sampling, including ANSI/ASQC Z1.4 standards.

4113*

Industrial Experimentation. Prerequisite: 4103. Analytical methods for the purpose of continuous process improvement using the Deming approach. Experimentation driven by the Taguchi loss function, Taguchi arrays, linear graphs, triangular tables, and Taguchi's concepts of parameter and tolerance design. Extensive use of factorial and fractional factorial designs for measurement and attributes data. Analysis of variance and graphical interpretation of significant factors and interactions. Wide variety of industrial applications.

4203*

Facility Location and Layout and Material Handling Systems. Prerequisites: 3813, 4014 and senior standing. Design principles and analytical procedures for locating and developing an overall functional relationship plan and the methods for materials receipt, storage and movement for either an industrial or service oriented industry. Product-quantity analysis and material flow, and information routing warehouse design, various layout methodologies, and their measures of merit. Introduction to material handling methods and technologies including automated systems. Case studies and field trips are required.

4323*

Manufacturing Systems Design. Prerequisites: 3313, 3503. Principles and procedures related to the design, implementation, documentation, and control of manufacturing systems. Consideration of transfer lines, numerical control, flexible automation, robotics, and manufacturing support activities such as cost, quality, and materials control. Introduction to basic computer-aided design and computer-aided manufacturing (CAD/CAM).

4413*

Industrial Organization Management. Issues, concepts, theories and insights of management with a focus on productivity. Application of management, emphasizing effective performance.

4613*

Production Control. Prerequisite: 4014. Concepts of planning and control of production environments. Design of operation planning and control systems. Techniques used in demand forecasting, operations planning, inventory control, scheduling, and progress control. A production simulator is used to provide a realistic application experience.

4713*

System Simulation. Prerequisites: 4014, STAT 4033. Simulation of discrete-event systems. Problem formulation, translation to a computer model, and use of a model for problem solution. Simulation concepts and theory including random variable selection and generation, model validation and statistical analysis of results. Use of GPSS and survey of other languages and related simulation tools.

4723*

Information Systems for Management Decisions and Control. Prerequisite: 3703. Systems engineering methodology applied to the design of information systems for management of all types of organizations. Data base management systems. Distributed and centralized systems. Different phases of system design and implementation.

4823*

Industrial Ergonomics. Lab 3. Prerequisite: 3813. Characteristics of humans, equipment, and work environment examined using a systems approach. Job designs that concurrently emphasize multiple goals of productivity, safety and employee satisfaction, investigation of psychological, social, safety, reward, training and ergonomic parameters that affect work life of both employee and supervisor.

4913

Senior Design Projects. Lab 6. Prerequisite: limited to students in the final semester of their professional program. Student teams work on professional-level engineering projects selected from a wide range of participating organizations. Projects are equivalent to those normally experienced by beginning professionals, and require both oral and written reports. (Open only to students in industrial engineering and management.)

4923*

Energy and Water Management. Prerequisites: 3503, ENSC 2213, 2613. Design, implementation and management of energy and water management programs. Energy and water conservation, choice of energy sources, safety and security of fuel storage, contingency planning and use of standby fuels, and choice of rate schedules. Improvement of profits through optimal energy and water utilization. Outside speakers when appropriate.

4931

Industrial Engineering and Management Seminar. Prerequisite: senior standing. Designed to orient seniors to their professional work environment. Topics include placement procedures, resume construction, interviewing skills, professional dress, graduate school, professional societies and registration, personal management of time and money, and job-related expectations. Taught by senior faculty; utilizes outside speakers.

5000*

Research and Thesis. 1-6 credits, maximum 6. Prerequisite: approval of major adviser. Research and thesis for master's students.

5003*

Statistics and Research Methods. Prerequisite: STAT 4033. Statistical and research methods used in various areas of industrial engineering including problem definition, managing the research process statistical methods and analysis tools, survey vs. experimental research techniques.

5010*

Industrial Engineering Projects. 1-2 credits, maximum 6. Prerequisites: consent of school head and approval of major adviser. Special graduate projects and independent study in industrial engineering.

5013*

Linear Programming. Prerequisites: 4014, or 5003, or MATH 3013; FORTRAN. Simplex algorithm to solve deterministic linear optimization models considering maximization and minimization objectives. Degeneracy, alternative optima and no feasible solutions. Revised simplex procedures. Duality theory, economic interpretations, dual simplex and complementary pivoting. Sensitivity analysis and parametric programming. Special cases of linear optimization problems and underlying mathematical foundations. Large-scale models including computational considerations. Same course as CS 5013.

5023*

Optimization Applications. Prerequisite: graduate standing. A survey of various methods of unconstrained and constrained linear and non-linear optimization. Applications of these methodologies using hand-worked examples and available software packages. Intended for engineering and science students. Same course as CHE 5703, ECEN 5703 and MAE 5703.

5030*

Engineering Practice. 1-9 credits, maximum 12. Prerequisite: approval of adviser. Professionally supervised experience in a real-life problem involving authentic projects for which the student assumes a degree of professional responsibility. Activities must be approved in advance by the student's adviser. May consist of full or part-time engineering experience, on-campus or in industry, or both, either individually or as a responsible group member. Periodic reports both oral and written required as specified by the adviser.

5033*

Dynamic Programming. Prerequisites: 5013, STAT 4213 or equivalent. An introduction to dynamic programming. Formulating dynamic programming problems, computational techniques, control problems, and Markov decision problems, with applications to production control, transportation, inventory theory, and other areas.

5103*

Advanced Industrial Quality Control. Prerequisites: 4103, STAT 4033. Modern quality philosophy and application. Theory and application of traditional and nontraditional control charting techniques. Special emphasis on underlying assumptions such as normality and error-free inspection. Oriented toward economically-based statistical monitoring of processes, including optimization of decision variables such as sample size, frequency, and control limit spread.

5113*

Total Quality Management. Prerequisite: graduate standing. Major categories of criteria for the Malcolm Baldrige National Quality Award, including leadership, information and analysis, strategic quality planning, human resource utilization, quality assurance, results, and customer satisfaction. Key concepts and tools: customer requirements determination, customer satisfaction measurement, cost of quality, quality planning, supplier relations, process improvement strategy, causes of variation, process stability and control, process capability, the use of SPC tools, and measures of performance. Emphasis on those activities that outstanding companies do well.

5133*

Stochastic Processes. Prerequisites: MATH 2233, MATH 3013, STAT 4113. Definition of stochastic processes, probability structure, mean and covariance function, the set of sample functions. Renewal processes, counting processes, Markov chains, birth and death processes, stationary processes and their spectral analyses. Same course as STAT 5133 and MATH 5133.

5203*

Advanced Facility Location and Layout and Material Handling Systems. Prerequisites: 3503, 4014, 4203. A continuation and expansion of topics covered in 4203 with an emphasis upon model development for predicting and evaluating the effectiveness of production and/or service systems. Advanced analytical and computer techniques.

5303*

Computer Integrated Manufacturing. Prerequisite: 4323. Focus on the design, development, implementation and operation of modern manufacturing systems. Understanding the sequence of engineering-related activities over the product life-cycle. Integration of product and process design, compatibility and exchange of data and information, use of computer-aid (CAx) tools, design for (DFx) approaches, manufacturing philosophies, and volume dependent product costing.

5313*

Robotics Application Issues. Lab 3. Prerequisite: graduate standing in engineering or consent of instructor. Role of robotics in modern manufacturing systems. Design and selection of appropriate end effectors and sensors to produce a reliable cost effective robotic application. Comparison of commercial and custom designs of end effectors and a study of industrial applications. Field trips to industry and work in the IE&M CAM/Robotics laboratory.

5350*

Industrial Engineering Problems. 1-6 credits, maximum 6. Prerequisite: approval of major adviser. A detailed investigation into one area of industrial engineering with a required written report.

5413*

Managing the Engineering and Technical Function. Prerequisite: 4413 or equivalent industrial experience. Advanced study of the engineering and technical organization. Focus on the engineering and technical functions, management process, roles, and activities. Individual study of current technical management issues of student interest.

5503*

Financial and Advanced Capital Investment Analysis. Prerequisites: 3503, 4014, STAT 4033. An understanding of financial concepts and markets, and an advanced treatment of proper methods of capital project selection under risk and uncertainty. Decision making under capital rationing. Financial environment and valuing securities, representing cash flows, selecting investments, avoiding common pitfalls, evaluating timing consideration, depreciation and corporate taxation, replacement analysis, and incorporating risk and uncertainty.

5603*

Project Management. Prerequisite: 4413 or equivalent. A systems approach to planning, organizing, scheduling and controlling projects. The behavioral and quantitative aspects of project management. Importance of working with personnel as well as technology. Project management software utilized.

5613*

Integrated Manufacturing Control Systems. Prerequisite: 4613. Advanced treatment of planning and control philosophies and techniques for manufacturing and production systems. Approaches that focus on demand-driven control and achieving competitive advantage through manufacturing are highlighted. Material requirements planning, capacity planning, shop floor control, master scheduling, production planning and demand management. Just-in-time and the theory of constraints.

5633*

Advanced Production Control. Prerequisites: 4014, 4613, corequisite: 5003. Advanced concepts and quantitative techniques used in production planning and control, including demand forecasting using regression, time series analysis, and Box-Jenkins models, mathematical programming approaches, to aggregate planning and disaggregation, static and dynamic scheduling of machines and cells, and independent demand inventory management. Deterministic and stochastic models and their relationship to Just-In-Time and Zero Inventory practices.

5643*

Network Modeling and Analysis. Prerequisites: 4014, 5003. Network approach to the modeling and analysis of complex systems. Deterministic and stochastic network topics include PERT, CPM, decision trees, network flows, flowgraphs, and GERT (Graphical Evaluation and Review Technique). Modeling of practical problems. Systems analysis using network techniques and available computer programs.

5703*

Discrete Systems Simulation. Prerequisite: 4713. Discrete-event systems via computer simulation models. Model building and the design and analysis of simulation experiments for complex systems. Application to a variety of problem areas. Use of ARENA simulation language.

5713*

Statistical Topics in Simulation Modeling. Prerequisite: 4713 or 5703. Statistical Analysis in simulation modeling of discrete-event systems. Modeling of input processes, random variate generation and analysis of simulation output. Methods can be applied to any discrete-event simulation.

5733*

Computer Graphics, Microcomputer Systems and Process Control. Prerequisites: 3703; ECEN 3213. Computer graphics systems and their capabilities (hardware and software): graphics programming and use of plotter. Application of graphics and microcomputers in industrial engineering. Microcomputer applications in industrial engineering. Process control fundamentals including digital control algorithms.

5803*
Human Factors Engineering. Prerequisites: 4823, 4113 or equivalent. Basic consideration of the human factors in engineering systems with emphasis on the interface of man-machine systems. Development of human abilities and limitations in relation to equipment designs and work environments.

5813*
Productivity Measurement and Improvement. Prerequisites: 3813 and 4413 concurrently. Productivity issues, concepts, theories and insights focusing on job and organizational design are explained, illustrated and discussed. Understanding the productivity improvement process. Development of productivity measurement systems. Designing organizational processes which improve productivity.

5913*
Decision-making Models for Multi-objective Analysis. Prerequisite: 4014. Quantitative and qualitative aspects of multiple-criteria decision making. Dynamics of the decision process are examined and the multi-objective nature of most managerial decision problems is illustrated. General concepts and solution methodologies of the multi-objective problem. Multi-objective linear programming, goal programming, and compromise programming. Attribute importance, risk measurement, and utility measurement.

5923*
Advanced Energy and Water Management. Prerequisite: 4923. Continuation of material covered in 4923 with an emphasis on modern management techniques. Cogeneration, energy management control systems, private purchases of gas, energy accounting. Significant case study or term paper required.

5943*
Hazardous Material and Waste. Prerequisites: 3503 or equivalent, CHEM 1515. Management of hazardous materials and waste by the generator to reduce operating costs and protect employees. Emphasis on hazard communication program, reducing volume and toxicity, and management activities.

6000*
Research and Thesis. 1-15 credits, maximum 30. Prerequisites: approval of major adviser and advisory committee. Independent research for Ph.D. dissertation requirement under direction of a member of the Graduate Faculty.

6023*
Nonlinear and Integer Optimization. Prerequisites: 4014 or 5013; FORTRAN or PASCAL. Theoretical and practical aspects of nonlinear and integer optimization. Development and application of nonlinear optimization techniques for unconstrained and constrained problems: sequential search, gradient, penalty and barrier, and projection methods. Development and application of integer and mixed integer techniques for unconstrained and constrained problems; implicit enumeration, branch and bound, and cutting methods. Same course as CS 6023.

6110*
Special Problems in Industrial Engineering. 1-6 credits, maximum 12. Prerequisites: consent of school Head and approval of major adviser. Special problems in industrial engineering and management under supervision of a member of the Graduate Faculty.

6113*
Reliability and Maintainability. Prerequisites: 5003, STAT 4033, FORTRAN. Probabilistic failure models of components and systems. Detailed study of reliability measures, and static and dynamic reliability models. Classical and Bayesian reliability testing for point and interval estimation of exponential and Weibull failures. Reliability optimization through allocation and redundancy. Fundamentals of maintainability.

6123*
Queueing Systems: Theory and Manufacturing Applications. Prerequisites: 5003, STAT 4033, 5133 or consent of instructor. Review of probability, stochastic processes, and Markov chains. Single-server and multi-server exponential queueing models. Queueing models with Poisson arrivals and general service times. Product form queueing network models: open and closed network models, mean value analysis algorithms for closed models, and single class and multiclass models. Approximations for general single server queues and nonproduct form networks. Applications of queueing models in the performance analysis of transfer lines, automatic assembly systems, and flexible manufacturing systems.

6423*
Engineering and Technical Consulting. Prerequisite: 5413 or consent of instructor. Theory and practice of internal and external engineering and technical consulting. Investigation of the engineering and technical client interface, effective engineer consultations in relationship to existing organizational cultures and practice, and the engineering and technical practitioner's impact on organizational improvement.

6513*
Analysis of Decision Processes. Prerequisites: 5003, STAT 4113 or 4203, FORTRAN. Bayesian decision theory with application to optimal decision making in industrial engineering and allied fields. Extensive and normal form analysis. Sufficient statistics, noninformative stopping and conjugate prior distributions. Additive utility, opportunity loss (regret) and value of information. Terminal analysis, preposterior analysis and optimal sampling. Applications using Bernoulli, Poisson and normal processes.

6713*
Advanced Systems Modeling. Prerequisites: 4014; 5003; 4713 or 5703; FORTRAN 77, Pascal or C. Methodologies for the modeling, analysis, and optimization of large, complex systems. Modeling and performance analysis using Petri nets, object-oriented modeling, optimization using simulation, and continuous systems simulation.

International Studies (IS)

5000*
Thesis. 1-6 credits, maximum 6. Prerequisites: graduate standing and consent of adviser. For students studying for a master's degree in international studies under the thesis option.

5010*
Contemporary Issues in International Studies. 1-6 credits, maximum 6. Prerequisite: graduate standing. Study of contemporary international issues including news reports, speeches from foreign dignitaries, political leaders and experts in selected international fields.

5110*
International Studies Practicum. 1-6 credits, maximum 6. Prerequisites: graduate standing and consent of adviser. For students studying for a master's degree in international studies under the creative component option.

5213*
International Relations, Affairs and Policy. Prerequisite: graduate standing. Research on the mechanics and theories of interaction between economic and political phenomena. Same course as POLS 5213.

5223*
Culture, History and World Systems. Prerequisite: graduate standing. Study of the impact and influence of culture and history on the development of contemporary world systems with future projections.

5233*
Global Competitive Environment. Prerequisite: graduate standing. Development of a global business strategy for the organization. Issues of highly diversified markets and business environments, global competition, financial markets, and complex organizational relationships. Same course as MBA 5233.

Japanese (JAPN)

1115
Elementary Japanese. Pronunciation, conversation, grammar and reading.

2115
(I)Intermediate Japanese I. Prerequisite: 1115 or equivalent. Reading, the writing system, culture, grammar, conversation.

2123
(I)Intermediate Japanese II. Prerequisite: 2115 or equivalent proficiency. Oral and written practice of Modern Japanese. A continuation of 2115.

2223
(I)Intermediate Japanese III. Prerequisite: 2123 or equivalent proficiency. A continuation of 2123.

3012
(I)Advanced Japanese Conversation I. Designed to increase facility and naturalness of delivery in dialogue. Development of general oral and aural proficiency.

3112
(I)Advanced Japanese Conversation II. Designed to increase facility and naturalness of delivery in dialogue. Development of general oral and aural proficiency.

3133
(I)Readings in Japanese I. Development of the student's competence in reading a wide variety of materials by contemporary Japanese writers. Designed to be taken concurrently with 3223.

3223
(I)Introduction to Business Japanese. Prerequisites: 2223 or equivalent; concurrent enrollment in 3133. Introduction to business vocabulary and writing of correspondence. Japanese business customs and practices.

3333
(I)Readings in Japanese II. Prerequisite: 3133. A continuation of 3133.

Journalism and Broadcasting (JB)

1143
(S)Media and Society. An overview of the characteristics of newspapers, magazines, photojournalism, radio, television, film, advertising, public relations and interactive media, emphasizing the media's impact and role in American society.

2003
Mass Media Style and Structure. Lab 2. Prerequisites: ENGL 1113, CS 1002, or consent of instructor. Demonstrated computer and keyboarding proficiency or completion of CS 1002. Elementary writing and editing techniques in print, broadcasting and other media.

2013
Principles of Advertising. Prerequisite: sophomore standing. Elements and purposes of advertising; media functions, economic aspects, budgets, appropriations, rate structures and terminology.

2183
Principles of Public Relations. An introduction to the history, development and current practice of public relations as a process in building relationships between organizations and publics.

3013
Advertising Media and Markets. Prerequisite: 2003. Analysis and evaluation of mass media for advertising; media and market research; media plans, budgets and sales presentations; advertising law and ethics.

3153
Fundamentals of Audio and Video Production. Lab 2. Prerequisite: 2003. Theory and practice of basic audio and video production techniques leading to later applications in radio, television and multimedia production.

3173
History of Mass Communication. Prerequisite: junior standing. Growth and development of mass communication systems in America, with emphasis upon the economic, social and political interaction of the media.

3263
Reporting. Lab 3. Prerequisites: 2003, AGEC 1114 or ECON 2013. Reporting and writing through enterprise techniques for news coverage.

3283
Public Relations Communications Methods. Prerequisite: 2183 or consent of instructor. An analysis and application course focused on the communications methods and techniques used in the practice of public relations.

3293
Visual Communication. Use of photographs, charts, graphs and other visual representations in the mass media; the language of pictures; theories of nonverbal communication visual aids in education and other information systems.

3313
News Editing I. Lab 3. Prerequisite: 3263. Copy editing, design and headline writing for newspapers and magazines.

3383
Public Relations Management and Strategies. The practice and techniques of public relations as a management function in business, industry, agriculture, government, education and other fields. For both majors and non-majors.

3400
Journalism, Advertising and Public Relations Laboratory. 1-3 credits, maximum 5. Prerequisites: junior standing and consent of instructor. Laboratory and/or internship practice for qualified students who wish creative communications experience beyond that available in the classroom.

3553
Radio and Television News Writing. Lab 3. Prerequisites: 3153, 3263. Broadcast news writing and reporting techniques with emphasis on radio coverage. Familiarization with news values, news services, broadcast equipment. Lab work in news reporting and writing.

3603
Advertising Copy and Layout. Lab 2. Prerequisite: 2013. Advertising copy and layout; modern merchandising methods; application emphasizing local and regional problems.

3753
Graphic Communication. Lab 3. Creative and practical aspects of typography, layout and design, and production of printed communication.

3823
Photography I. Lab 3. Taking and processing photographs: cameras, lenses, films, printing, and developing; essentials of good pictorial composition. For students who want an elementary understanding of photography, or to prepare for advanced work in photography or photojournalism.

3873
Audio Production. Lab 2. Prerequisite: 3153. Theory and practice of communication using electronic media. Students prepare and present materials in a broadcasting situation.

3900
Radio-Television Laboratory. 1-2 credits, maximum 5. Lab 6. Prerequisites: 3153 and consent of instructor. Preparation and participation in all phases of radio-television and cable through active internship program.

3913
Television Production. Lab 3. Prerequisite: 3153. Television production techniques, including camera, audio, lighting, staging, producing, graphics and on-camera performance.

4033
Communication Technology. Overview of satellite delivery of print media, radio, television and cable program services, data services, computer technology; public relations and advertising uses of the new technologies.

4063
Supervision of High School Publications. Essential journalistic forms for high school publications; organizing and administering high school publications; intended to meet the requirements for the state teacher's licensure in language arts.

4153
Journalistic Management. Prerequisite: senior standing or consent of instructor. Business and editorial management of newspapers, magazines, and industrial, business and farm publications.

4163
Mass Communication Law. Prerequisite: STAT 2013. Statutes and case decisions in print and broadcast law, including government regulation of broadcasting by the FCC and media relations with other regulatory agencies.

4223
Broadcast Sales. Prerequisite: 2003. Sales development, pricing, promotion and other aspects of broadcast sales and sales management.

4243
Programs and Audiences. Audience analysis, proper construction of programs for greatest appeal and use of appeals to attract the desired audience. Program types, rating systems, program selection and audience attention. Design and discussion of programs to reach specific audiences.

4253*
(I)International Mass Communications. Examination of the nature and flow of news and information within and among nations, states and societies from a theoretical vantage point grounded in region-specific realities. The political, economic, social, cultural and historical forces determining media practice in a global environment.

4263
Broadcast Management. Prerequisite: senior standing or consent of instructor. Functions, structure and organization of the broadcasting industry; special problems in broadcast station management, including personnel, sales, programming and government regulations.

4313
Public Affairs Reporting. Lab 5. Prerequisite: 3263. Coverage of social problems, people and events in fields of government, business, science, sports and entertainment.

4360
Special Problems in Journalism and Broadcasting. 1-3 credits, maximum 6. Prerequisites: junior standing, a minimum of 3.00 GPA, or consent of instructor. Independent study and project development to fit the student's major or minor specialization.

4393
Computer-assisted Journalism. Lab 6. Prerequisite: 3263. Access by news media and communication specialists to electronic sources of information primarily through the Internet. A skills course in understanding and applying ways to obtain and share information through computer access.

4413
Advanced Reporting and Writing. Lab 5. Prerequisite: 3313. Enhancement of writing style and reporting techniques; evaluation of sources and polling practices, and investigative coverage of newsmakers and events.

4423
News Editing II. Lab 6. Prerequisite: 3313. Advanced copy editing; ethics and legal considerations from an editor's viewpoint; design techniques for newspapers and magazines including picture editing, introduction to type, makeup and design practices, and special pages.

4433
Feature Writing for Newspapers and Magazines. Prerequisites: 15 credit hours of English or journalism. Newspaper features and special articles for general circulation magazines, business and trade journals; sources, materials, markets and other factors pertinent to nonfiction writing.

4453
Communications in Agriculture. Lab 2. Fundamentals of news-writing and other communication methods; the role of the news media in agriculture and related fields.

4493
Advanced Public Relations Media. Lab 6. Prerequisites: 3263, 3283 or consent of instructor. An advanced application course in planning, researching, writing, editing and designing of materials used in public relations communications.

4553
Advanced Radio-Television News Reporting. Lab 3. Prerequisites: 3153, 3553. Advanced broadcast news writing with emphasis on techniques of feature and in-depth reporting for radio, television and cable television.

4573
Broadcast Documentary. Lab 3. Prerequisites: 3553, 3913. Student-written and produced broadcast and cablecast mini-documentaries; analysis of selected programs.

4603
Integrated Marketing Communications. Lab 2. Prerequisite: 3603. Creative strategy and execution of advertising for mass media. Problems in idea creation for advertisers; emphasis on both the written and the visual components of advertising policies.

4623 Advertising Campaigns. Prerequisite: 3603. Preparation and presentation of advertising-promotion merchandising campaigns for national and local firms; work in teams with agencies and clients.

4653 Television and Radio Advertising. Lab 2. Prerequisite: 3603. Functions and characteristics of broadcast advertising; copywriting, scriptwriting, story boards, marketing plan; film and videotape commercial production.

4843 Public Relations Programs. Prerequisite: 2183 or consent of instructor. Capstone course requiring public relations students to prepare a public relations campaign involving the public relations process; research, planning, communications and evaluation.

4953 Advanced Television Practices. Lab 3. Prerequisite: 3913. Advanced professional television production. Student-produced and -directed television programs, including "specials," for distribution on cable or other professional media.

4993 Senior Honors Thesis. Prerequisites: departmental invitation, senior standing, Honors Program participation. A guided reading and research program ending with an honors thesis under the direction of a senior faculty member, with second faculty reader and oral examination. Required for graduation with departmental honors in journalism and broadcasting.

Landscape Architecture (LA)

1013 Introduction to Landscape Architecture and Landscape Contracting. An overview of the field of landscape architecture and landscape contracting with emphasis on the role of the landscape architect/landscape contractor and the need for design and management of outdoor space and structures and the environment.

1122 Computer-aided Design. Lab 4. Prerequisite: 1013. Introduction to computer operating systems, word processing and spread sheet analysis. Principles of electronic drafting, utilizing AutoCAD and Landcadd to generate 2D and 3D drawings.

2213 Landscape Architectural Graphics I. Lab 6. Prerequisite: 3 hours credit in freehand drawing or drafting. Drafting and illustration techniques for developing and presenting landscape concepts and designs in black and white media. Computer graphics applications including illustration, typesetting, scanning and visualization techniques.

2223 Landscape Architectural Graphics II. Lab 6. Prerequisite: 2213. The application of multimedia color presentation and delineation techniques to more complex plans, drawings and programs.

3010 Internship in Landscape Architecture and Landscape Contracting. 1-6 credits, maximum 6. Prerequisites: 45 credit hours, consent of internship chairperson. Supervised work experience with approved public and private employers in landscape architecture, landscape contracting or related fields. May not be substituted for other required courses.

3112 Landscape Architecture Seminar I. Prerequisite: 3324. Professional analysis of various aspects of the landscape architecture profession and designed works with guest speakers and in-state or regional field trips to completed works. Required of fourth year students.

3314 Landscape Architectural Design I. Lab 8. Prerequisites: 1013, 1122 and 2223. Introduction to the principles of design, problem solving, site analysis, and the correlation of aesthetic concerns with functional solutions in small-scale landscape architecture design problems and computer-aided design applications.

3324 Landscape Architectural Design II. Lab 8. Prerequisite: 3314. The design of small to medium scale areas with an emphasis on design process, site analysis and computer-aided design applications.

3673 (H)History and Theory of Landscape Architecture. History and historic styles and approaches to landscape architectural design. Past and present landscape design theory.

3682 Professional Practice and Office Procedure. Ethics, office practice and procedure. Contract documents and specifications relating to landscape architecture.

3884 Landscape Architectural Construction I. Lab 4. Prerequisite: CIVE 2613. Landform analysis, earth shaping and stormwater processes. Site grading and earthwork calculations. Stormwater runoff calculations and drainage management methods. Grading and stormwater management plans. Computer applications in earthwork and stormwater calculations.

3894 Landscape Architectural Construction II. Lab 6. Prerequisite: 3884. Advanced grading, horizontal and vertical roadway alignment, site layout and staking plans, construction documents, cost estimating, overview of soils construction materials and specifications, site utilities, computer applications and calculations.

4034* Landscape Planting Design. Lab 6. Prerequisites: 3324, HORT 3312 and HORT 3322. Plants in the landscape as aesthetic and functional elements. Environmental enhancement by and for plants. Preparation of planting sketches, plans and specifications.

4112 Landscape Architecture Seminar II. Prerequisite: 4414. Topics in landscape architecture and related fields, career exploration and job placement. Out-of-state field trips to completed landscape architecture projects. Required of fifth year students.

4414* Landscape Architectural Design III. Lab 6. Prerequisites: 3324, 3884. Medium scale site development projects with an emphasis on landforms, structures and computer-aided design applications.

4424* Landscape Architectural Design IV. Lab 8. Prerequisite: 4414. Medium-scale complex landscape architectural design projects with emphasis on arrangement and design of landscape elements as they relate to functional and aesthetic qualities. Integration of landscape construction detailing, drawings as part of design presentation, and computer-aided design applications.

4433* Landscape Analysis and Use. Lab 3. Prerequisite: 3313. The inventory and analysis of natural and man-made landscape resources and their application to land use.

4514* Landscape Architectural Design V. Lab 8. Prerequisites: 4424, 4894. The design of large-scale sites with an emphasis on mixed use developments and computer-aided design applications.

4524* Landscape Architectural Design VI. Lab 10. Prerequisite: 4514. A capstone course with a large scale development project in urban design, recreation or resource planning with computer-aided design applications, summarizing previous planning, design and construction course work.

4534 Landscape Architecture Vertical Design Studio. Lab 8. Prerequisite: 2223. Individual studio projects geared to design, course level. Offered on demand. Can be substituted for one landscape architecture design course (LA 3314, 3324, 4414, 4424, 4514, or 4524).

4573* Recreation Planning. Lab 6. Prerequisite: consent of instructor. Theory and methods for small and large scale area planning with emphasis on natural and cultural resources.

4583* Landscape Environmental Planning. Lab 6. Prerequisite: 3324. Materials and methods of construction, static, retaining wall design, wood structures, landscape lighting, cost estimation, construction documents, methods of detailing, water features, irrigation design, computer applications and calculations.

4680 Landscape Architecture Assembly. 1 credit, maximum 4. Presentations by faculty members and guest speakers dealing with various aspects of landscape architecture or related fields.

4894* Landscape Architectural Construction III. Lab 6. Prerequisite: 3894. Materials and methods of construction, statics, retaining wall design, wood structures, landscape lighting, cost estimation, construction documents, methods of detailing, water features, irrigation design, computer applications and calculations.

4990* Landscape Architecture Special Problems. 1-6 credits, maximum 12. Prerequisite: consent of appropriate faculty member. Landscape architectural related problems.

5110* Advanced Special Problems. 1-12 credits, maximum 20. Prerequisite: consent of appropriate faculty member. Specific landscape architectural problems.

Latin (LATN)

1113 Elementary Latin I. The rudiments of beginning Latin: grammar, vocabulary and elementary readings.

1223 Elementary Latin II. Prerequisite: 1113 or equivalent proficiency. Continuation of 1113. Grammar, vocabulary and readings.

2113 Elementary Latin III. Prerequisite: 1223 or equivalent. A continuation of 1223. Grammar and readings of Latin authors.

2213
Intermediate Readings. Prerequisite: 2113 or equivalent proficiency. Prose selections in Latin from a variety of authors.

3330
Advanced Readings in Latin. 1-6 credits, maximum 9. Prerequisite: 2213. Prose authors, poetry, and medieval Latin.

Legal Studies in Business (LSB)

1113
Law in Society. Forms and types of law and their evolution, including antitrust, ecology, consumerism and civil rights. Political, social and economic forces affecting legal developments. Legal needs of society and the probable future direction of the law.

3010
Special Topics in Legal Studies in Business. 1-3 credits, maximum 6. Prerequisites: 3213, prior consent of instructor. Analysis of a contemporary topic in business law. Changing social issues and trends in legal studies in business.

3213
Legal and Regulatory Environment of Business. Prerequisite: junior standing. General concepts regarding the nature of the legal system, ethical issues in business decision making, dispute resolution processes, basic constitutional limitations on the power of government to regulate business activity, the nature of government regulation, fundamental principles of tort and contract law.

3323
Law of Commercial Transactions and Debtor-Creditor Relationships. Prerequisite: 3213. Concentrated study of law relating to certain commercial transactions and debtor/creditor relationships. Includes law of sales, negotiable instruments, secured transactions, suretyship and bankruptcy.

3423
State and Federal Regulation of the Employment Relationship. Prerequisite: 3213 or equivalent. Legal foundations of employment in the United States. Contemporary topics relating to the employment environment such as state legislative and judicial limitations on employment at will doctrine, federal legislation relating to equal employment opportunity and affirmative action, fair labor standards, safety in the work place and state workers compensation laws.

4413*
Law of Business Organizations. Prerequisite: 3213. General principles of law relating to the formation, operation and termination of various forms of business organizations. Includes a study of the law of agency, partnerships and corporations.

4523*
Law of Real Property. Prerequisite: 3213 or equivalent. Nature of real property and of the legal transactions relating thereto. Topics may include deeds and conveyancing, landlord-tenant relationships, mortgages, easements, oil and gas interests, types of estates, joint ownership, and legal descriptions.

4633*
(I)Legal Aspects of International Business Transactions. Prerequisite: 3213 or equivalent. Legal aspects of operating a business entity engaged in international commerce. Topics may include: foreign business organizations, U.S. taxation of foreign investors, common clauses in transnational contracts, problems of technology transfer on the international market, anti-trust aspects of international business, and jurisdictional problems in resolving disputes.

5163*
Legal Environment of Business. Prerequisite: graduate standing. Legal environment within which business must operate. Nature and source of law, the operation of the judicial system, the operation of administrative agencies, selected Constitutional provisions frequently involved in litigation of business problems, and selected substantive legal areas having a direct relationship with business operation and decision making.

Leisure (LEIS)

1212
Beginning Swimming. Lab 2. Theory and practice of swimming strokes; techniques and basic water safety skills.

1232
Beginning Golf. Lab 2. Theory and practice of basic skills, rules, terminology and etiquette.

1242
Beginning Tennis and Racketball. Lab 2. Theory and practice of tennis and racketball; basic skills, rules, terminology, and game strategy for singles and doubles play. No credit for students with credit in 1252.

1252
Beginning Tennis. Lab 2. Theory and practice of basic skills, rules, terminology and game strategy for singles and doubles play. No credit for students with credit in 1242.

1262
Rebound Gymnastics. Lab 2. Theory and practice of tumbling, vaulting, trampoline and mini-tramp.

1282
Beginning Horseback Riding. Lab 2. Theory and practice of progressive skills for English and Western riding.

1312
Archery and Riflery. Lab 2. Theory and practice of archery and riflery; basic skills of target shooting, scoring, care and selection of equipment, and safety rules.

1322
Bowling. Lab 2. Theory and practice of approaches, deliveries, releases and mechanical principles involved in aiming and follow through.

1342
Physical Fitness. Lab 2. Theory and practice of aerobic and weight training activities with learning experiences designed to promote physical fitness.

1352
Weight Training. Lab 2. Improvement of muscular strength and endurance in the major muscle groups of the body through progressive resistive exercise. Fundamental anatomy, physiology, mechanical principles, methods and techniques as applied to weight training programs.

1362
Self Defense. Lab 2. Theory and practice of self defense; scientific principles of gravity and body control over opposing forces, and principles of contest judo.

2112
Rock Climbing. Lab 2. Theory and practice in the basics of technical rock climbing, bouldering and spelunking.

2122
Backpacking and Hiking. Lab 2. Theory and practice of outdoor skills and leadership techniques for executing and evaluating a wilderness activity.

2212
Intermediate Golf. Lab 2. Prerequisite: 1232 or equivalent. Development of swing principles, analysis of errors in direction and distance, trouble shots, handicapping, tournament play and rules.

2222
Intermediate Tennis. Lab 2. Prerequisite: 1252 or equivalent. Theory and practice of advanced serves and strokes; strategy for singles and doubles play; rules and competitive tennis.

2252
Dance Production. Lab 2. Prerequisite: 2312. Advanced technique, composition and staging.

2272
Modern Ballet. Lab 2. Theory and practice of fundamental skills and techniques of ballet through the use of modern themes.

2292
Beginning Jazz and Tap Dance. Lab 2. Theory and practice of fundamental skills and techniques for jazz and tap dancing.

2312
Modern Dance. Lab 2. Theory and practice of basic skills and knowledge relating to the creative and technical aspects of modern dance.

2322
Recreational Dance. Lab 2. Theory and practice of traditional social dances and a variety of "free style" dance forms.

2372
Intermediate Swimming and Emergency Water Safety. Lab 2. Prerequisite: 1212 or ability to swim 50 yards. Theory and practice of strokes, diving techniques and water safety skills for the intermediate swimming level. May obtain American Red Cross Emergency Water Safety Certification.

2413
Introduction to Leisure Services. The nature, scope and significance of leisure and recreation. Delivery systems for leisure services, major program areas and the interrelationship of special agencies and institutions serving the recreation needs of society.

2433
Introduction to Therapeutic Recreation. Theory and application of therapeutic recreation with emphasis on types of illnesses and disabilities, delivery systems, programming and services.

2443
Diversity in Leisure Services. An exploration of the primary and secondary dimensions of diversity and their impact on leisure. Responses of the leisure services profession to cultural diversity.

2462
Laboratory in Leisure Services. Lecture, discussion and experiential learning of recreation and leisure activity. Adapted activities, small and large group games, sports, arts and crafts, music, drama and cultural events. Fee required.

2473
Foundation of Leisure Service Leadership. Lab 2. Introduction to the principles and practical applications of group leadership techniques, problem solving, supervision and evaluation of personnel.

- 3010 Leisure Services Workshop.** 1-3 credits, maximum 6. Intensive training program on a specialized topic in leisure services.
- 3212 Lifeguard Training.** Lab 2. Prerequisites: 2372 or equivalent and ability to swim 500 yards. Theory and practice of water safety and rescue skills essential for lifeguards. May obtain American Red Cross Lifeguard Training Certification.
- 3333 Outdoor Pursuits.** Lab 1. Field based course to understand origins and components of involvement in outdoor pursuits. Numerous skills applied to various outdoor settings.
- 3430 Practicum in Leisure Services.** 1-3 credits, maximum 3. Prerequisites: 2413 and 2423. Supervised practical experience with leadership responsibilities for planning, conducting and evaluating activities and programs. Graded on a pass-fail basis.
- 3453 Advanced Practices in Leisure Services Leadership.** Prerequisite: 2423. Advanced techniques in principles and practices of group leadership; problem solving; supervision and evaluation of personnel.
- 3463 Program Design in Leisure Services.** Emphasis on organization, supervision, promotion and evaluation of programs.
- 3473 Evaluation of Leisure Services.** Prerequisite: 3463. Methods, techniques and application of the evaluation process related to a wide variety of leisure service functions: clientele, programs, personnel, facilities and organization.
- 3483 Principles and Clinical Practices in Therapeutic Recreation.** Prerequisite: 2433. Clinical intervention techniques and strategies, including treatment techniques, leisure education and role of recreation in the treatment process.
- 3491 Pre-internship in Leisure Services.** Preparation for internship in therapeutic recreation and leisure services management.
- 4010 Directed Studies in Leisure.** 1-3 credits, maximum 6. Prerequisites: consent of instructor and program head. Supervised readings, research or study of trends and issues related to leisure studies.
- 4213 Water Safety Instructorship.** Lab 1. Methods of teaching swimming and aquatic safety with practical application of knowledge, principles and analysis of skills. May obtain American Red Cross Water Safety Instructor's Certification (WSI).
- 4453* Outdoor Education.** Development of a holistic approach to teaching and learning in the outdoors. Learning in, about, and for, the out-of-doors as a process for acquiring skills with which to enjoy outdoor pursuits.
- 4463* Areas and Facilities in Leisure Services.** Prerequisites: 3463, HHP 3773. Planning, design and development of areas and facilities in leisure service delivery systems.
- 4473* Outdoor Recreation.** Theory and practical application of outdoor recreation concepts with emphasis on philosophies, principles, policies, economics, trends and problems.
- 4480 Internship in Leisure Services.** 1-12 credits, maximum 12. Prerequisite: last semester senior year with cumulative GPA of 2.50. Supervised field work experience in leisure services management or therapeutic recreation. Graded on a pass-fail basis.
- 4482 Senior Seminar in Leisure Services.** Prerequisite: last semester on campus. Culmination of course work in leisure studies. Examination of current issues, professional practices and personal philosophy of leisure.
- 4493 Administration of Leisure Services.** Decision making, problem solving, personnel policies, legal issues, fiscal policies and budget procedures related to the delivery of leisure services.
- 4513* Facilitation Techniques in Leisure Counseling.** Prerequisite: 3483. Philosophy, history, trends, models, legal aspects and basic methods of leisure counseling and leisure education.
- 4523* Program Design in Therapeutic Recreation.** Prerequisite: 3483. Systematic approach to the development, design and evaluation of therapeutic recreation programs.
- 4563* Entrepreneurial Leisure Services.** Prerequisite: 3463. Introduction to the scope, characteristics and management aspects of the commercial recreation industry from an entrepreneurial perspective.
- 4573* Leadership in Experiential Education.** An investigation of leadership styles and management models with an application to adventure based education.
- 4580* Technical Management in the Wilderness.** 1-6 credits, maximum 6. Developing technical competencies in back country navigation, emergency medical care and evaluation, winter Nordic mountaineering, technical rock climbing, hazard analysis and expedition planning.
- 4903 Grantwriting and Fund-raising in Non-profit Agencies.** Methods, techniques and direct experience in acquiring funds and in-kind resources necessary for the operation of philanthropic agencies.
- 4913* Managing Non-profit Agencies.** Management skills necessary for the development and on-going operation of a non-profit agency.
- 4923* Natural Resource-based Tourism.** Examination of the link between tourism and the natural environment. Analysis of travel motives, impacts, sustainability, and supply and demand.
- 4933* Advanced Methods in Therapeutic Recreation.** Prerequisites: clinical and consent of instructor. Theoretical and practical examination of contemporary implementation procedures used in therapeutic recreation practice.
- 5000* Master's Thesis.** 1-6 credits, maximum 6. Prerequisite: consent of major professor. Research in leisure studies for master's degree.
- 5020* Workshop in Leisure Studies.** 1-6 credits, maximum 6. Prerequisite: consent of instructor. Advanced instruction on specialized topic area in leisure studies.
- 5030* Field Problems in Leisure Studies.** 1-6 credits, maximum 6. Prerequisite: consent of instructor. Applied research within the practice of leisure studies.
- 5053* Research Design in Leisure, Health and Human Performance.** Prerequisite: PSYC 5303 or STAT 5013 or equivalent. Research design with applicability toward leisure, health and human performance. Conceptual understanding of theory, tools and processes involved in designing research.
- 5403* Interpretation in Leisure Services.** Organization and administration of visitor centers and interpretive naturalist programs, philosophic approaches, and methods for interpreting the natural and cultural history of public parks and recreation areas.
- 5413* Organization and Administration of Leisure Services.** Systematic approach to problem solving and decision making for structure, personnel management, finance and program development for leisure service delivery systems.
- 5443* History and Philosophy of Leisure.** Contributions of recreation and leisure and its effect on humans throughout history. Additional philosophical foundations in relation to current times.
- 5453* Social Psychology of Leisure.** Inquiry into the understanding of human behaviors, thoughts and attitudes related to leisure, and the understanding of complex issues related to the social psychology of leisure.
- 5463* Issues in Therapeutic Recreation.** Prerequisite: LEIS 2433 or professional experience in therapeutic recreation. Current issues in therapeutic recreation with emphasis on accreditation, certification, licensure, quality assurance and ethics.
- 5473* Leisure and Aging.** Prerequisite: LEIS 2433 or consent of instructor. Overview of the leisure needs and services for older adults, with emphasis upon the delivery system and leisure interventions.
- 5483* Therapeutic Recreation for Persons with Physical Disabilities.** Prerequisite: 3483 or consent of instructor. Role of therapeutic recreation in the treatment and rehabilitation of individuals with physical disabilities, with emphasis on terminology, prognosis, etiology of specific disabilities, program development and assessment.
- 5493* Therapeutic Recreation in Mental Health and Mental Retardation.** Prerequisite: 3483 or consent of instructor. Role of therapeutic recreation in mental health with emphasis upon client prognosis and methodologies of treatment programs.
- 6000* Doctoral Dissertation.** 1-15 credits, maximum 15. Independent research required of candidates for the Ed.D. in Applied Educational Studies. Credit awarded upon completion of the dissertation.
- 6010* Independent Study in Leisure Studies.** 1-6 credits, maximum 6. Prerequisite: consent of instructor. Supervised readings, research or study of trends and issues related to leisure studies.

6020*
Leisure Research Colloquium. 1-3 credits, maximum 6. Prerequisite: doctoral standing. Exploration and presentation of selected topics and research in leisure studies.

6453*
Leisure Behavior. The advanced study of leisure and human behavior. Research related to the understanding of how and why humans engage in leisure.

Library Science (LBSC)

1011
Library and Internet Information Competencies. Introduction to the organization, retrieval and evaluation of information found in research libraries and on the Internet. Development of information-seeking competencies using both print resources and electronic databases.

3050
The School Library and Learning Resources Center in the Curriculum. 2-5 credits, maximum 5. Lab 1-3. Designed for teachers. Importance and effective utilization of the centralized school library media center in the teaching-learning process, evaluative selection tools of print and nonprint media, and reading guidance tools. Initial course is 2 credit hours. In addition, storytelling and field experience credits are available for 1-3 credit hours.

4113*
Reference Materials. Selection, evaluation and use of basic reference materials most commonly used in all types of libraries: the organization of reference service; interpretation of reference questions.

4313*
Young Adult Literature. Survey of print and non-print materials, including multicultural and multi-ethnic materials, for young adults from middle school through high school. History, criticism, selection and evaluation of young adult literature and exploration of its relation to the needs and interests of young people. Same course as CIED 4313.

4414*
Introduction to Cataloging and Classification. Basic principles of cataloging, with practice based on functional application of current codes and manuals recognized by the profession.

Management (MGMT)

3013
Fundamentals of Management. Management principles and techniques of analysis. Decision making as applied to management systems, organizations, interpersonal relationships and production. Does not apply to a College of Business Administration major.

3123
Managing Behavior and Organizations. Prerequisites: STAT 2023 or equivalent; junior standing. Managing behavior and organizations with an emphasis on performance. Process differences and performance expectations at the individual, team and organizational levels. Understanding of the components and dynamics of managerial and organizational behavior with the emphasis on management applications.

3133
Management Performance Development. Prerequisite: 3123. The study of personal, interpersonal and group factors relating to managerial performance. An integration of the theory and practice of management.

3313
Human Resource Management. Prerequisite: 3013. Policies and practices used in personnel management. Focuses upon the functions of a human resource management department.

4123*
Labor Management Relations. Prerequisite: 3013. Labor relations and collective bargaining. Negotiation and administration of labor agreements and employee relations in nonunion organizations. Modes of impasse resolution.

4133*
Compensation Administration. Prerequisites: 3313, STAT 2023. Introductory course. Fundamentals of compensation such as the legislative environment, compensation theories, job analysis, job evaluation, wage structures and indirect compensation programs.

4213*
Managing Diversity in the Workplace. Diversity in the workplace as a business issue that affects performance. Companies' adaptation and alignment with the population they serve or represent. The development of a cohesive work team made up of individuals who differ in gender, age, race and national origin.

4313*
Organization Theory and Development. Prerequisite: 3123. The design of formal organizations with an emphasis on topics related to organizational and managerial effectiveness. Focus on what is known about managerial and organizational effectiveness and how this knowledge may be applied.

4413
Change Management. Prerequisite: 4313 or equivalent. Managing organizational change and redesign. The study of organizational change processes and the enhancement of performance through change management. Study of the body of knowledge and applications in this branch of organizational science.

4533*
Leadership Dynamics. Prerequisite: MGMT 3123 or equivalent. Leadership applications in business management. Contemporary business challenges require managerial leadership of the highest order. Students will be exposed to the latest developments in leadership theory and research. A cornerstone of the course will be the emerging construct of transformational leadership. The course emphasizes readings, class discussions, experiential exercises, and group projects to facilitate learning.

4613
International Management. Prerequisite: 3013. Survey of the organization, planning and management of international operations of business firms. Exploration of major cultural, economic and political systems, and their effects on the management function.

4713*
Conflict Resolution in Industry. Prerequisite: 3013. An integrated and interdisciplinary approach to the issues of industrial conflict and conflict resolution. An analytical development stressing both theory and empirical research. Models of conflict; conflict between the individual, the group and the organization; economic conflict and industrial conflict.

4813*
Advanced Human Resource Management. Prerequisite: 3313. Management of human resources at the organization level including employee relations law and human resource planning.

5113*
Management and Organization Theory. Prerequisite: admission to MBA program or consent of MBA director. Contemporary theories of organization. Structure and dynamics of organizational goals and environments.

5123*
Organizational Design and Research. Prerequisite: admission to MBA program or consent of MBA director. An analysis of research which integrates theory and design of organizations. Reviews empirical research findings and stresses methods of organizational analysis; design and modification of organizations.

5213*
Seminar in Organizational Behavior. Prerequisite: admission to MBA program or consent of MBA director. Current research on group behavior in organizations. Group processes and structural factors affecting the interaction process and intra- and intergroup performance characteristics. Laboratory simulation and team research projects used to pursue advanced topics.

5223*
Seminar in Human Resource Management. Prerequisite: 5113 or consent of instructor. Principles, theories and methods of human resource management applied to various types of organizations. Human resource functions of planning, staffing, training and development, performance management, compensation and benefits, safety and health, and labor relations.

5513*
Advanced Strategic Management and Business Policy. Prerequisite: MBA core courses. A terminal integrating course with emphasis on formulating and implementing basic policy decisions for business. An analytic approach to strategic decisions pursued through readings, cases and participation in a complex computer game.

5553*
Management of Technology and Innovation. Prerequisite: MBA core courses or consent of instructor. Business applications of research, practice, and theory in the management of technology and innovation. To improve the effectiveness by which technologies are developed, implemented, and institutionalized. Emphasizes both management with advanced technologies and strategic management of technology.

5713*
Labor Relations and Collective Bargaining. Prerequisite: admission to MBA program or consent of MBA director. A first course in labor relations. The industrial relations system, collective bargaining, labor legislation, the economic effects of unionization and other contemporary labor relations issues.

6313*
Advanced Organizational Behavior. Prerequisites: doctoral standing and consent of instructor. Theory and research focusing on individual and group behavior in organizations. Both classic and contemporary topics in organizational behavior, including work attitudes, motivation, job design, leadership, group processes, power and politics, and individual differences.

6323*
Advanced Policy and Strategy Formulation. Prerequisites: doctoral student status and consent of instructor. Seminar examining research concerning the content of overall organizational strategy and the process through which it is formulated.

6333*
Advanced Human Resource Management and Industrial Relations. Prerequisites: doctoral student status and consent of instructor. Selected topics in human resource management and industrial relations with emphasis on evaluation of research methods. Development of research proposals.

6343*
Advanced Organization Theory and Strategy Implementation. Prerequisites: doctoral student status and consent of instructor. Administrative task of implementing corporate and business strategies and extent to which organizational structure, technology, culture, leadership, politics, and reward systems affect that process. Developments in organization theory which are relevant to strategy implementation.

6353*
Advanced Methods in Management Research. Prerequisites: doctoral student status and consent of instructor. Course examines issues in theory building and development, strategies for collecting behavioral research. At conclusion of course, student should be able to: develop research questions, develop appropriate measures for constructs to be tested, and design research study using various methodologies.

Management Science and Information Systems (MSIS)

2103
Business Computer Concepts and Applications. Prerequisites: 30 credit hours and MATH 1513. Computer concepts, terminology, and software applications. Overview of hardware and software components, file structures, management information systems, futuristic trends, database management systems, systems analysis and design, and data communications. Introduction to database, spreadsheet, and word processing software application packages and application programming.

2203
Computer Programming for Business. Prerequisite: 2103 or CS 2113 or equivalent. Computer programs for business applications using the COBOL language. File structures, file updating techniques, sorting, report writing, magnetic tape and disk file handling.

3103
Management Information Systems. Prerequisite: 2103 or equivalent. Information technology (IT) management and the development and use of management information systems in today's business organizations. Use of global IT tools including on-line communication tools, software for data use and integration, and user interface and presentation tools.

3203
Advanced Computer Programming for Business. Prerequisite: 2203. Advanced programming features are examined with an emphasis on the development of computer programs for business application. File processing including magnetic tape sequential files, disk-indexed sequential files, and virtual storage applications are an integral part of the course. Subjects and techniques such as TSO, segmentation, debugging tools and procedures, and pertinent JCL are also studied and applied.

3223*
Production and Operations Management. Prerequisite: MGMT 3013. Production and operations management utilizing a management science approach. Management decision-making techniques and their application to problems in production and operations management. Examples of applicable techniques include linear programming and decision analysis.

3233
Management Science Methods. Prerequisite: 3223. Deterministic operations research techniques applied to the resource allocation and operational problems encountered in accounting, marketing, finance, economics and management. Linear programming and network models.

3243
Managerial Decision Theory. Prerequisite: 3223. Decision processes under risk and uncertainty. The use of models in business decision making with outcomes governed by probability distributions. Bayesian decision analysis, utility measurements, game theory, Markov chains, queuing, simulation probabilistic forecasting and inventory, network models, and dynamic programming.

3303
Business Systems Analysis. Prerequisites: 2103, 2203, ACCT 2203. Systems analysis as a profession and role of the systems analyst in the analysis, design, and implementation of computer-based business information systems. Current system documentation through use of classical and structured tools and techniques for describing flows, data flows, data structures, file designs, input and output designs, and program specifications. Information gathering and reporting activities and transition into system analysis and design.

3363
Advanced Management Information Systems Programming. Prerequisite: 2203 or equivalent. Programming tools with applications in industry. Advanced programming procedures, processes and algorithms.

4013*
Data Base Management. Prerequisite: 2103 or equivalent. Theoretical aspects and management applications of data bases, file organization, and data models, with emphasis on hierarchical network and relational structures. Discussion of storage devices, data base administration, and the analysis, design and implementation of data base management systems.

4113*
Systems Design and Development. Prerequisites: 3303, 4013. Business information systems design and development with coverage of essential systems analysis techniques. Theory and application of prototyping. Computer-aided software engineering (CASE) and fourth-generation language tools used to develop a functioning business information system. Project management and additional analysis, design and development topics.

4263
Applied Artificial Intelligence. Prerequisite: 2103 or equivalent. Managerial applications of artificial intelligence. Topics include an overview and survey of the major topics in artificial intelligence, such as neural networks, natural language processing, robotics, and vision; expert system concepts and strategies; evaluating tools and techniques; knowledge engineering methodology; building expert systems; project management for expert systems.

4363*
Advanced Topics in Systems Development. Prerequisite: 4113. Advanced topics in management information systems development methodologies such as analysis and design of web-based information systems, development and administration of groupware systems, and advanced object-oriented system development methodologies.

4373*
Advanced Topics in Management Information Systems. Prerequisite: 2103 or equivalent. Advanced topics such as advanced network management, electronic commerce, international management information systems, and legal and regulatory issues in telecommunications.

4443*
Computer-based Simulation Systems. Prerequisites: 3223, completion of lower-division mathematics requirements and a course in a scientific programming language such as FORTRAN, PL/1, or PASCAL. Discrete computer systems simulation using languages such as GPSS, GASP, or SLAM. Cases include queuing, layout planning and evaluation, and financial modeling.

4523*
Data Communication Systems. Prerequisite: 3303. Management orientation to decisions necessary in the design, implementation and control of data communications. Transmission service and equipment characteristics, network design principles, data communication software and federal regulatory policy affecting data communication.

5303*
Quantitative Methods in Business. Prerequisites: admission to the MBA program or consent of MBA director; demonstrated calculus proficiency. Application of quantitative techniques to business problems. Linear programming, transportation and assignment models, goal programming, integer programming, and networks.

5313*
Production Operations Management. Prerequisites: admission to MBA program or consent of MBA director, and 5303. The management of operations in manufacturing and service organizations. Production planning, facility location and layouts. Inventory control, waiting line problems and simulation. Project management and quality control. Emphasis is on a management science approach.

5333*
Advanced Decision Theory for Management. Prerequisite: admission to MBA program or consent of MBA director. Case studies and examples involving decision analysis. Studies taken from current literature.

5413*
Advanced Management Science. Prerequisite: admission to MBA program or consent of MBA director. Advanced management science methods, with computer applications. Mathematical programming, simulation, forecasting, queuing, Markov processes.

5613*
Advanced Production and Operations Management. Prerequisites: 5313 or equivalent; admission to MBA program or consent of MBA director. Production system, including a synthesis of production and management techniques used by operations managers. A computerized management simulation game provides decision-making experience.

5623*
Advanced Management Information Systems. Prerequisites: 5313, BADM 5003, ACCT 5103, STAT 3013; admission to MBA program or consent of MBA director. Design and use of management information systems in businesses and other organizations. Model building, information resource management and decision support systems.

5633*
Decision Support and Expert Systems. Prerequisite: BADM 5003 or equivalent. Technical and managerial issues involved in the evaluation, acquisition and implementation of advanced technologies, such as decision support systems, expert systems, artificial intelligence, executive information systems, neural networks and others.

5643*
Advanced Data Base Management. Prerequisites: 4253 or equivalent and admission to MBA program or consent of MBA director. Advanced theoretical and practical foundations. Brief review of classical issues surrounding design, analysis, and implementation of data bases, both from a micro and a mainframe perspective. Current and emerging issues in the data base field. Analysis, design, and implementation of distributed data bases, the object oriented data model paradigm, the use and management of automated design and support tools (e.g., CASE) from a data base perspective, and data security.

6200*
Advanced Topics in Management Information Systems. 3-6 credits, maximum 6. Prerequisites: doctoral student status and consent of instructor. Special advanced topics in management information systems for doctoral students.

Marketing (MKTG)

3213
Marketing. Prerequisite: ECON 2023. Marketing strategy and decision-making. Consumer behavior, marketing institutions, competition and the law.

3323
Consumer and Market Behavior. Prerequisite: 3213. Qualitative and quantitative analyses of the behavior of consumers; a marketing consideration of the contributions of economics and the behavioral disciplines to consumer behavior.

3433
Promotional Strategy. Prerequisite: 3213. Promotional policies and techniques and their application to selling problems of the firm.

3473
Professional Selling. Prerequisites: 3213, 3323, 3433. Skills to understanding the professional personal selling process. Strong emphasis on the communications function of personal selling. Lecture sessions combined with experiential exercises and role playing.

3513
Sales Management. Prerequisite: 3213. Sales planning and control, organization of the sales department, developing territories, motivating salespersons and control over sales operations.

3613
Retailing Management. Prerequisite: 3213. Applied marketing knowledge, with attention given to those concepts and methods which provide the necessary foundation for a retailing manager.

4113*
Marketing Decision Analysis. Prerequisite: 3213. Decision making in a variety of marketing applications to include model building, analysis of courses of action, and development of online information systems. Applications with microcomputers to focus on decision areas such as sales forecasting, media selection, sales force allocation and site location.

4223
Business Logistics and Channel Management. Prerequisites: 3213 and MGMT 3223. An economic and operational analysis of the physical flow of goods and materials. A system interpretation of marketing channels.

4333*
Marketing Research. Prerequisites: 3213 and STAT 3013. Basic research concepts and methods. Qualitative and quantitative tools of the market researcher.

4433
Problems in Marketing. Prerequisite: 3213. Problems in marketing. Specific topics vary from semester to semester.

4443*
Social Issues in the Marketing Environment. Prerequisite: 3213. Social and legislative considerations as they relate to the marketplace.

4553*
(I)International Marketing. Prerequisite: 3213. The conceptual framework for marketing into and from foreign countries. The development of action-oriented strategies with emphasis on the uncontrollable factors that affect marketing decisions in an international setting.

4683
Managerial Strategies in Marketing. Prerequisite: 90 credit hours including 9 credit hours of marketing. Analysis of the marketing management decision process; market opportunity analysis, strategy development, planning and integration with corporate strategy.

4773*
Services Marketing. Prerequisite: 3213. Conceptual and managerial tools for students who intend to be involved with the marketing of services. Characteristics of services, listening to customers, managing customer expectations, conceiving and creating service breakthroughs, service quality, positioning of services, managing demand and supply, creating a strategic service vision and designing a customer focused organization to create and retain customers.

4850
Applied Marketing Studies. 1-6 credits, maximum 6. Prerequisites: 12 credit hours of marketing and consent of instructor. Structured internship or field project with supporting academic study.

5133*
Marketing Management. Prerequisite: admission to MBA program. Consideration at an advanced level of the major elements of marketing from the point of view of the marketing executive. Emphasis on problem solving and decision making; using an interdisciplinary approach. Development of an integrated, comprehensive marketing strategy.

5213*
Services Marketing. Prerequisite: 5133. Services and services marketing with emphasis on services research and services management.

5220*
Seminar in Marketing. 3 credits, maximum 9. Prerequisite: 5133. Selected topics in marketing. Industrial marketing, product management, strategic marketing planning, international marketing, and services marketing.

5313*
Marketing Research Methodology. Prerequisite: 5133. Research methodology applied to marketing problems. Measurement, survey research, experimentation, and statistical analysis of data.

5553*
International Marketing Strategy. Prerequisite: 5133. An analysis of marketing in the global environment. Environmental effects on international marketing management and corporate strategy decisions.

5613*
Seminar in Consumer Behavior. Prerequisite: 5133 or consent of instructor. Psychological, sociological, and anthropological theories related to consumer decision processes. Special emphasis on current empirical research in consumer behavior.

5713*
Seminar in Promotional Strategy. Prerequisite: 5133. Promotional problems encountered by a firm and approaches to their solution.

5813*
Seminar in Channels of Distribution. Prerequisite: 5133. Development structure and interrelationships among members of marketing channels involving customer service, physical distribution decisions, and operating policies.

6323*
Seminar in Advanced Consumer Behavior. Prerequisite: MKTG 5133 or consent of the instructor. An interdisciplinary course examining empirical and theoretical studies of the factors that influence the acquisition, consumption, and disposition of goods, services, and ideas. Analysis of the psychological, sociological, anthropological, demographic, and regulatory forces that impact consumers. Examination of research methodologies employed to conduct empirical studies of consumer behavior.

6413*
Advanced Marketing Research. Prerequisite: 5313. Introduction to the latest empirical marketing research techniques. Data collection and analysis techniques such as conjoint analysis, multidimensional scaling, path analysis, and structural equations modeling (via LISREL).

6513*
Seminar in Marketing Theory. Prerequisite: 5133 or consent of instructor. Development of an evaluation of marketing theory.

6683*
Seminar in Marketing Strategy. Prerequisite: 5133 or consent of instructor. Examination of a broad range of marketing management topics from a strategic perspective. Understanding of content, theory and research methods involved in the development of strategic marketing knowledge.

6913*
Measurement and Experimental Design. An analysis of measurement issues from both psychometric and marketing perspectives. Scale construction and validation. The design, analysis, and evaluation of marketing experiments.

Mass Communications (MC)

5000*
Thesis. 1-6 credits, maximum 6. For mass communication graduate students who are candidates for the master's degree.

5010*
Specialized Mass Communication. 1-3 credits, maximum 3. Lab 4. Advanced message preparation in candidate's field of concentration.

5113*
Methods of Research in Mass Communication. Principles and techniques of research; research planning, design and measurement in mass communication.

5223*
Mass Communication Research Analysis and Interpretation. Prerequisite: 5113. Single- and multi-variate analysis, interpretation and reporting of mass communication research data. Use of computers in research analysis.

5333*
Process and Effects of Mass Communication. Mediating factors that affect interaction of ingredients in the communications process, and how these factors can affect the fidelity of information conveyed.

5653*
Introduction to Graduate Study. Prerequisite: graduate standing or consent of instructor. Orientation to skills necessary for successful completion of graduate work. Training in library and archival research, academic writing and preparation of research reports, familiarization with theoretical concepts and issues associated with mass communication. Required of all mass communication M.S. candidates, and prerequisite to M.S. candidates enrolling in mass communication seminars.

5663*
Public, Educational and Instructional Television. Uses of non-commercial television in public, educational and instructional applications. Analysis of program types and content.

5673*
Seminar in International Mass Communications. Prerequisite: graduate standing or consent of instructor. Examination of the nature and flow of news and information within and among nations, states, and societies from a theoretical vantage point grounded in region-specific realities. The political, economic, social, cultural and historical forces determining media practice in a global environment.

5733*
Responsibility in Mass Communication. Interaction between mass media and society, with emphasis upon the communicator's ethics and responsibilities.

5770*
Seminar in Communications Media. 1-3 credits, maximum 9. Prerequisite: graduate standing or consent of instructor. International communication, media history, legal research, new technology, women and the media, television and children, industrial television, and communication research.

5883*
Advanced Media Management. Prerequisite: graduate standing or consent of instructor. Management concerns in four areas of mass communication practice: public relations, advertising, broadcasting and print journalism. Different emphases offered according to student demand or need.

5913*
General Semantics in Mass Communication. Prerequisite: graduate standing or consent of instructor. Language as it affects thought and action, with special emphasis on writings of Johnson, Korzybski, Hayakawa, Chase and Lee in relation to communication media.

Master of Business Administration (MBA)

5010*
Independent Study. 3-6 credits, maximum 6. Prerequisite: admission to MBA program or consent of MBA director. Investigation of advanced research topics or directed study under the supervision of a faculty member. Consent of MBA Graduate Studies Committee required.

5011*
Financial Tools: An Overview for Managers. Prerequisite: admission to MBA program. Introduction for managers to concepts and terminology of accounting, economics and finance.

5021*
Personal Computer Tools: An Overview for Managers. Prerequisite: admission to MBA program. Introduction for managers to fundamental microcomputer tools and concepts. Work group support systems such as spreadsheets, word processing and electronic mail.

5031*
Quantitative Tools: An Overview for Managers. Prerequisite: admission to MBA program. Introduction for managers to quantitative tools used in business decision making.

5101*
Information Systems Technologies for Managers. Prerequisite: 5021. Use of various information systems resources available to managers. Database management systems, Internet and telecommunication networks.

5112*
Managing Individual and Group Performance. Prerequisite: admission to MBA program or consent of MBA director. Development of skills for managing individuals and small groups in an organizational context. Motivation, goal setting and rewards, leadership styles, conflict resolution, and team building.

5122*
Marketing Decisions for Management. Prerequisite: admission to MBA program or consent of MBA director. Exploration of marketing role in organizations through an examination of the significant marketing decisions required of management. Strategic and tactical decisions, marketing's relationship to business and society, and environmental influences.

5132*
Internal and External Accounting Information for Decision Making. Prerequisite: 5011. Development of the ability to read and analyze internal and external financial statements and other financial reports. Use of accounting information to make business decisions.

5142*
Economic Perspectives for Managers. Prerequisite: 5011. Application of microeconomic theory to managerial decision making. Understanding of government's role in the regulation of business and industry.

5152*
Financial Decision Techniques. Prerequisite: 5011. Development and practice of techniques to solve various financial problems facing organizations. Integration of existing financial theory and business practices.

5161*
Managing Information Systems. Prerequisite: 5011. Composition, development and management of information systems for organizational use. Decision support systems, executive information systems, and expert systems and their uses. Organizational issues concerning information systems design and development.

5172*
Research Methods for Business Decision Making. Prerequisites: 5021, 5031. Application of analytical techniques to business research and decision making. Methods to summarize, analyze, and make inferences from business and industry data.

5182*
Quantitative Modeling for Decision Support. Prerequisites: 5021, 5031. Use of modeling techniques to assist managers with decision making. Models illustrated through application to real-world business problems. Understanding advantages and limitations of the methods.

5192*
Managing Operations and Decision Processes. Prerequisite: 5172. Study of concepts of management of production and service operations. Contemporary manufacturing technologies and application of quantitative techniques. Development of analytical skills required to conduct detailed investigations of real-world systems.

5211*
Business Ethics and Social Responsibility. Prerequisite: admission to MBA program or consent of MBA director. Introduction to ethical theory and its relationship to business practices. Meaning and implementation of socially responsible business actions. Provides mid-level managers with an understanding of ethical perspectives adopted by others. Development of tools needed to make ethical decisions.

5221*
Public Environment of Business. Prerequisite: admission to MBA program or consent of MBA director. Survey of the external forces that influence and shape the organizational environment. Strategies for forecasting, responding to, and influencing these forces.

5233*
Global Competitive Environment. Prerequisite: admission to the MBA program or consent of the director. Development of a global business strategy for the organization. Issues of highly diversified markets and business environments, global competition, financial markets, and complex organizational relationships. Same course as IS 5233.

5240*
Managerial Communication Skills. 1-2 credits, maximum 2. Prerequisite: admission to MBA program or consent of MBA director. Identification and analysis of interactive corporate communications: oral, written and interpersonal. Application of communication theories to business situations with the goal of behavior and skill development.

5251*
Strategic Concepts. Prerequisite: admission to MBA program or consent of MBA director. Examination of corporate strategy formulation and environmental influences on strategy. Concepts used for analysis and development of corporate strategy. Interplay between strategy and the organization.

5261*
Legal Issues in Business. Prerequisite: admission to MBA program or consent of MBA director. Analysis of the basic concepts of public and private law related to business decisions. Overview of the laws affecting private business relationships including employment law, agency laws, and various forms of business organizations.

5303*

Strategy and Business Planning. Prerequisite: admission to the MBA program or consent of the director. Examination of issues faced by the general manager in creating and managing a single business firm. Exploration of how different business functions fit together to create a competitive business.

5310*

Integrative Decision Making II: Crossing Organizational Boundaries. 2-6 credits, maximum 6. Prerequisites: consent of MBA director and completion of minimum of 24 MBA credit hours. Identification and analysis of environmental forces affecting an organization's ability to compete and survive. Interaction among all corporate functional units. Development of a comprehensive, integrated plan of action for the firm.

5313*

Business Systems Integration. Prerequisite: admission to the MBA program or consent of the director. The structure and processes by which businesses apply and integrate functional expertise to meet business opportunities. Utilization of people, operations, management, technology, and information systems to preserve and continue viable organizations.

5400*

Business Practicum. 1-3 credits, maximum 3. Prerequisites: consent of MBA director and completion of 18 MBA credit hours. Application of knowledge and skills developed in MBA functional courses in an organizational environment. Integration of functional concepts, allowing students to experience the adaptation of concepts to fit organizational reality, and assisting students in understanding ways in which their academic training can help organizations.

5500*

Interdisciplinary Inquiry in Business Administration. 1-3 credits, maximum 9. Prerequisite: consent of MBA director. Investigation of various business problems using an interdisciplinary approach. Courses team taught to ensure problems viewed from varying functional perspectives.

5990*

MBA Applied Business Report. 3-6 credits, maximum 6. Prerequisite: admission to MBA program or consent of MBA director. Independent investigation of a business problem under the direction of a supervising professor.

Mathematics (MATH)

0123

Intermediate Algebra. Prerequisite: one year of high school algebra or equivalent. Review of fundamental operations of algebra, rational expressions, exponents and radicals, linear and quadratic equations, inequalities, introduction to analytic geometry. Does not count for college credit. Graded on a satisfactory-unsatisfactory basis.

1483

(A)Mathematical Functions and Their Uses. Prerequisite: 0123 or placement into 1513. Analysis of functions and their graphs from the viewpoint of rates of change. Linear, exponential, logarithmic and other functions. Applications to the natural sciences, agriculture, business and the social sciences.

1493

(A)Applications of Modern Mathematics. Prerequisite: 0123 or placement into 1513. Introduction to contemporary applications of discrete mathematics. Topics from management science, statistics, coding and information theory, social choice and decision making, geometry and growth.

1513

(A)College Algebra. Prerequisite: two years of high school algebra or 0123. Quadratic equations, functions and graphs, inequalities, systems of equations, exponential and logarithmic functions, theory of equations, sequences, permutations and combinations. No credit for those with prior credit in 1715 or any mathematics course for which 1513 is a prerequisite.

1613

(A)Trigonometry. Prerequisites: 1513 or equivalent, or concurrent enrollment. Trigonometric functions, logarithms, solution of triangles and applications to physical sciences. No credit for those with prior credit in 1715 or any course for which 1613 is a prerequisite.

1715

(A)College Algebra and Trigonometry. Prerequisites: one unit of high school plane geometry, and 0123 or high school equivalent. An integrated course in college algebra and trigonometry. Combined credit for 1513, 1613, and 1715 limited to six hours. No credit for those with prior credit in any course for which 1613 is a prerequisite. Satisfies the six hour general education Analytical and Quantitative Thought area requirement.

2103

(A)Elementary Calculus. Prerequisite: 1513. An introduction to differential and integral calculus. For students of business and social sciences.

2123

(A)Calculus for Technology Programs I. Prerequisites: 1715 or 1513 and 1613. First semester of a terminal sequence in calculus for students in the School of Technology. Functions and graphs, differentiation and integration with applications.

2133

(A)Calculus for Technology Programs II. Prerequisite: 2123. Second semester of a terminal sequence in calculus for students in the School of Technology. Calculus of trigonometric, exponential and logarithmic functions and applications to physical problems.

2145

(A)Calculus I. Prerequisites: 1715, or 1513 and 1613. An introduction to derivatives, integrals and their applications, including introductory analytic geometry. Satisfies the six hour general education Analytical and Quantitative Thought area requirement.

2155

(A)Calculus II. Prerequisite: 2145. A continuation of 2145 including multivariate calculus, series and applications. Satisfies the six hour general education Analytical and Quantitative Thought area requirement.

2233

Differential Equations. Prerequisite: 2155. Methods of solution of ordinary differential equations with applications. First order equations, linear equations of higher order, series solutions, and Laplace transforms.

2653

Discrete Mathematics I. Prerequisite: 1513 or 1715. Logic, set theory proof techniques, probability and combinatorics, relations and functions, matrix algebra, graphs, Boolean algebra and lattices. Same course as CS 2653.

2910

Special Studies. 1-3 credits, maximum 6. Prerequisite: consent of instructor. Special subjects in mathematics.

2951

Introduction to Problem Solving. Prerequisite: 2145. An introduction to techniques of problem solving with problems drawn from throughout mathematics.

3013*

Linear Algebra. Prerequisite: 2145. Algebra and geometry of finite-dimensional linear spaces, linear transformations, algebra of matrices, eigenvalues and eigenvectors.

3263*

Linear Algebra and Differential Equations. Prerequisite: 2155. An integrated treatment of linear algebra and differential equations. No credit for those with credit in 2233 or 3013.

3403*

(A)Geometric Structures. Prerequisite: 1483, 1493 or 1513. Fundamentals of plane geometry, geometric motion (translation, rotations, reflections), polyhedra, applications to measurements.

3603*

(A)Mathematical Structures. Prerequisite: 1483, 1493 or 1513. Foundations of numbers (set theory, numeration, and the real number system), number theory, algebraic systems, functions and applications, and probability.

3613*

Introduction to Modern Algebra. Prerequisite: 3013. Introduction to set theory and logic; elementary properties of rings, integral domains, fields and groups.

3653

(A)Discrete Mathematics II. Prerequisite: 2653 or 3613. A continuation of 2653. Algebraic structures, coding theory, finite state machines, machine decomposition, computability, formal language theory. Same course as COMSC 3653.

4003*

Mathematical Logic and Computability. Prerequisites: 3613 or PHIL 3000 or 3003 or consent of instructor. The basic metatheorems of first order logic: soundness, completeness, compactness, Lowenheim-Skolem theorem, undecidability of first order logic, Godel's incompleteness theorem. Enumerability, diagonalization, formal systems, standard and non-standard models, Godel numberings, Turing machines, recursive functions, and evidence for Church's thesis. Same course as CS 4003 and PHIL 4003.

4013*

Calculus of Several Variables. Prerequisites: 2155 and 3013. Differential and integral calculus of functions of several variables, vector analysis, Stokes' Theorem, Green's Theorem and applications.

4023*

Introduction to Modern Analysis. Prerequisite: 2155, recommended 3613. An introduction to the theorems and proofs of one-variable calculus. Properties of the real numbers, sequences and series of constants and functions, limits, continuity, differentiation and integration.

4033*

(A)History of Mathematics. Prerequisite: 2145. Early development of mathematics as a science, contributions of Greek mathematics, mathematical advancements of the 17th and 18th centuries, and the mathematics of the 19th and 20th centuries. The emphasis in the course will be on replicating the setting and techniques of the times to understand the nature of a discovery and its relationship to contemporary thought.

4143*

Advanced Calculus I. Prerequisites: 3013 and 4023. A rigorous treatment of calculus of one and several variables. Elementary topology of Euclidean spaces, continuity and uniform continuity, differentiation and integration.

- 4153***
Advanced Calculus II. Prerequisite: 4143. Continuation of 4143. A rigorous treatment of sequences and series of functions, uniform convergence, differentiation and integration of vector-valued functions, and differential forms.
- 4233***
Intermediate Differential Equations. Prerequisites: 2233, 3013. Systems of differential equations, series, solutions, special functions, elementary partial differential equations, Sturm-Liouville problems, stability and applications.
- 4283***
Complex Variables. Prerequisite: 4013. Analytic functions, power series, residues and poles, conformal mapping, and applications.
- 4403***
Geometry. Prerequisite: 3013, recommended 3613. An axiomatic development of Euclidean and non-Euclidean geometries.
- 4513***
Numerical Mathematics: Analysis. Prerequisites: 2233, 3013, knowledge of FORTRAN or consent of instructor. Machine computing, algorithms, and analysis of errors applied to interpolation and approximation of functions solving equations and systems of equations, discrete variable methods for integrals and differential equations. Same course as COMSC 4513.
- 4553***
Linear and Nonlinear Programming. Prerequisites: 2155, 3013. Linear programming, simplex methods, duality, sensitivity analysis, integer programming and nonlinear programming.
- 4583***
Introduction to Mathematical Modeling. Prerequisite: 3013. Techniques of problem solving and mathematical models presented by examples and case studies of applications of mathematics in industrial settings. Oral and written presentation of solutions.
- 4613***
Modern Algebra I. Prerequisite: 3613. An introduction to the theory of groups and vector spaces.
- 4663***
Combinatorial Mathematics. Prerequisite: 3013. Counting techniques, generating functions, difference equations and recurrence relations, introduction to graph and network theory.
- 4713***
Number Theory. Prerequisite: 3613. Divisibility of integers, congruences, quadratic residues, distribution of primes, continued fractions and the theory of ideals.
- 4900**
Undergraduate Research. 1-4 credits, maximum 4. Prerequisite: consent of instructor. Directed readings and research in mathematics.
- 4910***
Special Studies. 1-3 credits, maximum 9. Prerequisite: consent of instructor. Special subjects in mathematics.
- 4950**
Problem Solving Seminar. 1 credit, maximum 3. Prerequisites: 2233, 3013. The general process of problem solving. Selected problem-solving techniques. Applications to challenging problems from all areas of mathematics.
- 4993**
Senior Honors Thesis. Prerequisites: senior standing and Honors Program participation. A guided reading and research program ending with an honors thesis under the direction of a faculty member and including a public presentation. Required for graduation with departmental honors in mathematics.
- 5000***
Research and Thesis. 1-6 credits, maximum 6. Prerequisite: consent of advisory committee. Directed reading and research culminating in the master's report or master's thesis.
- 5010***
Seminar in Mathematics. 1-3 credits, maximum 12. Prerequisite: consent of instructor. Topics in mathematics.
- 5013***
Modern Algebra II. Prerequisite: 4613. Continuation of 4613. An introduction to the theory of rings, linear transformations and fields.
- 5023***
Advanced Linear Algebra. Prerequisite: 3013. A rigorous treatment of vector spaces, linear transformations, determinants, orthogonal and unitary transformations, canonical forms, bilinear and hermitian forms, and dual spaces.
- 5113***
Intermediate Probability Theory. Prerequisites: 5143 and STAT 4113. Measurement of theoretical presentation of probability, integration and expectation, product spaces and independence, conditioning, different kinds of convergence in probability theory, statistical spaces, characteristic functions and their applications. Same course as STAT 5113.
- 5133***
Stochastic Processes. Prerequisites: 2233, 3013 and STAT 4113. Definition of stochastic processes, probability structure, mean and covariance function, the set of sample functions, stationary processes and their spectral analysis, renewal processes, counting analysis, renewal processes, counting processes, discrete and continuous Markov chains, birth and death processes, exponential model, queueing theory. Same course as IEM 5133 and STAT 5133.
- 5143***
Real Analysis I. Prerequisite: 4153. Measure theory, measurable functions, integration and differentiation with respect to measures.
- 5153***
Real Analysis II. Prerequisite: 5143. Aspects of point set topology: nets, locally compact spaces, product spaces, Stone-Weierstrass theorem. Elementary functional analysis: Hahn-Banach, uniform boundedness, and open mapping theorems, Hilbert spaces. Riesz representation theorems: duals of Lebesgue spaces and spaces of continuous functions.
- 5213***
Fourier Analysis. Prerequisite: 4013 or 4023. Orthogonal series expansions, Fourier series and integrals and boundary value problems. Applications.
- 5233***
Partial Differential Equations. Prerequisite: 4013 or 4233. Classification of second order equations, characteristics, general theory of first order equations, Dirichlet problem for Laplace's equation and Green's functions, eigenvalue problems, and variational methods.
- 5243***
Ordinary Differential Equations I. Prerequisites: 4143; 5013 or 5023. Existence and uniqueness of solutions, linear systems and their asymptotic behavior, oscillation and comparison and singularities.
- 5253***
Ordinary Differential Equations II. Prerequisite: 5243. Stability and asymptotic behavior of systems of nonlinear differential equations, Liapunov Theory, perturbation and the Poincare-Bendixon theory for planar autonomous systems, bifurcation, basins and attractors, chaotic behavior, and invariant tori.
- 5283***
Complex Analysis I. Prerequisite: 4143. Basic topology of the plane, functions of a complex variable, analytic functions, transformations, infinite series, integration and conformal mapping.
- 5293***
Complex Analysis II. Prerequisite: 5283. Riemann Mapping Theorem, meromorphic functions, analytic continuation, Dirichlet problem, and entire functions.
- 5303***
General Topology. Prerequisite: 4143 or consent of instructor. Basic properties of topological spaces and continuous functions, including connectedness, compactness, and separation and countability axioms. Metric, product, and quotient spaces, Urysohn lemma, and Tietze extension theorem.
- 5313***
Geometric Topology. Prerequisites: 4613, 5303. Manifolds, complexes, the fundamental group, covering spaces, combinatorial group theory, the Seifert-Van Kampen theorem, and related topics.
- 5413***
Differential Geometry. Prerequisite: 4013 or 4143. Differential manifolds, vector fields, differential forms, connections, Riemannian metrics, geodesics, completeness, curvature, and related topics.
- 5523***
The Calculus of Variations and Optimal Control. Prerequisite: 4023 or 4143. Extrema of integrals depending on unknown functions. Euler conditions, Hamilton-Jacobi equations, Weierstrass E-function, Pontryagin maximum principle, bang-bang controls, feedback, stochastic problems and Kalman-Bucy filter.
- 5543***
Numerical Analysis for Differential Equations. Prerequisites: 4513 or CS 4513, and 4233. Advanced machine computing, algorithms, analysis of truncation and rounding errors, convergence and stability applied to discrete variables, finite elements, and spectral methods in ordinary and partial differential equations. Same course as CS 5543.
- 5553***
Numerical Analysis for Linear Algebra. Prerequisites: 3013, and 4513 or CS 4513. Advanced machine computing, algorithms, analysis of rounding errors, condition, convergence, and stability applied to direct and iterative solution of linear systems of equations, linear least squares problems, and algebraic eigenvalue problems, including LU and QR factorization, conjugate gradients, QR algorithm, and Lanczos method. Same course as CS 5553.
- 5580***
Case Studies in Applied Mathematics. 1-3 credits, maximum 6. Prerequisites: 2233, 4013, and knowledge of computer programming. Selected mathematical problems from industry. Independent problem-solving, oral presentation of solutions, and technical report writing. Seminar-style format.
- 5593***
Methods of Applied Mathematics. Prerequisites: 2233, 4013, and knowledge of computer programming. Continuous and discrete techniques in modern applied mathematics. Positive definite matrices, eigenvalues and dynamical systems, discrete and continuous equilibrium equations, least squares estimation and the Kalman filter, potential flow, calculus of variations, network flows, and combinatorics.

5613*

Algebra I. Prerequisite: 4613. A rigorous treatment of classical results in group theory and ring theory.

5623*

Algebra II. Prerequisite: 5613. A rigorous treatment of classical results in module theory and field theory.

5653*

Automata and Finite State Machines. Prerequisites: 3613 or CS 5313 or CS 5113 and CS 5213. Finite state model, state diagrams and flow tables, equivalent states and equivalent machines. Formal grammars, context-free languages and their relation to automata. Turing machines, and recursive function. Same course as CS 5653.

5663*

Computability and Decidability. Effectiveness, primitive recursivity, general recursibility, recursive functions, equivalence of computability, definitions, decidability, recursive algorithms. Same course as CS 5663.

6000*

Research and Thesis. 1-9 credits, maximum 24. Prerequisite: consent of advisory committee. Directed reading and research culminating in the Ph.D. or Ed.D. thesis.

6010*

Advanced Seminar in Mathematics. 1-3 credits, maximum 12. Prerequisites: consent of instructor and student's advisory committee. Directed reading on advanced topics in mathematics.

6123*

Advanced Probability Theory. Prerequisites: 4283 and 5113 or STAT 5113. Sequences of random variables, convergence of sequences, and their measure theoretical foundations. Different kinds of convergence in probability theory. Characteristic functions and their applications. Laws of large numbers and central limit theorems. Conditioning. Introduction to stochastic processes. Same course as STAT 6123.

6143*

Functional Analysis I. Prerequisites: 4613 or 5023, 5153, 5303. Theory of topological vector spaces including metrizable, consequences of completeness, Banach spaces, weak topologies, and convexity.

6153*

Functional Analysis II. Prerequisite: 6143 or consent of instructor. Introduction to and basic results in several subfields of analysis which employ functional analytic methods. Topics from bounded and unbounded operator theory, Banach algebras, distributions, Fourier analysis, and representation theory.

6213*

Harmonic Analysis. Prerequisites: 5153, 5283. Classical results giving connections among the size of a harmonic or analytic function on a complex domain, the existence and smoothness of its boundary values, and behavior of the Fourier series; selected extensions, related topics and applications.

6233*

Theory of Partial Differential Equations. Prerequisites: 5233, 5153. Tempered distributions, Sobolev spaces, distribution solutions of PDEs, fundamental solutions. Existence, well-posedness and uniqueness theorems for Cauchy problem and boundary value problems.

6283*

Several Complex Variables. Prerequisite: 5293. Elements of function theory of several complex variables, including extension phenomena, domains of holomorphy, notions of convexity, holomorphic maps, and complex analytic varieties.

6290*

Topics in Analysis. 1-3 credits, maximum 9. Prerequisite: consent of instructor. Advanced topics in analysis.

6323*

Algebraic Topology I. Prerequisite: 5313. Chain complexes, homology and cohomology groups, the Eilenberg-Steenrod axioms, Mayer-Vietoris sequences, universal coefficient theorems, the Eilenberg-Zilber theorem and Künneth formulas, cup and cap products, and duality in manifolds.

6333*

Algebraic Topology II. Prerequisite: 6323. Homotopy groups, the Hurewicz and Whitehead theorems, Eilenberg-MacLane spaces, obstruction theory, fibrations, spectral sequences, and related topics.

6390*

Topics in Topology. 1-3 credits, maximum 9. Prerequisite: consent of instructor. Advanced topics in topology.

6433*

Algebraic Geometry. Prerequisite: 5623. Affine and projective varieties, dimension, algebraic curves, divisors, and Riemann-Roch theorem for curves.

6453*

Complex Geometry. Prerequisite: 5283. Complex manifolds, analytic sheaves, differential forms, Dolbeault cohomology, Hodge theory, line bundles, divisors, Kodaira embedding, and vanishing.

6490*

Topics in Geometry. 1-3 credits, maximum 9. Prerequisite: consent of instructor. Advanced topics in geometry.

6513*

Theoretical Numerical Analysis. Prerequisites: 5153, 5543 or CS 5543, and 5553 or CS 5553. An advanced theoretical treatment based on function spaces and operator theory of algorithms for machine computing and analysis of errors.

6590*

Topics in Applied Mathematics. 1-3 credits, maximum 9. Prerequisite: consent of instructor. Advanced topics in applied mathematics.

6613*

Commutative Algebra. Prerequisite: 5623. Commutative rings, exactness properties of modules, tensor products, integral dependence, chain conditions, completions, filtrations, local rings, dimension theory, and flatness.

6623*

Homological Algebra. Prerequisite: 5623. Closed and projective classes, resolution and derived functors, adjoint theorem, construction of projective classes in the categories of groups, rings and modules; categories, Abelian categories.

6690*

Topics in Algebra. 1-3 credits, maximum 9. Prerequisite: consent of instructor. Advanced topics in algebra.

6713*

Analytic Number Theory. Prerequisite: 4283 or 5283. Arithmetic functions, Zeta and L functions, distribution of primes and introduction to modular forms.

6723*

Algebraic Number Theory. Prerequisite: 5013 or 5623. Number fields, ideal theory, units, decomposition of primes, quadratic and cyclotomic fields, introduction to local fields.

6790*

Topics in Number Theory. 1-3 credits, maximum 9. Prerequisite: consent of instructor. Advanced topics in number theory.

6813*

Lie Groups and Representations. Prerequisites: 4153, 4613, 5303. Differentiable manifolds, vector fields, Lie groups, exponential map, homogeneous spaces, representations of compact Lie groups, and maximal tori.

6823*

Lie Algebras. Prerequisites: 5013 and 5023. Matrix groups, Lie algebras, root systems, structure of semisimple Lie algebras, universal enveloping algebra, and representations of Lie algebras.

6890*

Topics in Representation Theory. 1-3 credits, maximum 9. Prerequisite: consent of instructor. Advanced topics in representation theory.

Mechanical and Aerospace Engineering (MAE)

3033

Engineering Design. Lab 2. Prerequisite: ENGR 1322; corequisite: IEM 3503. Design methodology and practice. Design process, with emphasis on the broad range of technical, economic, and societal factors considered in design decision making. Designing and building a machine to participate in a design competition.

3043

Mechanics of Machinery. Prerequisites: ENSC 2122, MATH 2233; co-requisite 3403. The kinematics and kinetics of rigid bodies subjected to planar and spatial motion; vector and matrix methods. Euler's equations to examine gyroscopic motion. The design of gears and gear trains; Analytical design of cam profiles. Multi-degree of freedom machine systems through the application of the Lagrange equation.

3113

Measurements and Instrumentation. Lab 3. Corequisites: 3403, 3723. Application of basic electronic laboratory measurement equipment. Selection and testing of transducers for measurement of displacement, time frequency, velocity, pressure, force, temperature, flow-rate, and vibration, for machine design applications. Considerations of accuracy, uncertainty and repeatability. Design projects involving the use of analog and digital integrated circuits and construction of prototype sensors. Practice in the use of signal processing including digital filtering and applications of Fast Fourier Transform theory. Practice in the use of computer-based data acquisition systems. Preparation of formal reports, including the presentation of plots, figures and tables.

3123

Manufacturing Processes. Prerequisites: ENSC 2142 and ENSC 3313 or equivalent. An introduction to manufacturing processes including the fundamental processes of casting, forging, rolling, extrusion, drawing and metal cutting. Quantitative relationships to identify important parameters which influence a given process.

3223

Thermodynamics II. Prerequisite: ENSC 2213. A continuation of ENSC 2213. Irreversibility and availability, power cycles, refrigeration cycles, mixtures and solutions, chemical reactions, phase and chemical equilibrium, and introduction to compressible flow.

3233

Heat Transfer. Prerequisite: ENSC 3233; co-requisite: MAE 3403. Mechanisms of heat transfer. Steady and transient conduction, free and forced convection, heat exchanger design and analysis, radiation and multiphase behavior. Numerical methods, dimensional analysis and boundary layer theory.

3253

Applied Aerodynamics and Performance. Prerequisites: 3293, ENSC 3233, MATH 2233. Relevant fluid properties; standard atmospheres; mathematical models of flows about bodies. Characteristic parameters of airfoils and wings. Thin airfoil theory and flows about finite wings. Boundary layers. Propeller theory. Supersonic and hypersonic flows about wings and lifting bodies. Drag polars. Power required for level flight. Rate of climb and descent. Steady turns. Maximum range and endurance. Design applications.

3293

Compressible Fluid Flow. Prerequisites: ENSC 2213, 3233, MATH 2233. Gas flows in one and two dimensions. Basic thermodynamic and dynamic equations. Nozzle and duct flows, choking, plane and oblique shock waves, Prandtl-Meyer expansions, rocket propulsion, frictional high-velocity flows and heat addition effects. Two-dimensional ideal fluid flow, stream function, velocity potential, linearized flows and method of characteristics.

3323

Mechanical Design I. Lab 3. Prerequisites: ENSC 2112, ENSC 2142. Design of machine elements, pressure vessels, fasteners and weldments. Failure theories, fatigue, and thermal stress, in the design process. Analytical, numerical and energy methods for the calculation of deflection of machine components.

3403

Computer Methods in Analysis and Design. Prerequisite: ENGR 1412, co-requisite STAT 4033. Application of computer methods in the design, analysis, and simulation of mechanical, thermal and fluid systems. Linear algebra and numerical methods. Applied statistics.

3723

Systems I. Prerequisites: ENSC 2122, 2613 and MATH 2233. Physical and mathematical modeling of electrical and mechanical dynamic systems. Transient response of first- and second-order systems. Laplace transform technique for solving differential equations; transfer functions, frequency response and resonance. Same course as ECEN 3723.

4010*

Mechanical Engineering Projects. 1-6 credits, maximum 6. Lab variable. Prerequisite: consent of instructor. Special projects and independent study in mechanical engineering.

4053*

Automatic Control Systems. Prerequisite: 3113. Properties of feedback control systems, mathematical models of basic components, state-variable models of feedback systems, design specifications of control systems, time-domain analysis, stability, stability robustness, transform analysis, frequency domain techniques, root-locus, design of single-input-single-output systems and compensation techniques for engineering systems. Same course as ECEN 4413.

4063*

Mechanical Vibrations. Prerequisite: 3723. Lumped parameter analysis of multi-mode vibrating systems. Analysis techniques including classical analytical methods, matrix methods and numerical methods. Selection and design of vibration isolation systems. Selection of vibration instrumentation. Machine dynamics, including bal-ancing, whirl, nonlinear effects, and self-excited vibrations.

4223*

Aerospace Engineering Laboratory. Lab 3. Prerequisites: 3113, 3253, 4283. Experimental study of aerospace principles including topics in aeronautics and astronautics. State-of-the-art instrumentation, diagnostics, and computerized data acquisition equipment and techniques applied to experiments including application of low speed wind tunnel testing techniques, rocket propulsion and control-jet experiments, fundamentals of supersonic nozzles, and flight test evaluation of performance, stability, control, and handling qualities of a propeller-driven airplane.

4243*

Gas Power Systems. Prerequisites: 3223 and ENSC 3233. Power and propulsion engines utilizing a gas as the working fluid. Thermodynamic and dynamic equations of one-dimensional compressible flow, including shock waves. Design and analysis of overall aircraft engine systems and individual components of the aircraft engine, as well as engine component matching, using design software packages. Centrifugal and axial flow turbines and compressors.

4263*

Vapor Power Systems. Prerequisites: 3223, 3233. Vapor power cycles, combustion processes applied to power production, power plants, and auxiliary systems associated with power plants. Overall design of power plants as well as component design. Power system economics and loan analysis. Extensive use of software design and analysis packages.

4273*

Experimental Fluid Dynamics. Lab 3. Prerequisites: 3113 and ENSC 3233. Experimental study of basic and applied fluid dynamics systems with comparisons to analytical predictions. Fluid dynamics instrumentation, digital data acquisition and processing, design of facilities and experiments, technical report writing and design project with experimental verification.

4283*

Aerospace Vehicle Stability and Control. Prerequisites: 3253, ENSC 2122. Motion and control of aerospace vehicles. Derivation of equations of motion for aircraft and spacecraft. Aerodynamic stability derivatives. Static and dynamic aircraft stability and control. Handling qualities. Satellite orbital and attitude dynamics. Satellite attitude control. Design experience for stability and control in aeronautical and astronautical vehicles.

4323*

Design for Manufacturing. Lab 3. Prerequisite: 3123. Integration of concepts of product design with manufacturing principles, including behavior and properties of material, stress analysis, heat transfer and lubrication. Processing techniques and economics. Emphasis on analysis requirements and applications of processing parameters and design variables, in CAD/CAM.

4333*

Mechanical Metallurgy. Lab 2. Prerequisite: ENSC 3313. Mechanical deformation processes and strengthening mechanisms in engineering materials. Material failure modes including creep, fatigue, stress corrosion, ductile and brittle fractures.

4344*

Design Projects. Lab 4. Prerequisites: 3033, 3113, 3323. Students work in small teams on a semester-long design project sponsored by a company, agency, or individual. Team members work with mentors from sponsors and with faculty members in fields related to their topics. Presentations on safety, patent law, product liability, report writing, oral presentations, scheduling and ideation. Oral presentations, progress reports, and a professional log book documenting personal activity and contributions.

4353*

Mechanical Design II. Prerequisites: 3033, 3123 or 4333, 3323. Design of power transmission systems, including belts, chains and gears. Selection and application of hydraulic and pneumatic components in machine design applications. Selection of electric motors, actuators, encoders, and related electromechanical components. Design practice in the form of short projects integrating segments of the course.

4363*

Experimental Methods in Design. Lab 6. Prerequisites: 3113 and 3323. Laboratory techniques for the experimental analysis of vibration, stress, force and motion. Projects involve the use of strain gages, brittle lacquer techniques, reflection and transmission polariscopes, load cells and accelerometers.

4374*

Aerospace Systems Design. Lab 4. Prerequisites: senior standing and consent of instructor. Multidisciplinary design of aerospace vehicles. Multidisciplinary teams that work on a semester-long project that includes the design, construction, and flight test of an aerospace vehicle optimized for a given set of requirements. Teamwork, leadership and presentation skills emphasized. Students from all appropriate fields are encouraged to enroll.

4401

Seminar. Prerequisite: senior standing. Group discussions on professional aspects of engineering including ethics and legal concerns. Preparation of written and oral reports on selected and assigned topics.

4513*

Aerospace Structures I. Prerequisite: 3323. Design and analysis of flight structures. Topics from two and three-dimensional elasticity. Behavior of composite materials. Stress and deflection analysis of thin-skinned stiffened structures. Introduction to the finite element method and its applicability in the design process.

4703*

Design of Indoor Environmental Systems. Prerequisites: 3223, 3233. Design of heating, ventilating and air conditioning systems. Calculation of heating and cooling loads.

4733*

Dynamic Systems Design. Prerequisites: 3033, 3113. Design of dynamic engineering systems, formulation of design specifications, characterization and selection of components for dynamic engineering systems including sensors and actuator elements, considerations of passive, active, open-loop and closed-loop solutions, use of microprocessors and microcontrollers as part of dynamic engineering systems, design practice with open-ended design projects integrating the various components of the course.

5000*

Thesis. 1-6 credits, maximum 6. A student studying for a master's degree who elects to write a thesis must enroll in this course.

5010*

Mechanical Engineering Projects. 1-12 credits, maximum 12. Project in research or design selected by the student, or assigned by the instructor. A student who wishes to complete a master's degree under Plan III must enroll in this course.

5030*

Engineering Practice. 1-12 credits, maximum 12. Prerequisites: senior or graduate standing and consent of instructor. Solution of real-life engineering design and development problems in an actual or simulated industrial environment. Activities include application of design and testing procedures, economic evaluation and periodic oral and written reporting on one or more assigned problems. Activities must be approved in advance by the adviser.

5043*

Advanced Dynamics. Prerequisites: 3043, MATH 3013. Advanced treatment of analytical methods for rigid body motion with emphasis on multi-dimensional motion. Newtonian formulations, LaGrange's equations, Euler's equations, the Poincot construction, Hamilton's equations, Canonical transformations, spin stabilization, the rotation matrix, and Kane's formulations. Applications to engineering problems.

5073*

Advanced Mechanical Vibrations. Prerequisite: 4063 or consent of instructor. Analysis of nonlinear vibrations, classical analysis of continuous systems and numerical methods.

5083*

Engineering Acoustics. Acoustical analysis and measurement techniques, with emphasis on design applications for noise and vibration control in machinery and in buildings.

5093*

Numerical Engineering Analysis. Prerequisite: basic FORTRAN programming. Practical digital methods for obtaining steady-state and transient solutions to lumped and distributed mechanical, fluid and thermal problems.

5123*

Metal Cutting. Prerequisite: ENSC 3313. Understanding the fundamental principles and practice (mechanics and material aspects) of machining and grinding of materials. Historical aspects; physics of metal cutting, mechanics of machining (orthogonal and oblique); shear stress and shear strain in machining, dynamometry; tool materials, tool wear, tool life, and machinability; vibrations in machining; thermal aspects of machining, cutting fluids; economics; surface finish accuracy and surface integrity, and grinding.

5133*

Mechanical Behavior of Materials. Prerequisite: ENSC 3313 or equivalent. A unified approach to the behavior and response of engineering materials to applied loads. Mechanical and metallurgical fundamentals of deformation processes. Spatial scales of atomic physics, micromechanics and continuum mechanics.

5143*

Tribology. The principles of tribology. Definition of tribology, contact of solids, surface topography, real area of contact, friction of various materials, basic mechanisms of friction, mechanisms of wear (adhesion, abrasion, fatigue, erosion, and fretting), hardness of solids, frictional heating and surface temperatures, material properties that influence surface interactions, surface roughness measurement, surface integrity - residual stresses and subsurface deformation, application of tribology to manufacturing, wear resistant materials, wear-resistant coatings, experimental methods in tribology, surface analytical tools in tribology, scanning tunneling microscopy/atomic force microscopy, wear monitoring and wear prevention, and systems approach to tribology.

5153*

Precision Engineering I. Prerequisite: graduate standing or consent of instructor. An integrated approach to underlying engineering principles governing product and process designs requiring accuracies typically better than 1 part in 10^6 . Design and control of precision machines and instruments, dimensional and surface metrology, scanning probe microscopy, ultra-precision machining and grinding, and precision assembly.

5233*

Viscous Fluid Dynamics. Prerequisite: ENSC 3233. The dynamics of viscous flow over external surfaces, inside channels, and in free shear layers. Boundary layer solutions. Theory of similarity. Approximation methods.

5263*

Combustion. Prerequisite: 3233. Theory, design and performance of combustion systems. Fundamentals of aerothermochemistry fluid dynamics, heat transfer and combustion. Laminar and turbulent flows. Diffusion and premixed flames. Pollutant reduction. Numerical simulation and solution.

5323*

Plasticity and Metal Forming. Prerequisite: ENSC 2114 or equivalent. Basic theory of plasticity and its applications to metal-forming problems. Application of computer-aided design (CAD) and computer-aided manufacturing (CAM) techniques in part and tool design and manufacture.

5373*

Instrumentation. Lab 2. Analysis and design of instrumentation systems, laboratory experiences with electronic instrumentation and transducers, application of digital and analog integrated circuit components to measurement problems.

5403*

Computer-aided Analysis and Design. Prerequisite: basic FORTRAN programming. Theory, application and implementation of digital-computer-oriented algorithms for the synthesis, simulation, analysis and design of engineering systems. Advanced FORTRAN methods for optimization, simulation and data analysis. Implementation of these methods uses program libraries, batch processing, remote terminals and graphic display units.

5413*

Optimal Control. Prerequisite: 5713 or ECEN 5713. Optimal control theory for modern systems design. Specification of optimum performance indices. Dynamic programming, calculus of variations and Pontryagin's minimum principle. Iterative numerical techniques for trajectory optimization. Same course as ECEN 5413.

5433*

Robotics, Kinematics, Dynamics and Control. Prerequisite: 4053 or ECEN 4413 or consent of instructor. Kinematic and dynamic analysis of robot manipulators. Inverse kinematics, motion planning and trajectory generation. Industrial practice in robot servo control. Dynamics and control in the presence of constraints. Actuators and sensors. Force sensors and vision systems. Robotic force control and its applications in industry. Passivity based control algorithms. Advanced control techniques for motion and force control. Same course as ECEN 5433.

5453*

Fluid Power Control I. Prerequisite: 4053 or concurrent enrollment. Static and dynamic modeling of hydraulic and pneumatic control systems and components. Energy and power transfer and impedance matching concepts. Dynamic performance and stability of open- and closed-loop servodrives. Introduction to system design.

5463*

Nonlinear System Analysis and Control. Prerequisite: 4053 or ECEN 4413. Failure of superposition of effects; phase-plane analysis; limit-cycles; Lyapunov stability; hyperstability and input-output stability; controllability and observability of nonlinear systems; feedback linearization; robust nonlinear control system design. Same course as ECEN 5463.

5473*

Digital Control Systems. Prerequisite: 4053 or ECEN 4413. Input output and state space representations of linear discrete-time systems. Approximate methods in discrete-time representation. Stability methods. Controllability, observability, state estimation, and parameter identification. Design and analysis of feedback control system using frequency-domain and state-space methods. Introduction to optimal control. Same course as ECEN 5473.

5483*

Digital Data Acquisition and Control. Prerequisite: undergraduate course in programming. Use of microcomputers operating in real-time applied to engineering systems for data acquisition and control, use of analog to digital, digital to analog, and digital input/output, synchronous and asynchronous programming. Competence in the engineering use of microcomputers through lectures and laboratory applications. Same course as ECEN 5483.

5493*

Software Design for Real-time Distributed Systems. Prerequisite: 5483 or ECEN 5483 or consent of instructor. Fundamental concepts associated with the design of software for implementation on distributed computer systems using real-time operating systems. Parallel computing in a real-time environment and control algorithm design. State-of-the-art boards including analog-to-digital and digital-to-analog equipment and newest computer-aided software engineering tools. Same course as ECEN 5493.

5513*

Stochastic Systems. Prerequisites: ECEN 3513 and 4503 or STAT 4033 or MAE 4053 or MAE 4063 or consent of instructor. Theory and applications involving probability, random variables, functions of random variables, and stochastic processes, including Gaussian and Markov processes. Correlation, power spectral density, and nonstationary random processes. Response of linear systems to stochastic processes. State-space formulation and covariance analysis. Same course as ECEN 5513.

5523*

Estimation Theory. Prerequisite: 5513 or ECEN 5513. Stochastic model development, parameter estimation and state estimation. The linear model, model order determination, least squares, estimation, maximum likelihood estimation, Bayesian estimation. Gaussian random vectors, estimation in linear and Gaussian models, state estimation, the Kalman filter, prediction and smoothing. Same course as ECEN 5523.

5533*

Analysis of Structural Systems. Prerequisite: 3323. Computer-oriented matrix methods in the analysis of linear structural systems; energy principles; matrix equations for static and dynamic analyses of elastic systems; stability.

5543*

Modern Materials. Prerequisite: ENSC 3313. Properties, applications and recent innovations of structural engineering materials. Metals, ceramics, polymers and composites considered.

5553*

Fatigue and Fracture Mechanics. Prerequisite: 4333 or consent of instructor. Fracture processes in engineering materials including design considerations, failure avoidance and predictability. Fatigue processes and high-strength, toughness-limited materials. Same course as CIVEN 5553.

5563*

Finite Element Methods. Introduction to the finite element method in mechanical engineering. Numerical and mathematical formulations including an introduction to variational methods. Computer applications in solid mechanics, heat transfer and fluid mechanics.

5573*

Continuum Mechanics. Prerequisite: consent of instructor. Principles governing the mechanics of continua. Kinematics of deformation including the Lagrangian and Eulerian descriptions. Development of stress and strain tensors. Conservation principles to derive field equations describing solid and fluid mechanics. Application to problems in linear elasticity and viscous fluid flow.

5583*

Corrosion Engineering. Lab 2. Prerequisite: ENSC 3313. Modern theory of corrosion and its applications in preventing or controlling corrosion damage economically and safely in service.

5593*

Theory of Viscoelasticity. Prerequisite: consent of instructor. Advanced stress analysis in solids exhibiting time-dependent behavior. Material characterization and thermodynamic foundation of the constitutive behavior of time-dependent materials such as polymers, solid propellants and metals near their melting points; time-temperature; superposition principle for thermo-rheologically simple materials; correspondence principle for linearly viscoelastic and associated linearly elastic solutions; integral formulation for quasistatic boundary value problems; treatment of time-varying boundary conditions such as moving boundaries and moving loads; linearly viscoelastic stress waves and approximate methods of linearly viscoelastic stress analysis.

5633*

Applied Thermodynamics. First and Second Law analysis. Prediction of properties of non-ideal fluids, including mixtures. Engineering applications to power system design, solar systems, HVAC systems, waste heat recovery and underground petroleum reservoirs.

5703*

Optimization Applications. Prerequisite: graduate standing. A survey of various methods of unconstrained and constrained linear and non-linear optimization. Applications of these methodologies using hand-worked examples and available software packages. Intended for engineering and science students. Same course as CHE 5703, ECEN 5703 and IEM 5023.

5713*

Linear Systems. Prerequisite: graduate standing or consent of instructor. Introduction to the fundamental theory of finite-dimensional linear systems with emphasis on the state-space representation. Mathematical representations of systems; linear dynamic solutions; controllability, observability, and stability; linearization and realization theory; and state feedback and state observer. Same course as ECEN 5713.

5733*

Neural Networks. Prerequisite: graduate standing. Introduction to mathematical analysis of networks and learning rules, and on the application of neural networks to certain engineering problems image and signal processing and control systems. Same course as CHE 5733 and ECEN 5733.

5743*

Geometric Modeling for Design and Manufacturing. Prerequisite: C programming or consent of instructor. Application of parametric geometry for engineering design and manufacturing. Representation of curves, surfaces and solids. Analytic and relational properties. Fundamentals of solid modeling.

5773*

Intelligent Systems. Prerequisite: 5733 or ECEN 5733. Introduction to the state-of-the-art intelligent control and system successfully deployed to industrial and defense applications. Emerging intelligent algorithms (e.g., bottom-up, top-down, semiotics); reinforcement learning and hybrid systems; and case studies and design projects. Same course as ECEN 5773.

5803*

Advanced Thermodynamics I. Prerequisite: 3223. A rigorous examination of the fundamental principles of engineering thermodynamics; the First Law, the pure substance, flow processes, Second Law availability, properties of substances, thermochemistry, mixtures and equilibrium.

5823*

Radiation Heat Transfer. The mechanism of the transfer of energy by thermal radiation; radiant properties of materials, energy transfer prediction methods and solar energy topics.

5843*

Conduction Heat Transfer. Prerequisite: ENSC 3233. Advanced heat transfer analysis and design, with primary emphasis on conduction.

5853*

Computational Heat Transfer. Prerequisites: 3233, graduate standing, knowledge of FORTRAN. Computational techniques for the solution of two-dimensional heat transfer, fluid flow and related processes in problems of practical interest. A general-purpose computer program used to demonstrate the capabilities of the numerical method through a wide variety of engineering problems.

5873*

Advanced Indoor Environmental System. Prerequisite: 4703. Heating, cooling, and ventilating systems. System and component design, building thermal simulation and energy calculation procedures.

5913*

Ideal-fluid Aerodynamics. Prerequisite: ENSC 3233 or equivalent. Principles of inviscid, incompressible flow. Small disturbance theory for flow about airfoils and wings. Two and three dimensional panel methods. Introduction to unsteady and compressibility effects.

5923*

Guidance and Control of Aerospace Vehicles. Prerequisite: 4053 or ECEN 4413 or equivalent. Navigation, guidance and attitude control of aircraft, launch vehicles and spacecraft. Inertial navigation mechanizations and error analysis. Stability augmentation systems.

5933*

Aeroelasticity. Prerequisite: graduate standing or consent of instructor. Interaction between fluid dynamic, inertial and elastic forces. Development of analytical and computational methods for analysis. Application to a broad range of problems in engineering.

6000*

Research and Thesis. 1-15 credits, maximum 30. Prerequisites: consent of the head or the graduate committee of the School and approval by the student's advisory committee. Independent research under the direct supervision of a member of the graduate faculty. For students pursuing study beyond the level of the M.S. degree.

6010*

Advanced Study. 1-12 credits. Prerequisite: approval of the student's advisory committee. Study and investigation under the supervision of a member of the faculty along lines of interest well advanced of and supported by the 5000-series courses.

6123*

Non-traditional Machining. Prerequisite: consent of instructor. Rationale for non-traditional machining; various non-traditional machining processes including electro-discharge machining, electro-chemical machining, plasma arc-, microwave-, and laser assisted processing, waterjet (abrasive) cutting, ultrasonic machining, chemical machining, thermal assisted processing, and electron beam machining.

6133*

Surface Mechanics. Prerequisite: consent of instructor. Models and solutions basic to surface studies. Equations of continuum mechanics, thermal field solutions at sliding interfaces, elasticity, plasticity. Applications of solution techniques to surface, surface layer and interface phenomena.

6233*

Turbulent Fluid Dynamics. Prerequisite: 5233. Isotropic turbulence, turbulent wakes and jets, bound turbulent shear flows, transition, hydrodynamic stability and integral calculation methods for turbulent boundary layers.

6263*

Computational Fluid Dynamics. Prerequisite: 5233. Steam function-vorticity and pressure-velocity simulations of incompressible and compressible flows. Temperature and concentration solutions. Applications to various external and internal flow problems.

6423*

System Identification. Prerequisite: 5473 or 5713 or ECEN 5473 or ECEN 5713. Linear and nonlinear system modeling of random systems. Models of linear time-invariant systems, non-parametric methods and preliminary model development, parameter estimation methods, convergence and consistency, asymptotic distributions of parameter estimates, nonlinear modeling. Same course as ECEN 6423.

6453*

Adaptive Control. Prerequisite: 5473 or ECEN 5473 or ECEN 5713 or MAE 5713. Analysis and design of control techniques which modify their performance to adapt to changes in system operation. Review of systems analysis techniques, including state variable representations, linearization, discretization, covariance analysis, stability, and linear quadratic gaussian design. On-line parameter estimation, model reference adaptive systems, self-tuning regulators, stable adaptive systems. Same course as ECEN 6453.

6463*
Advances in Nonlinear Control. Prerequisites: 5463 or ECEN 5463. Introduction to vector fields and Lie algebra; controllability and observability of nonlinear systems; local decompositions; input-output and state-space representation on non-linear systems; feedback linearization; controlled invariance and distribution; control of Hamiltonian systems. Same course as ECEN 6463.

6483*
Robust Multivariable Control Systems. Prerequisite: 5713 or ECEN 5713. Introduction to multivariable systems: SISO robustness vs. MIMO robustness; multivariable system poles and zeros; MIMO transfer functions; multivariable frequency response analysis; multivariable Nyquist theorem; performance specifications; stability of feedback systems; linear fractional transformations (LFT's); parameterization of all stabilizing controllers; structured singular value; algebraic ricatti equations; H2 optimal control; H-infinity controller design. Same course as ECEN 6483.

6563*
Advanced Solid Mechanics. General non-linear problems of elasticity including thermal, dynamic and anisotropy effects; stress wave propagation; consideration of plasticity.

6823*
Advanced Radiative Transfer. Prerequisite: 5823. Radiative energy transfer within participating media and among real surfaces. Anisotropic scattering, emission, refractive index effects, and wavelength-dependent analysis. Current solution techniques—approximate and exact. Relationship of electric fields to radiative transfer. Combined radiation with conduction and/or convection. A project concerned with a unique radiative transfer problem.

6843*
Convection Heat Transfer. Prerequisite: 5233 or equivalent. Advanced convective heat transfer in laminar and turbulent flows over external surfaces and inside channels. Heat transfer at high velocities, free convection boundary layers, and mass transfer.

Mechanical Engineering Technology (MET)

1103
Introduction to Mechanical Engineering Technology. Lab 2. Introduction to mechanical engineering technology, analytical techniques, and data presentation. Orientation to the mechanical engineering technologist's profession.

1223
Computer-aided Drafting and Design. Lab 4. Prerequisite: GENT 1153. Computer-aided drafting and design for creation of engineering drawings. Geometric construction in two dimensions and three dimensions, automated dimensioning, and section practices using ANSI standards.

2103
Industrial Materials. Lab 3. Prerequisite: CHEM 1314. A survey of the properties, characteristics and applications of metals, polymers, ceramics and other industrial materials. Terminology, concepts and principles involved in material selection, specification and processing. Laboratory activities include data collection and report generation, determination of material properties, and evaluation of material characteristics.

2213
Machine Drafting. Lab 6. Prerequisites: 1223, GENT 1153. Detail and assembly drawings of machines and products using drafting machines and computer-aided drafting techniques.

2313
Fundamentals of Hydraulic Fluid Power. Lab 2. Prerequisites: ECT 1003, MATH 1513. Basic fluid power concepts. Standard hydraulic symbols, component design and application, fluid power system considerations, design and operation.

3003
Dynamics. Prerequisites: GENT 2323 and MATH 2123. Plane motion of particles and rigid bodies. Force-acceleration, work-energy, and impulse-momentum principles. Graphical analysis, mechanisms and vibrations.

3113
Basic Instrumentation. Lab 2. Prerequisites: GENT 2323, MATH 2123. Data analysis. Theory, operational characteristics and application of transducers for measurement of strain, force, velocity, acceleration, displacement, time, frequency, temperature, pressure, fluid flow.

3313
Applied Fluid Mechanics. Prerequisites: 2313, MATH 2123, and PHYS 1214. Fluid mechanical principles applied to fluid power systems and general fluid systems. Fluid system analysis using Bernoulli and general energy equations, laminar and turbulent flows, flow and pressure measurement, flow forces, lift and drag.

3333
Thermodynamics and Heat Transfer for Electronics. Lab 3. Prerequisites: MATH 2133 and junior standing. Principles of thermodynamics and heat transfer important to the design, construction and operation of electronic systems. Basic heat transfer by conduction, convection, and radiation. Heat removal from electronic systems by heat-sinking, free-air convection, forced-air convection and combinations. Identification of specific over-heating problems in electronics systems and the design of appropriate heat removal techniques.

3343
Physical Metallurgy. Lab 3. Prerequisite: 1223 and CHEM 1314. Analysis and evaluation of the properties of metals commonly used in product design. Property change caused by hot and cold working, and by heat treatment. Laboratory activities including metallographic specimen preparation, inspection and testing; and standard tests of tensile properties, hardenability, hardness and toughness.

3413
Fundamentals of Pneumatic Fluid Power. Lab 2. Prerequisites: 2313, ECT 1003, MATH 1513. Basic pneumatics concepts, gas laws, component design and application, system design considerations. Air logic.

3503
Gas Turbines for Non-majors. Lab 2. Prerequisite: MATH 1513 or MATH 1715. Non-analytical, descriptive treatment of the operation of gas turbine engines including accessories and systems. Lab requires student participation in engines disassembly, inspection and reassembly. Field trips to engine overhaul and repair facilities.

3573
Advanced Production Processes. Lab 3. Prerequisites: 1223, 2103, GENT 1153, MATH 1513. Advanced manufacturing and production processes including polymers and plastics, powder metallurgy, foundry, welding and metal forming. Design for assembly (DFA) and design for manufacture (DFM).

4003
Machine Design I. Prerequisites: 3323, CS 2113, and MATH 2133. Applications of statics and strength to the design of machine components. Problems of choosing materials, impact and fatigue loading.

4013
Computer-aided Design. Lab 2. Prerequisite: 1223, CS 2113, GENT 2323. Advanced computer-aided drafting and design for 2d and 3d geometric construction, dimensioning, design, and analysis. Application of CAD in mechanical, electronic and manufacturing problems.

4050
Advanced Mechanical Design. 1-3 credits, maximum 3. Prerequisites: junior standing and consent of instructor. Special problems in mechanical engineering technology.

4123
Senior Design Projects. Lab 6. Prerequisites: 1223, 4003 and ENGL 3323. Selected problems in design integrating principles of drafting, analysis, materials and manufacturing. Design projects are typically supplied by industry.

4203
Machine Design II. Lab 6. Prerequisites: 3323, CS 2113, and MATH 2133. Design of machine components such as gears, bearings, fasteners, springs, and weldments.

4213
Kinematics and Mechanisms. Prerequisites: 1223, 3003, CS 2113, MATH 2133. Analysis and design of mechanisms such as the 4-bar linkage, slidercrank, cam and gear. Graphical and computer techniques.

4303
Computer Integrated Manufacturing. Prerequisite: 1223, 2103, MATH 1613. Introduction to programming techniques and manufacturing applications of computer numerical control (CNC) and robotics. Machine capabilities and tooling requirements with programs being prepared manually and with COMPACT II computer assistance.

4313
Electrohydraulics and Motion Control. Lab 2. Prerequisites: 3313, EE 3103. Principles of electronics as applied to fluid power controls. Trends in modern fluid power systems. Solenoid systems, proportional control, servosystems, programmable controllers, and robotics. Lab includes design, fabrication and operation of practical systems.

4453
Applied Thermodynamics. Prerequisite: 3433. Mixtures, psychrometrics, combustion, heat engine cycles, heat pumps cycles, internal and external combustion engines. Refrigeration.

4463
Thermal Fluids Laboratory. Lab 3. Prerequisites: GENT 3433, GENT 4433. Laboratory and industrial observation and analysis of thermal science applications including heat transfer, heat engines, and heat pumps.

4883
Tool Design. Lab 3. Prerequisite: 2213, 3343. Basic design and development of special tools for processing or manufacturing engineering materials. Design and specification and inspection tools using appropriate techniques of engineering graphics and analysis.

Mechanized Agriculture (MCAG)

1413 Introduction to Engineering in Agriculture. Prerequisite: MATH 1513 or concurrent enrollment. Application of the physical and engineering sciences to agricultural problems. Energy; energy conversion; thermal, electrical, mechanical and fluid systems; equipment calibration; environmental control of agriculture buildings and irrigation system requirements.

2313 Surveying. Lab 3. Prerequisite: MATH 1613. A study of the equipment and practices used in surveying for small areas. Common practices of plane surveying; differential, profile, and topographic leveling; field notes, accuracy and precision, error and error control, and land measurement.

3101 Environment Management of Agricultural Structures. Lab 4. Prerequisites: 1413, MATH 1513. Principles, evaluation and management of building temperatures, humidity, and ventilation.

3211 Engines and Power. Lab 4. Prerequisites: 1413, MATH 1513. Theory, operation, performance and diagnostics of internal combustion engines for mobile applications.

3223 Metals and Welding. Lab 3. Prerequisite: 1413. Essential knowledge and theory necessary for understanding the principles of hot and cold metals and welding. Laboratory provides opportunity to apply and develop associated skills.

3311 Surveying. Lab 4. Prerequisites: 1413, MATH 1513. Use of surveying equipment and common applications in agriculture.

3321 Erosion Control Practices. Lab 4. Prerequisites: MATH 1513 and concurrent enrollment in MCAG 3311. Analysis, planning and management of soil and water resources.

4101 Agricultural Electrification. Lab 4. Prerequisites: 1413, MATH 1513. A study of electrical theory and electrical applications in agricultural environments.

4123* Principles of Food Engineering. Prerequisite: MATH 1513. For non-engineers. Application of the engineering approach to solving heat and mass transfer problems in food processing. An introduction to the basic concepts of the conservation laws, fluid flow, heat transfer, refrigeration, freezing, psychrometrics, and energy conservation.

4200* Topics in Mechanized Agriculture. 1-4 credits, maximum 4. Investigations in specialized areas of mechanized agriculture.

4203* Irrigation Principles. Prerequisite: MATH 1513. Sources, measurement and efficient use of irrigation water. Selection of pumping plants and power units. Layout and management of surface and sprinkler systems.

4211 Machinery Calibration. Lab 4. Prerequisites: 1413, MATH 1513. Analysis of the metering function, calibration, and management of agricultural planting, fertilizing, and pesticide application equipment.

4212 Safety and Health in Agribusiness. Lab 2. Prerequisite: junior standing or above. Study of the causes and prevention of accidents in agribusinesses. Investigations including the acute and chronic risks of machinery, animals, gases, confined spaces, outdoor and hazardous materials.

4220* Advanced Methods in Agricultural Mechanics. 1-6 credits, maximum 6. Prerequisite: 4222. Developing agricultural mechanics programs for vocational agriculture and technical schools. Application of agricultural mechanics methods, practices and skills to advanced projects.

4223 Methods and Management of Agricultural Mechanization. Lab 3. Prerequisite: MATH 1513. The role of agricultural mechanics in educational systems. A study of the principles of agricultural mechanics, methods of teaching, instructor responsibility and liability, laboratory safety, project construction, selection of resources, project evaluation, and the selection, use and care of tools.

4311 Technology and Environment. Lab 4. Prerequisites: 1413, MATH 1513. A study of the impact of technology on the environment.

Medical Technology (MTCL)

4117 Clinical Microbiology. Lab 12. Prerequisites: concurrent internship in affiliated hospital, and all degree requirements for B.S. in medical technology except 30 hours MTCL. The theory and laboratory study of pathogenic bacteria, viruses, rickettsiae, fungi, and parasites. Includes isolation, identification, antimicrobial susceptibility testing, and medical significance.

4125 Clinical Chemistry I. Lab 9. Prerequisites: concurrent internship in affiliated hospital, and all degree requirements for B.S. in medical technology except 30 hours MTCL. The theory and laboratory methodology of analytical biochemistry, clinical microscopy, routine and special procedures, and medical significance.

4236 Clinical Hematology. Lab 12. Prerequisites: concurrent internship in affiliated hospital, and all degree requirements for B.S. in medical technology except 30 hours MTCL. Systematized study of diseases, cell maturation and function, principles of hemostasis; methodology used in routine and special hematology studies; and correlation of hematological findings with physiological conditions.

4246 Clinical Immunology. Lab 12. Prerequisites: concurrent internship in affiliated hospital, and all degree requirements for B.S. in medical technology except 30 hours MTCL. Immunologic responses and procedures used in serological determinations; immunohematology, fundamentals of antigen-antibody reactions, blood groups and types, compatibility testing, blood components, and the lab methods used as they relate to the medical significance of immunology and infectious diseases.

4325 Clinical Chemistry II. Lab 9. Prerequisites: concurrent internship in affiliated hospital, and all degree requirements for B.S. in medical technology except 30 hours MTCL. The theory and laboratory methodology of analytical biochemistry, instrumentation, lab mathematics, routine and special procedures and medical significance.

4351 Topics in Medical Technology. Prerequisites: concurrent internship in affiliated hospital, and all degree requirements for B.S. in medical technology except 30 hours MTCL. Principles and practices of the medical laboratory including basic management, quality assurance, education methodology, computer applications, laboratory safety, and special projects in selected areas.

Microbiology (MICR)

1513 (L,N)Inquiry-based Biology. Lab 3. Prerequisites: CHEM 1413, GEOL 1613, PHSC 1313 recommended. Directed inquiry and hands on study of biological principles. Recommended for elementary education majors as model course to learn and teach science.

2124 Introduction to Microbiology. Lab 4. Prerequisites: one year of chemistry; and BIOL 1604, and 1403 or 1604. General principles of microbiology.

3143 Medical Mycology. Lab 4. Prerequisite: 2124. Examination of fungi as animal pathogens; laboratory techniques used in the identification of human and animal pathogens, and differentiation from common contaminants.

3153 Medical Parasitology. Lab 2. Prerequisite: introductory biology. Human and parasitological problems including endemic, exotic and zoonotic organisms. Life cycles, diagnosis and control procedures. Principles applicable to all areas of zoology, medicine, veterinary medicine and medical technology.

3154* Food Microbiology. Lab 4. Prerequisites: 2124 and organic chemistry. Relationship of microorganisms to food manufacture and preservation, to food spoilage and microbial food poisoning and to various aspects of primary food production. Same course as ANSI 3154.

3224* Advanced Microbiology. Lab 4. Prerequisite: 2124, corequisite: CHEM 3015. Subcellular structure and function of microorganisms. Synthesis, translocation, and metabolism of cellular macromolecular constituents. Substrate transport and metabolism.

3254* Immunology. Lab 3. Prerequisite: 2124. Vertebrate host's ability to defend itself against foreign intrusion. Chemistry and biology of the acquired immune response. Same course as CLML 3254.

4000 Honors in Microbiology. 1-4 credits, maximum 4. Prerequisite: consent of departmental honors committee. Supervised study and research in microbiology.

4001 Professional Transitions in Microbiology and Cell and Molecular Biology. Prerequisites: declared microbiology or cell and molecular biology major with minimum 70 hours earned and consent of instructor. Understanding major areas and employment activities in microbiology, cell biology and molecular biology fields. Evaluating and understanding scientific and professional literature, and making the transition from undergraduate education to postgraduate education or employment. Same course as CLML 4001.

4113* Microbiology of Soil. Lab 6. Prerequisite: 2124. Microorganisms of the soil and their relationship to soil fertility.

4123*

Virology. Prerequisites: BIOL 3014 or one course in biochemistry. Corequisite: 3224. Virus-host interactions including structure-function of animal, plant and bacterial viruses. Discussion of the molecular biology of virus infection and development. Same course as CLML 4123.

4124*

Microbial Ecology. Lab 4. Prerequisites: 2124 and one semester of organic chemistry. Corequisite: 3224. Roles of microbes in biogeochemical cycles and energy transfers.

4133*

Molecular and Microbial Genetics. Lab 2. Prerequisites: 2124, BIOL 3024 and one semester of organic chemistry. Corequisite: 3224. The properties of macromolecules, from the structure of proteins and nucleic acids to molecular mechanisms of DNA replication and recombination, transcription, protein synthesis, and gene regulation. Gene transfer mechanisms in bacteria and their viruses. Fundamentals of recombinant DNA technology.

4134*

Pathogenic Microbiology. Lab 3. Prerequisite: 2124. Corequisite: 3224. Examination of pathogenic bacteria as they relate to humans, other animals, plants and insects.

4323*

Bioenergetics. Prerequisites: BIOC 3653 or BIOL 3014. Bioenergetics reactions and mechanisms involved in energy production in plants, animals and microbial systems. Same course as CLML 4323.

4990

Special Problems. 2-4 credits, maximum 4. Prerequisite: consent of instructor. Minor investigations in the field of microbiology.

4993

Senior Honors Project. Prerequisites: departmental invitation, senior standing, Honors Program participation. A research project under the direction of a faculty member resulting in a written report to be judged by a second faculty member as well. Required for graduation with departmental honors in microbiology.

5000*

Thesis. 2-6 credits, maximum 6. Prerequisite: consent of major professor. A student studying for the M.S. degree enrolls in this course for six hours credit.

5113*

Advanced Immunology. Prerequisite: 3254. Advanced studies with emphasis on the regulation of vertebrate immune responses.

5130*

Current Topics in Immunology. 1 credit, maximum 6. Prerequisites: 3255 and consent of instructor. Discussion or current immunologic literature, with emphasis on critical analysis of research papers.

5142*

Microbial Genetics Laboratory. Lab 4. Corequisite: 4133. Comprehensive laboratory course in research techniques involving classical and modern methods of gene transfer and fusions.

5153*

Emerging Infectious Agents. Prerequisites: 3134, 4123. An in-depth discussion of the importance of emerging infectious agents, the molecular basis for their emergence, and the broad spectrum of host-microbe interactions favoring the evolution of new infectious agents.

5160*

Seminar. 1 credit, maximum 2. Required of all graduate students majoring in microbiology.

5203*

Bio-informatics. Lab 1. Prerequisite: graduate standing or consent of instructor. BASIC programs and public domain software to model and analyze simple biological processes. Models to evaluate more complex biological processes. No prior experience with computers or programming necessary, but recommended.

5223*

Membrane Physiology. Prerequisites: PHYS 1214, and BIOL 3014 or BIOC 4113 or CHEM 3354 or PHYS 3313. Application of biophysical, biochemical and biological techniques to the study of the structure and function of membranes and membrane components; kinetic measurements, spectroscopic techniques and diffractive techniques. Application of these illustrated with current research problems. Same course as PHYS 5353.

5254*

Biotechnology. Lab 2. Prerequisites: 4133 and 5142 or consent of instructor. An indepth exposure to the practical application of biological principles. Classical and modern (genetic engineering) biotechnology, within a framework involving the identification of a problem or need, determination of a solution or product, strain development, scale-up technology, and product recovery or process enhancement.

5713*

Three Dimension Computer Visualization and Modeling of Biological Macromolecules. Prerequisite: graduate standing or consent of instructor. Visualization and modeling of 3-D structure of biologically important macromolecules, such as DNA, RNA, and proteins; important components of modern biological research. Computer programs used in the modern research environment. The operation, applications, and limitations of computer programs employed for analysis of genetic information and the correlation between genetic information and macromolecular structure.

5990*

Special Problems. 1-4 credits, maximum 10. Prerequisite: permission of instructor. Investigations in the field of microbiology.

6000*

Dissertation. 1-15 credits, maximum 45. Prerequisite: consent of major adviser. Research in microbiology for the Ph.D. degree.

6112*

Molecular Biology of Viruses. Prerequisites: 4123 and 4133. Advanced techniques in the study of viruses.

6120*

Recent Advances in Microbiology. 1-3 credits, maximum 6. Prerequisite: one graduate course in biochemistry. Discussion and evaluation of recent scientific contributions in terms of the living organism.

6143*

Advanced Microbial Physiology. Lab 3. Prerequisite: 3224 or consent of instructor. Discussion of selected topics in microbial physiology. Critical analysis of research papers.

6153*

Advanced Molecular Genetics. Prerequisites: 4133 and 5142. Structure, function and regulation of nucleic acids. Gene transfer mechanisms, genetic recombination and plasmid biology. Recent developments in recombinant DNA technology.

6253*

Microbial Evolution. Prerequisites: 2124, BIOC 3653, BIOL 3024. The mechanisms and results of microbial evolution in nature and in the laboratory, with emphasis on microbes as model evolutionary systems, molecular evolution, classification and phylogeny, and discussion of protobiology and the probable fate of engineered microbes.

6304*

Genetics of Simple Eukaryotes. Prerequisites: solid understanding of basic cellular maintenance and propagation processes and consent of instructor. In-depth discussion of lessons learned from simple eukaryotes such as *S. cerevisiae* (yeast), *A. nidulans* (fungus), *D. melanogaster* (fly) and *C. elegans* (worm).

6323*

Current Topics in Eukaryotic Signal Transduction and Gene Regulation. Prerequisites: BIOC 3653, BIOL 3014, 3024. Discussion of current literature on the mechanisms of eukaryotic signal transduction and gene regulation.

Military Science (MLSC)

1000

Leadership Laboratory. 1 credit, maximum 2. Lab 2. Prerequisites: concurrent enrollment in 1112 and 1212. Learning and practicing basic skills such as rappelling, drill and ceremony, land navigation, individual first aid, individual training in small unit tactics.

1112

Introduction to Reserve Officers' Training Corps (ROTC). Team study and activities in basic drill, physical fitness, rappelling, leadership reaction course, first aid, presentations and basic marksmanship. Fundamentals of leadership. Optional weekend exercise. Concurrent enrollment in MLSC 1000 recommended.

1212

Introduction to Leadership. Principles of effective leading, communication skills, and organizational ethical values. Concurrent enrollment in MLSC 1000 recommended. Optional weekend exercise.

2122

Camp Challenge. Lab 4. Prerequisites: Open only to students who have not completed all of basic ROTC and who pass physical examination. A six-week summer camp similar to Army Basic Training. No military obligation incurred. Completion of course MLSC 2122 qualifies a student for entry into the Advanced Course. Graded on a pass-fail basis.

2130

Military Physical Conditioning. 1 credit, maximum 2. Lab 3. Prerequisite: must be enrolled in MLSC theory classes. Participation in and learning to plan and lead a physical fitness program. Development of an individual fitness program and the role of exercise and fitness in person's life.

2233

Self and Team Development. Lab 2. Ethics-based leadership skills that develop individual abilities and contribute to the building of effective teams. Skills in oral presentation, writing, planning, coordinating groups, land navigation and basic military tactics.

2313

Individual and Team Military Tactics. Lab 2. Prerequisite: 2233. Individual and team aspects of military tactics in small unit operations. Safety assessment, movement techniques, planning for team safety and security and methods of pre-execution checks. Training techniques for continued leadership development.

3113
Leading Small Organizations I. Lab 2. Prerequisites: completion of lower-division MLSC or equivalent, and approval of professor of military science. Practical opportunities to lead small groups in situations of increasing complexity receiving personal assessments and encouragement. Use of small unit defensive tactics and opportunities to plan and conduct training for lower-division students both to develop such skills and as vehicles for practicing leading.

3223
Leading Small Organizations II. Lab 2. Prerequisite: 3113. Analysis of tasks; preparation of written or oral guidance for team members to accomplish tasks. Delegating tasks and supervising. Planning and adapting to the unexpected in organizations under stress. Examination and application of lessons from leadership case studies. Examination of importance of ethical decision making in setting a positive climate that enhances team performance.

4014
Reserve Officers' Training Corps (ROTC) Advanced Camp. Lab 8. Prerequisites: 3113 and 3223. A six-week camp conducted at an Army post. Individual leadership and basic skills performance. Graded on a pass-fail basis.

4123
Leadership Challenge and Goal-Setting. Lab 2. Prerequisites: 3113 and 3223. Planning conducting and evaluating activities of the ROTC cadet organization. Articulating goals, putting plans into action to attain them. Assessing organizational cohesion and developing strategies to improve it. Developing confidence in skills to lead people and manage resources.

4223
Military Ethics, Justice and Professionalism. Lab 2. Prerequisites: 3113 and 3223. Continuation of the methodology from MLSC 4123. Identification and resolution of ethical dilemmas. Refining counseling and motivating techniques. Examination of aspects of tradition and law as related to leading as an officer in the Army.

4422
The Tactical Planning Process. Prerequisite: ROTC advanced course status or consent of department head. The tactical planning process and its components. Computer tactical simulations used to organize and synchronize the process.

Music (MUSI)

0501
Concert and Recital Attendance. Graduation requirement for music degree or certificate candidates.

1001
Percussion Techniques. Lab 2. Methods for playing and teaching percussion instruments.

1011
Piano Class Lessons. For students with no previous experience.

1021
Piano Class Lessons.

1031
Voice Class Lessons.

1041
Voice Class Lessons.

1051
Organ Class Lessons.

1071
Single Reed Techniques. Lab 2. Methods for playing and teaching the clarinet and saxophone.

1081
Double Reed Techniques. Lab 2. Methods for playing and teaching the oboe and bassoon.

1090
Secondary Harpsichord. 1-2 credits, maximum 8.

1091
High Brass Techniques. Lab 2. Methods for playing and teaching the trumpet and French horn.

1100
Elective Harpsichord. 1-2 credits, maximum 8.

1110
Elective Organ. 1-4 credits, maximum 8.

1120
Elective Piano. 1-4 credits, maximum 8.

1130
Elective Voice. 1-4 credits, maximum 8.

1140
Elective Brass. 1-4 credits, maximum 8.

1150
Elective Strings. 1-4 credits, maximum 8.

1160
Elective Woodwinds. 1-4 credits, maximum 8.

1170
Elective Percussion. 1-4 credits, maximum 8.

1180
Secondary Organ. 1-2 credits, maximum 8.

1190
Secondary Piano. 1-2 credits, maximum 8.

1200
Secondary Voice. 1-2 credits, maximum 8.

1210
Secondary Brass. 1-4 credits, maximum 8.

1220
Secondary String. 1-2 credits, maximum 8.

1230
Secondary Woodwind. 1-2 credits, maximum 8.

1240
Secondary Percussion. 1-2 credits, maximum 8.

1250
Major Organ. 1-4 credits, maximum 8.

1260
Major Piano. 1-4 credits, maximum 8.

1270
Major Voice. 1-4 credits, maximum 8.

1280
Major Violin. 1-4 credits, maximum 8.

1290
Major Viola. 1-4 credits, maximum 8.

1300
Major Cello. 1-4 credits, maximum 8.

1310
Major Double Bass. 1-4 credits, maximum 8.

1320
Major Guitar. 1-4 credits, maximum 8.

1330
Major Harp. 1-4 credits, maximum 8.

1340
Major Flute. 1-4 credits, maximum 8.

1350
Major Oboe. 1-4 credits, maximum 8.

1360
Major Clarinet. 1-4 credits, maximum 8.

1370
Major Saxophone. 1-4 credits, maximum 8.

1380
Major Bassoon. 1-4 credits, maximum 8.

1390
Major Trumpet. 1-4 credits, maximum 8.

1400
Major French Horn. 1-4 credits, maximum 8.

1410
Major Trombone. 1-4 credits, maximum 8.

1420
Major Euphonium. 1-4 credits, maximum 8.

1430
Major Tuba. 1-4 credits, maximum 8.

1440
Major Percussion. 1-4 credits, maximum 8.

1450
Major Harpsichord. 1-4 credits, maximum 8.

1513
Music Literature. Music of the Baroque, Classical, Romantic, and Contemporary periods, with emphasis on style analysis.

1531
Sightsinging and Eartraining I. Prerequisite: 2672 or successful completion of Music Theory Placement Examination. Development of skills in sightsinging and aural perception. Taken concurrently with MUSI 1533.

1533
Theory of Music I. Prerequisite: Successful completion of Music Theory Placement Examination. Choral and instrumental writing and analysis correlated with keyboard skills. Taken concurrently with MUSI 1531.

1541
Sightsinging and Eartraining II. Prerequisites: 1531 and 1533. A continuation of 1531. Taken concurrently with 1543.

1543
Theory of Music II. Prerequisites: 1531 and 1533. A continuation of 1533, taken concurrently with 1541.

1623
Introduction to Music Business. A survey of music business procedures, opportunities, technologies and trends.

2011
Piano Class Lessons. Prerequisites: 1021 and music major status. Class lessons for music majors (non-keyboard concentration) preparing for the piano proficiency examination.

2021
Piano Class Lessons. Prerequisites: 2011 and music major status. Successful completion of the course fulfills piano proficiency examination requirement for music majors (non-keyboard concentration).

2051
High String Techniques. Lab 2. Methods for playing and teaching the violin and viola.

2061
Low String Techniques. Lab 2. Methods for playing and teaching the cello and double bass.

2071
Flute Techniques. Lab 2. Methods for playing and teaching the flute.

2091
Low Brass Techniques. Lab 2. Methods for playing and teaching the trombone, euphonium, and tuba.

2250
Major Organ. 1-6 credits, maximum 12. Prerequisite: 1250.

- 2260**
Major Piano. 1-6 credits, maximum 12. Prerequisite: 1260.
- 2270**
Major Voice. 1-6 credits, maximum 12. Prerequisite: 1270.
- 2280**
Major Violin. 1-6 credits, maximum 12. Prerequisite: 1280.
- 2290**
Major Viola. 1-6 credits, maximum 12. Prerequisite: 1290.
- 2300**
Major Cello. 1-6 credits, maximum 12. Prerequisite: 1300.
- 2310**
Major Double Bass. 1-6 credits, maximum 12. Prerequisite: 1310.
- 2320**
Major Guitar. 1-6 credits, maximum 12. Prerequisite: 1320.
- 2330**
Major Harp. 1-6 credits, maximum 12. Prerequisite: 1330.
- 2340**
Major Flute. 1-6 credits, maximum 12. Prerequisite: 1340.
- 2350**
Major Oboe. 1-6 credits, maximum 12. Prerequisite: 1350.
- 2360**
Major Clarinet. 1-6 credits, maximum 12. Prerequisite: 1360.
- 2370**
Major Saxophone. 1-6 credits, maximum 12. Prerequisite: 1370.
- 2380**
Major Bassoon. 1-6 credits, maximum 12. Prerequisite: 1380.
- 2390**
Major Trumpet. 1-6 credits, maximum 12. Prerequisite: 1390.
- 2400**
Major French Horn. 1-4 credits, maximum 8. Prerequisite: 1400.
- 2410**
Major Trombone. 1-6 credits, maximum 12. Prerequisite: 1410.
- 2420**
Major Euphonium. 1-4 credits, maximum 8. Prerequisite: 1420.
- 2430**
Major Tuba. 1-6 credits, maximum 12. Prerequisite: 1430.
- 2440**
Major Percussion. 1-6 credits, maximum 12. Prerequisite: 1440.
- 2450**
Major Harpsichord. 1-4 credits, maximum 8.
- 2551**
Sightsinging and Eartraining III. Prerequisites: 1541 and 1543. Further development of skills in sightsinging and aural perception. Taken concurrently with 2553.
- 2553**
Theory of Music III. Lab 1/2. Prerequisites: 1541 and 1543. Choral and instrumental writing correlated with sightsinging, melodic and harmonic dictation and keyboard skills. Taken concurrently with 2551.
- 2561**
Sightsinging and Eartraining IV. Prerequisites: 2551 and 2553. A continuation of 2551. Taken concurrently with 2563.
- 2563**
Theory of Music IV. Lab 1/2. Prerequisites: 2551 and 2553. A continuation of 2553. Taken concurrently with 2561.
- 2573**
(H)Introduction to Music. Instruments, musical forms and styles, and major composers from the 16th century to the present. For non-majors; no prior musical experience required.
- 2600**
Chamber Ensembles. 1 credit, maximum 8. Lab 2. Combination of voices, keyboard, and orchestral instruments for performing chamber music, music theater and duo piano repertoire.
- 2610**
University Bands I. 1-2 credits, maximum 6. Lab 3-5.
- 2620**
Symphony Orchestra I. 1-2 credits, maximum 6.
- 2630**
University Choral Ensembles I. 1-4 credits, maximum 6.
- 2672**
Fundamentals of Music. Accepted for certificate/license in elementary education. Fundamentals of music, sightsinging, and piano keyboard. No credit for students with prior credit in 1592.
- 2682**
Music Education. Prerequisite: 2672. For certificate/licensure in elementary education. Methods of teaching music in grades K-6.
- 3022**
Piano Skills for Vocal Music Education Majors. Prerequisite: 2011 or consent of instructor. Development of skills in sight-reading, score reading, and general ensemble accompaniment for vocal music education majors.
- 3100**
Elective Harpsichord. 1-2 credits, maximum 8.
- 3110**
Elective Organ. 1-4 credits, maximum 8. Prerequisite: 1110.
- 3120**
Elective Piano. 1-4 credits, maximum 8. Prerequisite: 1120.
- 3130**
Elective Voice. 1-4 credits, maximum 8. Prerequisite: 1130.
- 3140**
Elective Brass. 1-4 credits, maximum 8. Prerequisite: 1140.
- 3150**
Elective String. 1-4 credits, maximum 8. Prerequisite: 1150.
- 3160**
Elective Woodwind. 1-4 credits, maximum 8. Prerequisite: 1160.
- 3170**
Elective Percussion. 1-4 credits, maximum 8. Prerequisite: 1170.
- 3180**
Secondary Organ. 1-2 credits, maximum 8. Prerequisite: 1180.
- 3190**
Secondary Piano. 1-2 credits, maximum 8. Prerequisite: 1190.
- 3200**
Secondary Voice. 1-2 credits, maximum 8. Prerequisite: 1200.
- 3210**
Secondary Brass. 1-2 credits, maximum 8. Prerequisite: 1210.
- 3220**
Secondary String. 1-2 credits, maximum 8. Prerequisite: 1220.
- 3230**
Secondary Woodwind. 1-2 credits, maximum 8. Prerequisite: 1230.
- 3240**
Secondary Percussion. 1-2 credits, maximum 8. Prerequisite: 1240.
- 3250**
Major Organ. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2250.
- 3260**
Major Piano. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2260.
- 3270**
Major Voice. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2270.
- 3280**
Major Violin. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2280.
- 3290**
Major Viola. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2290.
- 3300**
Major Cello. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2300.
- 3310**
Major Double Bass. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2310.
- 3320**
Major Guitar. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2320.
- 3330**
Major Harp. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2330.
- 3340**
Major Flute. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2340.
- 3350**
Major Oboe. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2350.
- 3360**
Major Clarinet. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2360.
- 3370**
Major Saxophone. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2370.
- 3380**
Major Bassoon. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2380.
- 3390**
Major Trumpet. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2390.
- 3400**
Major French Horn. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2400.
- 3410**
Major Trombone. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2410.
- 3420**
Major Euphonium. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2420.
- 3430**
Major Tuba. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2430.
- 3440**
Major Percussion. 1-4 credits, maximum 8. Prerequisites: upper-division examination, 2440.
- 3450**
Major Harpsichord. 1-4 credits, maximum 8.
- 3460**
Secondary Harpsichord. 1-2 credits, maximum 8.

- 3501**
Pre-clinical and Laboratory Experiences in Music. Prerequisite: declared intent to pursue Teacher Education program. Observation and micro-teaching in music. Graded on a pass-fail basis.
- 3583**
(H,I)World Music. Survey of the richly diverse music of non-western cultures emphasizing traditional musical practices prior to contact with western media. Exploration of the wide parameters of musical possibilities and the distinct priorities of various musical cultures, in order to gain insight and appreciation of distinctly non-western music. Historical recordings supplemented by video tapes. Knowledge of western classical music notation helpful.
- 3592**
Introduction to Music Technology. Prerequisite: 2563. Study of specialized computer applications in music, including MIDI basics and sequencing.
- 3610**
University Bands II. 1-2 credits, maximum 6. Lab 3-5. Prerequisite: 4 hours of 2610.
- 3620**
Symphony Orchestra II. 1-2 credits, maximum 6. Lab 4.
- 3630**
University Choral Ensembles II. 1-4 credits, maximum 6. Prerequisite: 4 hours of 2630.
- 3712**
Basic Conducting. Principles of conducting choral and instrumental groups.
- 3722**
Evaluation Techniques for the Ensemble Conductor. Prerequisite: 3712. Studies in diagnostic and achievement evaluation techniques appropriate for school musicians in ensemble situations.
- 3731**
Introduction to Elementary Music Education. Orientation to methods (including Orff, Kodaly, Dalcroze, and Manhattanville Music Curriculum Project) appropriate for teaching music in the elementary school.
- 3732**
Teaching Choral Music. Prerequisite: 3712. Repertoire, rehearsal procedures, and vocal techniques for the public school choral teacher.
- 3733**
Survey of Rock and Roll Styles. Elements and musical styles of rock and roll, its evolution and its social, economic and cultural effects.
- 3743**
Foundations of Music Education. Prerequisite: full admission to Teacher Education. Interdisciplinary approach including aspects of philosophy, aesthetics, sociology and psychology as they are applied in music in post-elementary public schools.
- 3753**
(H)History of Music to 1750. Prerequisites: 1513 and 1533, or equivalent. Aids music majors and other qualified students in understanding the musical styles, forms, schools, composers and instruments that developed in Western civilization from antiquity through the Baroque period.
- 3763**
(H)History of Music from 1750. Prerequisite: 1513, 1533 or equivalent. Aids music majors and other qualified students in understanding the musical styles, forms, schools, composers and instruments that developed in Western civilization from the pre-classical period to the 20th century.
- 3772**
Counterpoint. Prerequisites: 2563 and satisfactory upper-division examination. Analysis and application of contrapuntal techniques of the 18th century.
- 3773**
Survey of Jazz Styles. Elements and stylistic features of jazz, its evolution and its impact on society.
- 3783**
Form and Analysis. Prerequisites: 2563 and satisfactory upper-division examination. Analysis of standard repertoire with emphasis on form and structural harmonic analysis.
- 3832**
Elementary Music Methods K-6. Prerequisite: 3731. Current elementary music trends, techniques, and materials. For those who will be involved with teaching elementary music grades K-6.
- 3842**
Marching Band Methods. Prerequisite: 3731. Organizational responsibilities and charting for public school marching bands.
- 3901**
Junior Recital. Prerequisites: junior standing and consent of major applied music teacher.
- 4021**
Piano Class Lessons. Prerequisite: senior music major status.
- 4031**
Solo Literature for the Adolescent Singer. Examination of solo literature and pedagogical approaches suitable for use at the high school level.
- 4100**
Music Industry Internship. 1-6 credits, maximum 8. Lab 8. Prerequisites: 90 credit hours and minimum 2.50 GPA in all music and business courses. Directed practical experiences in an approved retail store or in a work situation related to the music industry.
- 4250**
Major Organ. 1-6 credits, maximum 12. Prerequisites: 3250 and successful completion of recital attendance requirements.
- 4260**
Major Piano. 1-6 credits, maximum 12. Prerequisites: 3260 and successful completion of recital attendance requirements.
- 4270**
Major Voice. 1-6 credits, maximum 12. Prerequisites: 3270 and successful completion of recital attendance requirements.
- 4280**
Major Violin. 1-6 credits, maximum 12. Prerequisites: 3280 and successful completion of recital attendance requirements.
- 4290**
Major Viola. 1-6 credits, maximum 12. Prerequisites: 3290 and successful completion of recital attendance requirements.
- 4300**
Major Cello. 1-6 credits, maximum 12. Prerequisites: 3300 and successful completion of recital attendance requirements.
- 4310**
Major Double Bass. 1-6 credits, maximum 12. Prerequisites: 3310 and successful completion of recital attendance requirements.
- 4320**
Major Guitar. 1-6 credits, maximum 12. Prerequisites: 3320 and successful completion of recital attendance requirements.
- 4330**
Major Harp. 1-6 credits, maximum 12. Prerequisites: 3330 and successful completion of recital attendance requirements.
- 4340**
Major Flute. 1-6 credits, maximum 12. Prerequisites: 3340 and successful completion of recital attendance requirements.
- 4350**
Major Oboe. 1-6 credits, maximum 12. Prerequisites: 3350 and successful completion of recital attendance requirements.
- 4360**
Major Clarinet. 1-6 credits, maximum 12. Prerequisites: 3360 and successful completion of recital attendance requirements.
- 4370**
Major Saxophone. 1-6 credits, maximum 12. Prerequisites: 3370 and successful completion of recital attendance requirements.
- 4380**
Major Bassoon. 1-6 credits, maximum 12. Prerequisites: 3380 and successful completion of recital attendance requirements.
- 4390**
Major Trumpet. 1-6 credits, maximum 12. Prerequisites: 3390 and successful completion of recital attendance requirements.
- 4400**
Major French Horn. 1-6 credits, maximum 12. Prerequisites: 3400 and successful completion of recital attendance requirements.
- 4410**
Major Trombone. 1-6 credits, maximum 12. Prerequisites: 3410 and successful completion of recital attendance requirements.
- 4420**
Major Euphonium. 1-4 credits, maximum 8. Prerequisites: 3420 and successful completion of recital attendance requirements.
- 4430**
Major Tuba. 1-6 credits, maximum 12. Prerequisites: 3430 and successful completion of recital attendance requirements.
- 4440**
Major Percussion. 1-6 credits, maximum 12. Prerequisites: 3440 and successful completion of recital attendance requirements.
- 4450**
Major Harpsichord. 1-4 credits, maximum 8.
- 4490***
Lessons in Applied Music (Major Field). 1-4 credits, maximum 4. Prerequisite: bachelor's degree or equivalent performing level in applied major field. Major applied music field.
- 4600***
Chamber Ensembles. 1 credit, maximum 8. Lab 2. Prerequisite: 2600 (4 hrs.) or equivalent. Combinations of voices, keyboard, and orchestral instruments for performing chamber music, music theater and duo piano repertoire.
- 4753***
Advanced Music History and Literature. Prerequisite: two semesters of music history. Advanced music history and literature. Historical and stylistic analyses of musical forms and composers' techniques. Open to graduate students and advanced undergraduate students.
- 4810***
Problems in Musical Composition. 1-2 credits, maximum 2. Prerequisites: 1543 and consent of instructor. Practical experiences in musical composition.
- 4840***
Special Studies in Music Literature. 1-2 credits, maximum 4. Prerequisite: junior standing or consent of instructor. Survey of music literature suitable for teaching various levels in applied music.

4890*
Special Studies in Music Pedagogy. 1-2 credits, maximum 4. Prerequisite: junior standing or consent of instructor. Survey of music pedagogical methods suitable for various levels and types of applied music.

4901
Senior Recital. Prerequisites: senior standing and permission of major applied music teacher.

4912
Orchestration and Arranging. Prerequisite: upper-division standing as a music major or consent of instructor. Orchestrating for instrumental ensembles and arranging for choral ensembles.

4940
Student Teaching in Public School Music. 1-12 credits, maximum 12. Prerequisites: 3501 and full admission to Teacher Education. Directed observation, seminars, and supervised student teaching in selected elementary and secondary music programs. Graded on a pass-fail basis.

4952*
Music in the School Curriculum. Aims, content and motivation of the music education program in elementary and secondary schools from the standpoint of the classroom teacher, music specialist and administrator.

4962*
Music Education Seminar. Research into latest developments of public school choral and instrumental music.

4972
Twentieth Century Music Theory and Literature. Prerequisites: 2563, 3762. Melodic, harmonic and rhythmic techniques in 20th century music.

4990*
Selected Studies in Music and Music Education. 1-3 credits, maximum 8. Short-term area studies in music and music education.

4993
Senior Honors Project. Prerequisites: departmental invitation, senior standing, Honors Program participation. A guided program in musicological research, music composition, or music performance, ending with an honors project under the direction of a faculty member with a second faculty member to complete an examining committee. Required for graduation with departmental honors in music.

5004*
Final Degree Project. Preparation of a recital of significant repertoire to be conducted or played in public performance, depending upon the student's degree track. Submission of a formal paper that is a formal interpretive analysis of each work.

5113*
Introduction to Graduate Studies in Music. Prerequisite: admission to Master of Music program. Understanding of the resources available for research in the field of music. Explanation of the types of research materials needed for classes in the Master of Music degree program, as well as providing the groundwork for success in the professional world as a music educator and performer.

5480*
Lessons in Applied Music (Minor Field). 1-2 credits, maximum 4. Prerequisite: bachelor's degree or equivalent performance level, in applied major field.

5490*
Lessons in Applied Music (Major Field). 1-2 credits, maximum 8. Prerequisite: bachelor's degree or equivalent performance level, in applied major field. Private Lessons.

5512*
Advanced Studies in Music Literature and Pedagogy I. Prerequisite: 3753, 3763 or equivalent. Techniques of successful programming, teaching and performance of ensemble literature through a survey of repertoire appropriate to the student's chosen medium.

5522*
Advanced Studies in Music Literature and Pedagogy II. Prerequisite: 3753, 3763 or equivalent. A continuation of 5512, with emphasis upon music of the 20th century and its attendant specialized performance techniques.

5583*
World Music. Survey of the richly diverse music of non-Western cultures emphasizing traditional musical practices prior to contact with Western media. Historical recordings supplemented by video tapes. Knowledge of Western classical music notation helpful. Taught in conjunction with 3583.

5610*
University Bands. 1 credit, maximum 4. Large ensembles.

5620*
Symphony Orchestras. 1 credit, maximum 4. Large ensembles.

5630*
University Choral Ensembles. 1 credit, maximum 4. Large ensembles.

5712*
Advanced Studies in Conducting I. Prerequisites: 3712 and 3722 or equivalent. Acquisition of an expressive conducting gestural vocabulary as it relates to the student's chosen medium.

5722*
Advanced Studies in Conducting II. Prerequisites: 5712. A continuation of 5712 focusing upon the gestural vocabulary as it relates to the specific complexities of contemporary music.

5733*
Techniques of Pedagogy and Performance. Prerequisites: 3712 and 3722 or equivalent. Advanced techniques and modes of ensemble rehearsal and practice.

5742*
Conducting Practicum. Lab 2. Prerequisites: 5712, 5722. Supervised conducting opportunities with major OSU ensembles or approved off-campus ensembles.

5750*
Seminar in Music History. Prerequisites: 3753 and 3763 or equivalent. Major European musical genres and pedagogical methods of a specified time in musical history. Acquaintance with source materials from the specified period to facilitate a knowledge of performance of genres studied. Topics vary.

5842*
Music Repertory. Survey of music literature suitable for teaching various levels in applied music.

5972*
20th Century Music Theory and Literature. Prerequisites: 2563, 3763 or equivalent. Musical techniques and literature in the 20th century.

5973*
Analysis of Musical Styles. Prerequisite: 3783 or equivalent. Exploration of techniques appropriate for the analysis of selected music of various styles from the Middle Ages to the 20th century, including Schenkerian analysis and set theory applications.

Natural Science (NATS)

5050
Report. 1-2 credits, maximum 2. Prerequisite: enrollment in program leading to M.S. in natural science. Guidance in reading and research required for M.S. in natural science degree.

5990*
Topics in Natural and Applied Sciences. 1-3 credits, maximum 9. Prerequisite: graduate standing. Special topics in the natural and applied sciences for students interested in topics not normally covered in existing course work.

Nutritional Sciences (NSCI)

2111
Professional Careers in Nutritional Sciences. Career opportunities in dietetics and foods and nutrition. Roles and responsibilities of nutritional sciences professionals. Routes to professional memberships and current issues in professionalism.

2114
(N)Principles of Human Nutrition. Functions of the nutrients in human life processes. Nutrient relationship to health as a basis for food choices. Open to all University students.

2850
Special Topics in Nutritional Sciences. 1-3 credits, maximum 4. Study of specific consumer education issues or topics in nutritional sciences.

3133
Science of Food Preparation. Lab 3. Prerequisites: HRAD 1114, organic chemistry. Application of scientific principles to food preparation. Same course as HRAD 3133.

3213
Management in Hospitality and Food Service Systems. Prerequisite: a course in economics. Function and methods of management as related to the hospitality and food service industries. Same course as HRAD 3213.

3223
Nutrition in the Life Cycle. Prerequisite: 2114 or equivalent. Nutritional needs and dietary concerns of individuals from conception through old age.

3440
Nutritional Sciences Preprofessional Experience. 1-3 hours, maximum 3. Supervised work experience in one or more of the following: college and university food service, health care facilities, and food processing plants.

3543
(I,S)Food and the Human Environment. Impact of the various factors which affect food availability, production, processing, distribution and consumption of food in the world. Challenges and solutions to the world food crisis.

3553
Purchasing in Hospitality and Food Service Systems. Prerequisite: 3133 or concurrent enrollment. Procurement of food and non-food materials in hospitality and related industries. Same as HRAD 3553.

4013*
Experimental Foods. Lab 6. Prerequisite: 3133 or consent of instructor. Investigations in physical, chemical and sensory qualities of foods under experimental conditions. Development of an individual research project.

4023*

Nutrition and Health Issues. Prerequisites: 2114, 3223. Analysis of the role of specific nutrients in health maintenance and in prevention of chronic disease. Communication of nutrition information to the public.

4323*

Human Nutrition and Metabolism. Prerequisites: 2114 or equivalent, organic chemistry, physiology. Digestion, absorption and metabolism of nutrients; functions and health implications in the human organism.

4333*

Food, Beverage and Labor Cost Controls. Prerequisites: ACCT 2203, junior standing. Menu analysis and food/beverage/labor cost controls associated with hospitality industry operations. Same course as HRAD 4333.

4365*

Quantity Food Production Management. Lab 5. Prerequisites: HRAD 2125, HRAD or NSCI 3553 and a course in accounting or mathematics or consent of instructor. Organizing, purchasing, costing, preparation and service of food in a quantity food production setting. Same course as HRAD 4365.

4373*

Creative Teaching of Nutrition. Prerequisites: 2114, 3223 or concurrent enrollment. Analyses of various methods, techniques, resources and evaluation for nutrition education. Experimental component required.

4573*

Institution Organization and Management. Lab 3. Prerequisites: NSCI or HRAD 3553, 4365. The organization of personnel and resources in a food service institution and the techniques required by the manager. Lab consists of work experience in Residence Hall Food Services. Same course as HRAD 4573.

4643

Critical Issues in Nutrition and Dietetics. Prerequisite: senior standing. Integration of the body of knowledge of nutrition and dietetics through examination of critical issues.

4733*

Community Nutrition. Prerequisites: 2114, 3223 and an educational methods course. Application of nutrition, education and communication principles to community nutrition programs and services. Field work required.

4850*

Special Unit Studies in Nutritional Sciences. 1-3 credits, maximum 6. Special units of study in nutritional sciences.

4853

Medical Nutrition Therapy I. Lab 2. Prerequisites: 4323 or concurrent enrollment, one course in biochemistry. Physiological and metabolic bases for dietary modifications in disease states. Interpretation of laboratory data as it applies to nutritional care.

4863

Medical Nutrition Therapy II. Lab 2. Prerequisite: 4853. A continuation of 4853.

4900

Honors Creative Component. 1-3 credits, maximum 3. Prerequisites: College of Human Environmental Sciences Honors Program participation, senior standing. Guided creative component for students completing requirements for College Honors in College of Human Environmental Sciences. Thesis, creative project or report under the direction of a faculty member in the major area, with second faculty reader and oral examination.

5000*

Research in Nutritional Sciences. 1-6 credits, maximum 6. Prerequisite: consent of adviser. Individual research and thesis that will fulfill the requirements for the master's degree.

5012*

Public Policy Development in Food, Nutrition and Related Programs. Rationale underlying selected governmental programs in food and nutrition and other home economics areas and assessment of the effectiveness of the programs.

5123*

Research Developments in Nutritional Sciences. Basic components of the research process and application of research methods to nutritional sciences.

5220*

Contemporary Issues in Dietetics. 1-2 credits, maximum 4. Prerequisite: acceptance as a dietetic intern. Contemporary issues in the practice of dietetics; formulation of innovative solutions and processes to enhance effectiveness in the workplace. Graded on a pass-fail basis.

5230*

New Findings in Nutrition. 1-3 credits, maximum 6. Prerequisite: 2114 or equivalent. Current emphases in nutrition, with implications for nutrition research, education, and public service.

5233*

Quantity Food Development. Lab 5. Prerequisite: 4363 or equivalent. Experimental approach to methods in quantity food production as related to time factor, institution equipment and proportions of ingredients.

5343*

Organization and Management of Food Service Systems. Prerequisite: 4573 or equivalent. Contemporary theories of organizational structures as applied in the management of food service systems.

5363*

Maternal and Infant Nutrition. Prerequisite: 2114 or equivalent. Nutritional needs and dietary concerns during pregnancy, lactation and the first year of life. Implications for nutrition intervention, education and policy.

5373*

Childhood Nutrition. Prerequisite: 2114 or consent of instructor. Normal nutritional needs of children, preschool through grade 12. Dietary implications for child care programs, school food service and parent education.

5393*

Nutrition for the Elderly. Prerequisite: 2114 or equivalent. Nutritional needs, and dietary concerns of the elderly. Implications for food and nutrition programs, policies, research and education.

5440*

Dietetic Internship Practicum. 1-6 credits, maximum 9. Prerequisites: acceptance as a dietetic intern and American Dietetic Association verification. Supervised learning experiences in approved facilities for the achievement of performance requirements for entry level dietitians. Graded on a pass-fail basis.

5463*

Advanced Human Nutrition. Prerequisites: a biochemistry course and an upper-level nutrition course. Application to the human being of metabolic processes which involve essential dietary components.

5553*

International Nutrition and World Hunger. Prerequisite: consent of instructor. Advanced study of the magnitude, causes, and nature of hunger and undernutrition in low income countries; emphasis on programs, policies and planning directed toward alleviating hunger.

5563*

Nutritional Assessment. Prerequisites: 3223, 4323, or equivalent. Dietary, physical, and biochemical assessment techniques and their application to patient or client nutritional status assessment in health care systems.

5593*

Quality of Work Life in Food Service Organizations. Prerequisite: one course in personnel management. Analysis of administrative problems in food service organizations. Focus on quality of work life assessment.

5612*

Theory, Research and Practice of Nutrition Education. Prerequisites: 4373 or equivalent and consent of instructor. Analyses of various learning and behavior change theories and application in nutrition education.

5643*

Advanced Medical Nutrition Therapy. Prerequisite: admission to dietetic internship or consent of instructor. Physiological and metabolic bases for nutritional support in disease.

5650*

Advanced Food Conservation and Processing. 2 credits, maximum 2. Lab 3. Prerequisite: 4013. Recent advances in food processing in relation to quality of product and conservation of food nutrients.

5673*

Manpower Management in Health Care and Related Industries. Lab 3. Prerequisites: 3213, 4573, or consent of instructor. Management of human resources in health care and related industries.

5713*

Community Dietetics. Prerequisites: 4373, 4733 or equivalent. Analysis of the impact of political, legislative, economic and cultural diversity factors on dietetic practice in public health and other community nutrition programs.

5743*

Experimental Methods in Nutritional Sciences. Prerequisites: a course in biochemistry, a course in statistics, a graduate course in food or nutrition. Experimental design for research in food and nutrition based on analytical laboratory techniques and other research methodology.

5753*

Management in Health Care Systems. Prerequisite: 4365, 4573 or consent of instructor. Total quality management for nutrition and food services in health care and related industries. Basics, systems and tools for monitoring and evaluating quality in nutrition and food service departments.

5850*

Special Topics in Nutritional Sciences. 1-3 credits, maximum 4. Prerequisite: graduate standing. Specialized workshops in nutrition, food science or food service administration.

5870*

Problems in Nutritional Sciences. 1-4 credits, maximum 6. Analysis of emerging problems and trends in nutritional sciences.

5960*

Seminar in Nutritional Sciences. 1 credit, maximum 2. Prerequisite: for M.S. students. Individual and group seminars on current issues and research in nutritional sciences.

6000*
Doctoral Thesis. 1-12 credits, maximum 30. Prerequisite: consent of major professor.

6113*
Critical Analysis of Current Issues in Nutrition. Prerequisite: 5463 or consent of instructor. Current issues in human nutrition with emphasis on interrelationships of nutrients in metabolism and their impact on health.

6123*
Micronutrients in Human Nutrition. Prerequisite: 5463 or consent of instructor. In depth study of vitamins and minerals and their interrelationships in metabolism.

6233*
Critical Analysis of Current Issues in Food Service Administration. Prerequisites: 5593, 5673. Current issues in food service administration with emphasis on total quality management, robotics, solid waste management and research needs.

6453*
Advanced Research Developments in Nutritional Sciences. Prerequisites: one course in research methods and one course in statistics. Components of the research process for students who have completed an advanced degree. Development, application and interpretation of research methodology.

6870*
Independent Study in Nutritional Sciences. 1-3 credits, maximum 6. In-depth analysis of research issues in nutritional sciences.

6960*
Advanced Studies in Nutritional Sciences. 1 credit, maximum 3. Critical evaluation of research in nutritional sciences. Individual and group seminars on selected topics.

Occupational Education (OCED)

3012
Analysis and Assessment of Training Needs. Techniques and procedures used in determining needs for, and content of, instructional programs. Emphasizes needs-assessment techniques and methods for identifying and analyzing the knowledge, skills and competencies required for satisfactory job performance. Procedures for translating such information into instructional programs. No credit for students with credit in TIED 4344.

3143
Introduction to Career Education. Current and prospective teachers introduced to the fundamental concepts and operational practices of career education. Historical development, needs assessment, goals, implementation strategies, evaluation, developmental concepts, curriculum planning and articulation.

3901
Seminar in Teacher Education. Procedures for gaining admission to Teacher Education and student teaching. Requirements for certification and graduation, and course planning to meet those requirements. Documentation and completion of 45 clock hours of observations in various school settings. Graded on a pass-fail basis.

4103
Methods of Teaching Occupational Education. Lab 2. Applications of teaching and learning principles. Instructional planning and delivery strategies available to the instructor, including shop and laboratory instruction, individualized and competency-based instruction and the use of instructional technology. Laboratory component involves course participants in micro-teaching and other actual situations. No credit for students with credit in TIED 4103.

4113
Occupational Education in American Society. Characteristics of occupational education and its development, role and function in a changing American society. Economic and sociological considerations of occupationally-oriented programs. Exploration of the interrelationship of occupational and academic subjects. Strategies for teaching multicultural and special needs in occupational and adult education.

4213
Computers and Multimedia for Workplace Education. Lab 2. Overview of MS-DOS microcomputer applications in workplace education, including selection of hardware and software, databases, spreadsheets, authoring systems, Internet and other on-line databases, and multimedia applications. Same course as BSPR 4213.

4223*
Program Planning and Development in Occupational Education. Planning and designing programs for the development of human resources. Program goals and objectives, curriculum, facilities, teaching-learning theories, materials development, program resources and program and instructional evaluation.

4333*
(I)International Occupational Education. Comparison and analysis of international occupational education.

4470
Teaching Practicum in Occupational Education. 1-12 credits, maximum 12. Prerequisite: full admission to Teacher Education. Organized teaching experiences under the guidance and direction of a local school cooperating teacher and university teacher educator. Participant assigned to a cooperating teacher with responsibility for planning, implementing and evaluating the classroom, laboratory or shop. Graded on a pass-fail basis.

5000*
Thesis or Report. 2-10 credits, maximum 10. Students studying for a master's degree may enroll for a total of two credit hours if they write a report or six hours if they write a thesis. Students working on a specialist's degree may earn a maximum of 10 hours credit.

5010*
Seminar. 1-3 credits, maximum 6. Graduate student seminars focusing on current and critical issues and common problems relevant to occupational education.

5113*
Principles of Occupational Education. Underlying principles and evolving concepts in occupational and adult education. Critical analysis of educational programs and service areas and the resulting implications for leadership personnel at all levels of program responsibility.

5133*
International Workplace Education. Prerequisite: graduate standing. Ideas, practices and systems of occupational education in other countries compared with contemporary practices in the United States to provide a basis for an enlarged, critical view of technical education.

5153*
Curriculum Planning in Occupational Education. Principles and procedures for curriculum planning, development and management in occupational and adult education with analyses of current trends and practices and their implications for program quality.

5313*
History and Organization of Vocational and Technical Education. Prerequisite: graduate standing. Social, political, and economic forces acting upon vocational and technical education studied in depth for leadership development.

5333*
Administration and Supervision of Local Occupational Education Programs. The duties of administrative and supervisory personnel responsible for the development, coordination and promotion of occupational education programs.

5443*
Interpreting Research in Occupational Education. Seminar on the methods of research, review, synthesis and interpretation with application to particular fields of occupational and adult education.

5480*
Modern Technology in Occupational Education. 1-6 credits, maximum 6. Technical developments in specialized occupational areas examined and analyzed for educational curriculum and program implications.

5553*
Occupational Education for Students with Special Needs. Techniques and procedures by which occupational education may serve individuals with special needs. Field experiences an integral part of the course.

5720*
Workshop. 1-3 credits, maximum 10. Professional workshops of various topics and lengths. Each workshop designed to meet unique or special needs of individuals concerned with adult education and human resource development.

6000*
Doctoral Dissertation. 2-10 credits, maximum 15. Required of all candidates for the Doctor of Education degree in adult education and human resource development.

6103*
Philosophy of Occupational Education. Alternative perspectives for developing a philosophical position in occupational and adult education.

6110*
Graduate Reading in Adult Education and Human Resource Development. 1-6 credits, maximum 6. Prerequisites: graduate standing and consent of department head and supervising professor. Supervised readings of significant literature not included in regularly scheduled courses.

6113*
Teacher Education and Personnel Development for Occupational Education. Prerequisite: 6103. Research, trends and innovative practices in teacher education and personnel development for occupational education.

6333*
Strategic Planning and Policy Development. Theoretical and practical aspects of the concepts and implementation processes. Articulation among various public and private sector organizations.

6343*
Financing Vocational-Technical Education. Prerequisite: graduate standing. Development of conceptual and legal bases for funding public vocational-technical education programs. Sources of funds, distribution strategies, local, state and federal accountability requirements, and fraud and abuse of funds.

6353*
Educational Futures. Prerequisite: admission to OSU doctoral program. An examination and discussion of demographic, social, economic, educational and technological trends and conditions having an impact on the nature and role of education and educational institutions.

6871*
Doctoral Seminar: Level 1. Orientation to doctoral program in OCED. May be taken prior to program application; required of all applicants.

6881*
Doctoral Seminar: Level 2. Preparation of the required tentative proposal for dissertation and the comprehensive doctoral examination. Required for OCED doctoral candidates.

Petroleum Technology (PET)

1234
Petroleum Fluid Properties. Lab 2. Prerequisites: MATH 1513 or 1715; CHEM 1215 or 1314. Chemical and physical properties of petroleum, petroleum products, natural gas, coal and drilling fluids. Introduction to reservoir engineering.

Philosophy (PHIL)

1013
(H)Philosophical Classics. Basic works by great thinkers, including Plato, Descartes and Hume.

1213
(H)Philosophies of Life. Introductory ethics and social philosophy. Moral decision-making, the good life, social values, freedom and responsibility.

1313
(A)Logic and Critical Thinking. Formal and informal reasoning, common fallacies, definitions and language functions, patterns of explanation. Practical criticism and development of everyday arguments.

2113
(H)Introduction to Philosophy. Selected philosophical problems: the nature of reality, knowledge, value, social ideals and religion.

3003*
(A)Symbolic Logic. Propositional logic and predicate logic with identity. Formal analysis of language.

3113*
(H)Ancient and Medieval Philosophy. Main systems of Western thought from the Greeks to 15th century Europe. Emphasis on Plato, Aristotle, Augustine and Aquinas.

3213*
(H)Modern Philosophy. Major philosophers and problems in Western thought from the 16th through the 19th century. Emphasis on Descartes, Hume and Kant.

3313
(H)19th and 20th Century Philosophy. Major philosophers and problems in Western thought from Hegel to the present.

3413
(H)Ethics. Contemporary and classical views on the nature of moral judgements, moral value, relativity and objectivity, freedom and responsibility.

3513*
(H)Social Philosophy. Major social thinkers and contemporary issues. Social authority, human rights, political forms and justice. Emphasis on Aristotle, Locke, Mill and Marx.

3613
(H)Philosophy of Religion. Nature of religion, religious experience and religious language. God-concepts, theistic arguments, God and evil, God and immortality.

3713
(H)Philosophy of Education. Classical and contemporary philosophers who have systematically developed their ideas about education, including Plato, Aristotle, Rousseau, Locke and Dewey.

3803
(H)Business Ethics. Ethical issues in business, such as employer-employee duties and loyalties, advertising uses, preferential treatment practices. Analytic grounding in basic theories of ethics.

3813*
(H)Recent American Philosophy. Dominant trends in American philosophy during the last 100 years, with emphasis on pragmatism.

3823
(H)Engineering Ethics. Philosophical analysis of moral issues in engineering practice, such as whistleblowing, conflicts of interest and product liability. Professional codes of ethics.

3833*
(H)Biomedical Ethics. Moral problems brought about by recent developments in scientific research and medical technology. Abortion, euthanasia, genetic engineering, and human experimentation.

3843
(H)Philosophy of Law. Prerequisite: upper-division standing. Philosophical issues related to U.S. law. The relationship between law and morality, the nature and functions of law, and grounds of liability.

3913*
(H)Existentialism. Selected writings and themes in the development of existentialism and related intellectual movements. Subjectivity, phenomenological description, hermeneutics, freedom and value; and such writers as Kierkegaard, Nietzsche, Heidegger, Sartre, Marcel and Buber.

3923
(H)Contemporary Issues in Philosophy. Selected current controversies and recent trends in philosophy.

3943*
(H,I)Asian Philosophy. Three main streams of Asian thought: Indian, Chinese and Buddhist. How various thinkers in the three traditions have dealt with questions of being and becoming, knowledge, ethics and society.

4003*
Mathematical Logic and Computability. Prerequisites: 3000 or 3003 or MATH 3613 or consent of instructor. The basic metatheorems of first order logic: soundness, completeness, compactness, Löwenheim-Skolem theorem, undecidability of first order logic, Gödel's incompleteness theorem. Enumerability, diagonalization, formal systems, standard and non-standard models, Gödel numberings, Turing machines, recursive functions, and evidence for Church's thesis. Same course as CS 4003 and MATH 4003.

4013*
(H)Perspectives on Death and Dying. Issues that arise as individuals confront the fact of mortality. Dying patients, the ethical issues of euthanasia and suicide, the process of grief, death in literature and the arts, and philosophical and religious views on immortality.

4113*
(H)Philosophy of Art and Literature. Nature of aesthetic objects and experiences; form, meaning and value in the arts; the function of art in society; criteria of criticism of the arts.

4313*
(H)Philosophy of Mind. Problems in philosophical psychology. Mind and body, freedom and determinism, personal identity and survival, self-knowledge, analysis of mental concepts.

4453*
(H)Philosophy in Literature. Selected literary works examined for philosophical ideas and themes. Attention to the interrelation of form and content. Thematic approach.

4713*
(H)Philosophy of Science. Philosophical issues related to science and its role in society. Topics include science and common sense, laws and theories, causality, nature of scientific progress.

4733*
(H)Philosophy of Biology. Selected philosophical topics, such as Darwinism and other theories of evolution, physical reductionism, and issues of genetic engineering.

4983*
Metaphysics and Epistemology. Prerequisite: 12 credit hours of philosophy. The study of the fundamental nature of reality and human knowledge of it.

4990*
Special Studies in Philosophy. 1-3 credits, maximum 10. Selected philosophical topics or works.

4991*
Contemporary Philosophy Research. Prerequisites: upper-division standing, at least 12 hours in philosophy completed. Study of leading edge research in philosophy through presentation and discussion of current philosophy journal articles with faculty.

4993
Senior Honors Thesis. Prerequisites: departmental invitation, senior standing, Honors Program participation. A guided reading and research program ending with an honors thesis under the direction of a faculty member, with second faculty reader and oral examination. Required for graduation with departmental honors in philosophy.

5000*
Thesis in Philosophy. 1-6 credits, maximum 6. Supervised individual work on a thesis for a master's degree.

5210*
Seminar on a Major Philosopher. 3 credits, maximum 9. Prerequisite: three courses in philosophy. The writings of a major philosopher and related material.

5310*
Seminar on a Field of Philosophy. 3 credits, maximum 9. Prerequisite: three courses in philosophy. Selected topics in one field of philosophy.

5513*
History of Educational Philosophy. Outstanding western educational theories. Emphasis on Plato, Aristotle, Quintilian, Comenius, Locke, Rousseau and Dewey.

5610*
Philosophical Issues in Education. 2-3 credits, maximum 3. Contemporary issues in educational theory and practice. The relation of education to political thought, religion, public law and culture.

5713*
Contemporary Philosophies of Education. Analysis of contemporary educational philosophies, with attention to recommended aims, curricula and methods.

5910*
Research Problems in Philosophy. 1-3 credits, maximum 10. Prerequisite: consent of instructor and department head. Individual or group research on specific philosophical problems.

Physics (PHYS)

1014
(N)Descriptive Physics. A survey course presenting the basic concepts and principles of physics with a minimum of mathematics. Motion, waves, temperature, electricity, magnetism, optics, atomic structure, and nuclear energy. No credit for students with credit in 1114.

1114
(L,N)General Physics. Lab 2. Prerequisite: high school algebra and trigonometry, or MATH 1483 or MATH 1715. Algebra-based introductory course covering the basic concepts of physics. Practical examples of the role of physics in other disciplines. Newtonian mechanics, fluids, heat, thermodynamics, waves, sound.

1214
(L,N)General Physics. Lab 2. Prerequisite: 1114. Continuation of 1114; electricity, magnetism, optics, quantum physics, atomic and nuclear structure.

1313
(L,N)Inquiry-based Physics. Lab 3. Properties of matter, motion, light and color, electrical circuits and energy conservation. Recommended for elementary education majors as model course to learn and teach science.

2014
(L,N)General Physics. Lab 2. Prerequisite: MATH 2145 or concurrent enrollment. Calculus-based introductory course for science, math and engineering majors. Mechanics, waves, heat, and thermodynamics.

2114
(L,N)General Physics. Lab 2. Prerequisite: 2014. Continuation of 2014. Electricity, magnetism and optics.

3013*
Mechanics I. Prerequisites: 2114 or equivalent, and MATH 2233 or concurrent enrollment. Mechanics of particles, systems of particles and rigid bodies.

3113*
Heat. Prerequisites: 1214 or 2114, and calculus. Thermometry, heat transfer, elementary theory of specific heat and the three laws of thermodynamics.

3213*
Optics. Prerequisites: 2114 and 3513, or consent of the instructor. Geometrical optics; interference, diffraction, dispersion, absorption and polarization of light.

3313*
Modern Physics for Engineers. Prerequisite: 2114 or equivalent. Emphasis on nuclear, molecular and solid state physics with engineering applications.

3322*
Modern Laboratory Methods I. Lab 6. Prerequisites: 2014, 2114. Introduction to electric and electronic measurements and computer applications in experimental control, data collection and laboratory computation. Experiments on test instruments, integrated electronics, signal processing, computer interfacing and data acquisition.

3513*
Mathematical Physics. Prerequisites: 1214 or 2114, and MATH 2155. Physical applications of vectors, vector calculus and differential equations. Fourier analysis. Orbit geometry, coordinate systems and transformation of coordinates. Matrices and determinants.

3622
Modern Laboratory Methods II. Lab 6. Prerequisites: 2014, 2114. Introduction to the operating principles and applications of modern physical methods used in research. Laboratory experiments with lasers, wave propagation, thermometry, radiation detection, optical interferometry and spectroscopy.

3713
Modern Physics I. Prerequisite: 2114. Atomic physics, special theory of relativity, and introduction to solid state and nuclear physics.

4003*
Computer Simulation Methods in Physics. Prerequisites: 3013, 3113, 3313 or consent of instructor. Introduction to computer simulation methods used in the physical sciences. Linear systems, nonlinear systems, molecular dynamics, Monte Carlo methods, cellular automata, simple quantum systems. Some knowledge of either C, FORTRAN, Pascal, or BASIC required.

4010*
Special Problems. 1-3 credits, maximum 9. Prerequisite: consent of instructor. Individual laboratory work of an advanced nature.

4113*
Electricity and Magnetism. Prerequisites: 2114 and MATH 2233, or their equivalents. Electrostatic fields, magnetic fields of steady currents, induced EMFs, Maxwell's equations and introduction to electromagnetic wave theory. Vector analysis used.

4213*
Introduction to Nuclear Physics. Prerequisites: 8 hours of physics and 8 hours of chemistry. For nonphysics majors. Fundamentals of nuclear physics with applications to chemistry, engineering and biology.

4263*
Introduction to Solid State Physics. Structure, specific heat, dielectric properties, lattice vibrations, free electron theory, band structure and superconductivity of solids.

4413*
Modern Physics II. Prerequisites: 3013 and 3713. Atomic and X-ray spectra; one-dimensional Schroedinger equation; nuclear structure; introduction to statistical mechanics and elementary quantum statistics.

4423*
Mechanics II. Prerequisite: 3013. Coupled oscillators, propagation of waves in discrete and continuous media, mechanics of discrete and continuous media and acoustics.

4513*
Introductory Quantum Mechanics. Prerequisite: 4423 or equivalent. Uncertainty principle, setting up Schroedinger equation (time dependent as well as time independent) and solving it for linear oscillator, hydrogen atom, periodic and other potentials.

4663*
Radioactivity and Nuclear Physics. Prerequisite: 3313. Natural and artificial radioactivity, decay laws; absorption, detection and measurement of radiations; nuclear transformations.

4712*
Senior Project. Lab 6. Advanced individual experimental projects. Project proposal, formal laboratory report, and oral presentation are required.

4813*
Electromagnetic Radiation. Prerequisites: 3213, 3513, 4113. Electromagnetic wave theory, reflection and refraction of electromagnetic waves; resonant cavities, wave guides, fiber propagation of electromagnetic waves; radiation sources; relativistic description of electromagnetic fields.

4993
Senior Honors Thesis. Prerequisites: departmental invitation, senior standing, Honors Program participation. A guided reading and research program ending with an honors thesis under the direction of a faculty member, with second faculty reader and oral examination. Required for graduation with departmental honors in physics.

5000*
Master's Thesis Research or Report. 1-9 credits, maximum 9. Prerequisite: consent of major professor. Thesis research or report for master's degree.

5110*
Seminar. 1-5 credits, maximum 20. Prerequisite: graduate standing in physics. Special topics in physics.

5113*
Statistical Thermodynamics and Kinetic Theory. Prerequisite: 3113. Fundamental concepts of thermodynamics: first, second and third laws; thermodynamic potentials. Statistical physics: Maxwell-Boltzman, Fermi-Dirac, Bose-Einstein distribution functions. Kinetic theory: transport phenomena, Boltzman H Theorem, the approach to thermodynamic equilibrium.

5133*
Theory of Spectra. Line spectra, hyperfine structure, Lamb shift, band spectra, NMR spectra and ESR spectra.

5163*
Lasers. Prerequisite: 4813 or equivalent. Semi-classical description of absorption and emission of light by matter; effects of cavities and optical elements; theory of lasers—gas, liquid, solid state and semiconductor. Electro-optics. Techniques of mode-locking, Q-switching, phase conjugation, Fourier transform optics. An introduction to non-linear optics.

5213*
Statistical Mechanics. Prerequisites: 5113 and 5613 or consent of instructor. Classical and quantum mechanical distribution functions for independent particles; interacting classical and quantum systems, superfluidity, phase transitions and critical phenomena, approximation methods.

5263*
Nuclear Physics. Prerequisites: 5453 and 5613. Nuclear forces, structure of nuclei and nuclear models.

5313*
Electromagnetic Theory. Prerequisite: 5453. Electric and magnetic fields in free space and in matter. Boundary value problems, Green's functions, stress tensors, multipole expansions, thermodynamics; electromagnetic waves.

5350*
Special Problems. 1-3 credits, maximum 3. Prerequisite: graduate standing in physics. Special problems of experimental or theoretical nature. Largely individual work with written report required.

5353*
Membrane Physiology. Prerequisites: 1214 and BIOL 3014 or BIOC 4113 or CHEM 3354 or PHYS 3313. Application of biophysical, biochemical and biological techniques to the study of the structure and function of membranes and membrane components, kinetic measurements, spectroscopic techniques and diffractive techniques. Application of these illustrated with current research problems. Same course as MICRO 5223.

5413*
Classical Mechanics. Prerequisites: 3013 and 3413 or equivalent. Generalized coordinates and advanced dynamics; coupled systems, wave motion; theory of elasticity.

5453*
Methods of Theoretical Physics. Prerequisite: 3513. Introduction to the various methods and techniques used in theoretical physics.

5613*
Quantum Mechanics I. Prerequisite: 5453. Postulates of quantum mechanics. Operators, commutation relations, eigenfunctions. Schroedinger, Heisenberg and interaction formalisms, angular momentum and central field problems; nondegenerate perturbation theory.

5663*
Solid State Physics I. Prerequisite: 4263. Crystal structure, cohesive energy of ionic crystals and metals, specific heats, free electron theory of metals, band theory, Brillouin zones, insulators and alloys; magnetic properties, optical properties and thermal and electrical conductivity of solids.

5713*
Solid State Physics II. Prerequisite: 5663 or equivalent. Symmetry, dielectric properties, ferroelectrics, magnetic properties, mechanical properties and defects of solids.

5913*
Selected Topics in Astrophysics. Recommended: ASTR 2023 and 3023. Derivation of fundamental equations and application to problems in astronomical spectroscopy, stellar atmospheres, stellar interiors, interstellar matter and radio astronomy.

5960*
Problems in Chemical Physics. 3-6 credits, maximum 6. Prerequisite: consent of instructor. Intermolecular forces, interaction of radiation with matter in bulk form, dielectric properties of matter, polymer physics and quantum theory of biopolymers.

6000*
Doctoral Dissertation Research. 1-15 credits, maximum 60. Prerequisites: admission to candidacy and permission of major professor.

6010*
Advanced Graduate Seminar. 1-3 credits, maximum 9. Prerequisite: consent of instructor. Special topics of an advanced nature in physics.

6113*
Advanced Theory of Solids. Prerequisite: 5663. Many-body techniques, transport processes, band theoretical techniques, superconductivity, dynamics of electrons in a magnetic field, and alloys.

6213*
Group Theory and Crystal Structure. Prerequisite: 5663. Group theory and imperfections in crystals. Dislocation theory and color centers.

6243*
Semiconductors I. Prerequisites: 5113, 5613, 5663. The first part of a survey of the physics of semi-conductors. Bonding and structure, crystal growth, epitaxial growth, band theory, phonons, photons, defects, intrinsic and extrinsic statistics, trapping and recombination.

6313*
Quantum Mechanics II. Prerequisite: 5613. Scattering theory, many-particle quantum mechanics and application to atomic and molecular systems; degenerate and time-dependent perturbation theory.

6343*
Semiconductors II. Prerequisite: 6243. The second part of the semiconductors sequence. Transport phenomena, junctions, devices, heterostructures and optical properties.

6413*
Modern Optics. Prerequisites: 5313, 5163, 5613. Non-linear optics, higher-order susceptibilities; four-wave mixing; quantum optics and photon statistics, Maxwell-Bloch equations.

6513*
Advanced Topics in Solid State Physics. Prerequisite: 5663 or equivalent. Interaction of radiation and matter, neutron scattering, phase transitions, magnetic resonance and cooperative phenomena.

6613*
Advanced Nuclear and Particle Physics. Prerequisites: 5263, 6313. Nuclear and elementary particle interactions, resonances, and models; relativistic quantum mechanics and quantum field theory.

6713*
Classical Theory of Fields. Prerequisite: 5313. Radiation theory, waveguides, scattering and dispersion relations; relativity.

Plant Pathology (PLP)

3344
Plant Pathology. Lab 4. Prerequisite: BIOL 1403. Concepts of disease development, spread and control of fungal, bacterial, viral, nematode, and environmental diseases.

3553
Fungi: Myths and More. Lab 2. Prerequisite: biology. Colorful folklore and myths of fungi and the role of fungi in the ecosystem and human affairs as diseases of plants, animals and humans. Laboratory instruction on mushrooms, mechanisms of dispersal and genetic recombinations. Undergraduate research component on isolation and growth of mushrooms and other fungi.

4013*
Plant Disease Control. Lab 3. Prerequisite: 3344 or concurrent enrollment. Disease-control theory and practices. Control practices and economics are considered in relation to principles and research results in the areas of quarantines, eradication, cultural practices, biological control, physical factors and chemicals.

4400
Undergraduate Research. 1-3 credits, maximum 3. Prerequisite: consent of instructor. Undergraduate research problems in plant pathology.

4922*
Applications of Biotechnology in Arthropod and Pathogen Control. Prerequisites: introductory biology and chemistry or equivalent. Applications of biotechnology in controlling arthropod pests of plants and animals and plant pathogens. Introduction to underlying technology, products being deployed, their effectiveness and associated problems or concerns resulting from their use. Same course as ENTO 4922.

5000*
Research. 1-6 credits, maximum 6. Research for the M.S. degree.

5004*
Plant Nematology. Lab 3. Prerequisite: 3344 or concurrent enrollment. General morphology, taxonomy and bionomics of nonparasitic and plant parasitic nematodes. Plant parasitic nematode assay techniques, subfamily identification, symptomology, pathogenicity and control.

5012*
Plant Virology Laboratory. Lab 4. Prerequisite: previous or concurrent enrollment in 5013. Methods of investigating plant viruses.

5013*
Plant Virology. Prerequisites: 3344 or equivalent; one course in biochemistry or physiology. Transmission, characterization, differentiation, replication and control of plant viruses; discussion of current literature.

5043*
Plant Pathology. Lab 4. Prerequisite: BIOL 1403. Principles of plant pathology: disease development, spread and control of fungal, bacterial, viral, nematode and environmental diseases. For advanced, special, and non-plant pathology graduate students.

5104*
Mycology. Lab 4. Prerequisite: graduate standing. A systematic study of the fungi, with emphasis on taxonomy, comparative morphology and fungal biology. Taught in the Department of Plant Pathology. Same course as BOT 5104.

5304*
Phylobacteriology. Lab 4. Prerequisite: 3344. Bacteria as plant pathogens, with examination of the taxonomy, genetics, ecology, physiology, host-parasite interaction and control of phylobacteria.

5413*
Plant Disease Epidemiology. Lab 3. Prerequisite: 3344 or 5043. Introduction to methodology and technical equipment used in epidemiological research and application of epidemiological principles in plant disease control.

5523
Integrated Management of Insect Pests and Pathogens. Prerequisites: 3344 and ENTO 2023 or equivalent or consent of instructor. Modern theory and practices for management of insect pests and pathogens in plant production systems, emphasizing an ecologically-based, integrated approach. Basic concepts of pest management, decision-making, cost/benefit analysis, and risk/benefit analysis. Same course as ENTO 5523.

5560*
Problems in Plant Pathology. 1-5 credits, maximum 10. Prerequisite: consent of instructor.

5613*
Host Plant Resistance. Lab 2. Prerequisites: 3344 and ENTO 2023 or equivalent and a general genetics course; or consent of instructor. Interactions of plants and the herbivorous insects and pathogenic micro-organisms that attack them. Development and deployment of multiple-pest resistant cultivars in crop management systems. Same course as ENTO 5613.

5724*
Physiology of Host-Pathogen Interactions. Lab 4. Prerequisites: 3344 and BIOC 3653. Physiology of the interactions between plants and pathogens. Mechanisms by which pathogens infect and by which plants resist infection.

5850*
Plant Pathology Seminar. 1 credit maximum per semester. 2 credits for M.S. and 4 credits for Ph.D. required.

5860*
Colloquium. 2 credits, maximum 2. Prerequisite: 3344. Concepts and principles of plant pathology through discussions of pertinent literature.

6000*
Research. 1-12 credits, maximum 36. Research for the Ph.D. degree.

6102*
Genetics of Plant Disease. Lab 4. Prerequisites: 3344 or equivalent and a course in general genetics. Genetics of host plants, plant pathogens and the interaction between the two. Flor's gene-for-gene hypothesis and its implications in breeding for disease resistance.

6202*
Genetics of Fungi. Lab 4. Prerequisites: 5104 or BOT 5104 or equivalent and a general course in genetics. Mating systems, parasexuality, mutagenesis, and gene mapping of fungi. Involvement of these topics in plant pathology.

6303*
Soilborne Diseases of Plants. Lab 3. Prerequisite: 3344. Soilborne diseases, their reception and importance, the pathogens involved, rhizoplane and rhizosphere influences, inoculum potential, specialization of pathogens, suppressive soil effects and disease management. Lecture and discussion sessions will emphasize in-depth understanding of problems and complexities associated with studies of soilborne pathogens.

Plant Science (PLNT)

1213
Crop Production. Soils and cropping practices necessary for future crop production systems. Production of modern crops and their management, as well as the adaptation of major agronomic crops to varying edaphic and climatic conditions. Importance of crop production to the producer and the consumer.

2012
Crop Production Laboratory. Lab 2. Prerequisite: 1213. Hands-on experiences with crop plants. Identification of crops in seed, seedling, mature stages; crop morphology, seed quality, grain grading, growth stages of crops.

2041
Career Orientation. Prerequisite: sophomore standing in the Department of Plant and Soil Sciences. Development and improvement of written and oral communicative skills; orientation to research and extension activities related to plant and soil sciences, and academic requirements and procedures. Graded on pass-fail basis.

3111
Weed Control Laboratory. Lab 2. Prerequisites: 1213 and 3112 (or concurrent enrollment). Identification of common weeds, principles and practices of herbicide application, and application equipment, handling and proper use of herbicides.

3112
Principles of Weed Control. Prerequisite: 1213. Weed control principles and practices included in cultural and chemical weed control. Current weed control practices in crops, rangeland and crop situations.

3213*
(N)Pasture Management and Forage Production. Prerequisites: 1213, 2124, and MATH 1213. Pasture systems, livestock management and forage crop production for maximum economical production of introduced forage species.

3554*
(N)Plant Genetics. Lab 2. Prerequisite: BIOL 1304. Basic principles of heredity. Interrelationship between classical genetics and molecular genetics emphasized. Mendelian genetics, cytogenetics, mutations, gene regulation and genetic engineering.

3781
Market Grain Technology. Lab 2. Prerequisite: 1213. Quality characteristics of grain for commercial use; identification of different market classes of grain, quality factors, and admixtures affecting the commercial grade; practice in grading grain using the federal grain standards.

3790
Seed and Plant Identification. 1 credit, maximum 2. Lab 3. Prerequisite: 1213. Identification and classification of agronomically important crop and weed species from seed and from seedling, vegetative, flowering or mature plants.

4080
Professional Internship. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Internship must be at an approved agribusiness unit or other agency serving agronomic agriculture. Requires a final conference with on campus adviser and a written report. Graded on a pass-fail basis.

4113*
Advanced Weed Science. Prerequisites: 3111 and 3112. Integrated approach for weed management. Weed life cycles and biology, weed crop interferences, herbicide families and their characteristics, and finally a systematic and integrated weed management system. Methods of conducting and interpreting research results in appropriate topics.

4123*
Crop Physiology. Prerequisites: 1213 and BOT 3463. Application of basic physiological concepts of growth and cultural management and underlying crop production; environmental and genetic effects on growth of crop plants. Plant ecosystems at the community level relative to optimum yields and quality.

4353*
Plant Breeding. Prerequisite: 3554 or equivalent. Basic principles dealing with the improvement of plants through application of genetic principles.

4470*
Problems and Special Study. 1-3 credits, maximum 12. Lab 1-3. Prerequisite: consent of the instructor. Problems in plant science selected from topics in range and turf, plant breeding and genetics, crop management and physiology, and weed control.

4571
Senior Seminar. Prerequisite: senior standing in agronomy. Career opportunities (talks and field trips); preparation of resumes and interviews. Graded on a pass-fail basis.

4673*
Grain Crops. Lab 2. Prerequisite: 1213. Production, distribution, classification, utilization and improvement of the major cereal crops.

4772*
Oilseed, Pulse and Mucilage Crops. Prerequisite: 1213. Production, utilization and improvement of oilseed, pulse and mucilage crops with special emphasis on peanuts and soybeans.

4783*
Cotton Production. Prerequisite: 1213. Production, utilization and improvement of cotton. Several other agronomic fiber crops briefly discussed.

5000*
Master's Thesis. 1-6 credits, 6 maximum total credits under Plan I, and 2 maximum total credits under Plan II. Prerequisite: consent of adviser. Research planned, conducted and reported in consultation with a major professor.

5020*
Graduate Seminar. 1 credit, maximum per semester 1 credit on M.S. program and 2 credits on a Ph.D. program required. Prerequisite: graduate standing. Philosophy of research, methods of research, or interpretation of research.

5110*
Problems and Special Study. 1-4 credits, maximum 6. Prerequisite: consent of instructor. Supervised study of special problems and topics not covered in other graduate courses.

5112*
Herbicide Fate in the Environment. Prerequisite: 4112. Processes involved in the behavior and fate of herbicides in air, soil, and water. Reaction, movement and dissipation of herbicides in soil.

5230*
Research. 1-4 credits, maximum 4. Prerequisite: consent of a faculty member supervising the research. Supervised independent research on selected topics.

5293*
Plant Response to Water Stress. Prerequisites: BIOC 3653, BOT 3463. Physiological ramifications of water deficit stress on cells, tissues, plants and canopies. Discussion of the soil/plant/atmosphere continuum, and avoidance and tolerance mechanisms leading to drought resistance. Photosynthesis, transpiration, and water-use efficiency and their relationship to biomass accumulation and crop yield.

5403*
Physiological Action of Herbicides. Prerequisite: BOT 3463. The mode of action, uptake and translocation, and metabolism of herbicides in crops and weeds.

5414*
Plant Breeding Theory, Methods and Strategies. Prerequisites: 3554, 4353 and STAT 5013, or consent of instructor. Development and application of statistical and genetic principles to breeding methodology of self- and cross-pollinated crops; emphasis on selection methods pertinent to plant improvement; examination of philosophies and strategies employed in private and public plant breeding programs.

5433*
Biotechnology in Plant Improvement. Prerequisites: 3554, 4353, and BIOL 3014 or consent of instructor. Use of emerging technologies in cell biology and molecular genetics to study and manipulate plants. Emphasis on genetic systems which influence productivity and end-product utilization. The integration of biotechnology into plant breeding programs and issues concerning the release of genetically engineered organisms into the environment.

5443*
Advanced Genetics. Prerequisites: 3554 or equivalent; BIOC 3543 or 3653. Concepts of eukaryotic genetics with emphasis on classical, molecular and quantitative genetics.

5452*
Cytogenetics. Prerequisite: 5443 or concurrent enrollment in BOT 5232. Behavior of chromosomes, cellular organelles and cytoplasm in relation to genetic behavior.

5863*
Management of Agricultural Research Systems. Organization, management and budgeting agricultural research systems with emphasis on developing countries. Analysis of research and training priorities, budgeting, staffing and management of projects.

6000*
Doctoral Thesis. 1-6 credits, maximum 20. Requisite: consent of adviser. Independent research to be conducted and reported with the supervision of a major professor as partial requirement for the Ph.D. degree.

6010*
Advanced Topics and Conference. 1-6 credits, maximum 12. Prerequisite: M.S. degree. Supervised study of advanced topics. A reading and conference course designed to acquaint the advanced student with fields not covered in other courses.

6410*
Topics in Plant Breeding and Genetics. 1-3 credits, maximum 6. Prerequisite: consent of instructor. Selected topics in the statistical and experimental analysis of quantitative traits, evolutionary development of domesticated plants and animals, and techniques used in breeding crop plants.

Political Science (POLS)

1010
Studies in American Government. 1-2 credits, maximum 2. Special study in American government to allow transfer students to fulfill general education requirements as established by Regents' policy.

1113
American Government. Organization, processes and functions of the national government of the United States. Satisfies, with HIST 1103 or 1483 or 1493, the State Regents requirement of six credit hours of American history and American government before graduation.

2023
(S)Public Law and Private Rights. Introduction to the U.S. Constitution, legal reasoning, legal research techniques, and topical issues of U.S. public law.

2033
Introduction to Public Administration. Public administration, including administration, administrative organization, decision-making, governmental public relations, and administrative responsibilities.

2113
(S)Comparative Politics. A comparative study of the political processes and institutions of contemporary societies. Introduction to the concepts and methods of comparative politics.

2993
Honors Tutorial in Political Science. Prerequisites: 1013, honors standing, and invitation by head of department. For the special needs of the sophomore-level honors student majoring in political science who wishes to study individualized topics at an accelerated pace in a tutorial format. After mastering basic principles in an area of interest the student will conduct independent research under close faculty supervision and prepare a report or reports.

3003
(I,S)The Soviet Union: History, Society and Culture. A comprehensive view of the Soviet Union, stressing those issues in the political, economic, technological, geographical and cultural spheres which are most relevant to the current situation. Accessible to beginning undergraduates. Same course as HIST 3003 and RUSS 3003.

3013*
(S)International Relations. Analysis of the major concepts in international relations - power, sovereignty, self-help, cooperation, dependency, and introduction to the dominant theoretical approaches to its study realism, pluralism, marxism and feminism.

3033*
International Law. The nature and scope of public international law, with emphasis on problems related to the recognition of states and governments, jurisdiction over nationals and aliens, and state responsibility in cases of expropriation and revolutionary damage.

3043
Politics of International Trade and Development. Theory and practice of international political economics. The patterns of association between political and market-based processes among nation states. Emphasis on interactions among advanced industrial states, transnational phenomena, and opportunities and pitfalls in north-south relations.

3053
(I,S)Introduction to Central Asian Studies. A comprehensive view of newly-emerged Central Asian states examining the history, politics, economics, geography, and culture of Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan as reflected in their thoughts, religion, literature, and architecture, in the past, and the strategic importance of their natural wealth for the present and future. Same course as HIST 3053 and RUSS 3053.

3100
Political Science Internship. 1-6 credits, maximum 6. Prerequisite: consent of department. Internship education experience in a specific subfield in the discipline of political science.

3123*
(I)Government and Politics of the Former Soviet Bloc. Political processes, governmental institutions and public policies of the successor states of the former USSR and selected Eastern European countries in the post-communism era.

3133*
(I)Politics of Anglo-American Democracies. Political processes and governmental institutions of the United Kingdom, Ireland, Canada, Australia, and New Zealand with comparisons to the United States.

3143*
(I)Politics of Western Europe. Political processes and governmental institutions of continental West European states, with emphasis on France, Germany and Italy.

3193
(I,S)Government and Politics in Latin America. Analysis of processes, institutions and contemporary trends in the politics of selected Latin American countries; political development, democratization, political role of the military, political economy and social movements.

3223*
(I)Politics and Administration in East Asia. Political processes, governmental institutions and administration in China, Japan and Korea.

3233
(I,S)Chinese Politics. Political process, government institutions and experience of development in People's Republic of China.

3243
Foreign Policies in the Former Soviet Bloc. The comparative foreign policies of the territories of the former "Eastern bloc" in the period following the revolutions of 1989-91. The resurgence of nationalism and the effects of defining and pursuing national self-interest on the foreign policies of Eastern European and former Soviet territories.

3313*
(I)Governments and Politics in the Middle East. Analysis of political institutions and processes with emphasis on selected countries of the Middle East; the social and economic basis of politics; nationalism, political development and factors of instability and change.

3353*
(S)Parties and Interest Groups. Political parties and interest groups as institutions; their role in elections and government.

3414*
Political Campaigns. Lab 2. Planning, fundraising, targeting, public opinion, support operations, voter contact, the mass media and candidate activities. Lab work in campaigns or government offices.

3423
(S)Voting and Elections. Electoral systems and their relationship to political development, political socialization, issue emergence, voting patterns, and electoral cycles.

3453*
(S)The Legislative Process. The power and organization of legislatures, as well as the selection and behavior of legislators. Special attention given to the U.S. Congress.

3483*
(S)The American Presidency. The politics of presidential selection, removal and succession; formal and informal powers of the president; relations with Congress, the national judiciary and national executive branch; proposed reforms and the vice-presidency.

3493*
Public Policy. Prerequisite: any one of 1013, 2033, 2113, ECON 1113, 2123, SOC 1113, PHIL 2113. Identification of policy options open to policy makers and examination of measurements and rationales underlying governmental programs.

3513
Public Opinion and Polling. The nature of public opinion. Public opinion polling, the factors influencing opinion formation, and the effects of public opinion on policy and policy makers.

3613*
State and Local Government. Political processes, government and administration of American states, cities and counties; special emphasis on Oklahoma.

3663*

Political Thought. The teachings of the three lasting traditions of Western political thought: classical, Christian and modern.

3953

(S)Minorities in the American Political System. Prerequisite: 1113. Examination of mass and elite level behavior of minorities in the contemporary U.S. political system.

3983*

(S)The Judicial Process: Courts, Judges and Politics. The American judiciary and legal process from a political perspective with particular emphasis on judicial organization and powers, recruitment, fact-finding, decision-making, impact of decisions, the legal profession and relations among courts. Oklahoma judicial organization.

4003*

Political Analysis. Prerequisites: 60 credit hours, or 45 hours with GPA of 3.25, including 2113. Logic and techniques of modern political analysis, including the logic of political analysis, the collection and analysis of political information, and data processing and computer applications to the study of politics.

4013*

American Foreign Policy. Major problems and policies of American foreign relations since World War II and description of foreign formulation and aid administration.

4053*

(I)World Politics. Foreign policies of major powers, areas of tension and sources of international conflict.

4100*

Problems of Government, Politics and Public Policy. 1-6 credits, maximum 6. Prerequisites: 60 credit hours, or 45 hours with GPA of 3.25, including 1013. Special problem areas of government, politics and public policy concentrating on topics not covered in other departmental course offerings.

4113*

International Institutions. The organization, procedures, functions and role of international institutions, with emphasis on the United Nations and related agencies.

4213*

(S)Legal Problems of the International Environment. A case survey of diverse areas in which international law finds applicability; problems of territorial jurisdiction, continental shelves, straits, canals and international river systems, maritime law, national and outer space law and the international law of pollution.

4343*

The United States Constitution. An examination of the theoretical, philosophical, and legal underpinnings of the U.S. Constitution, relying heavily on a study of *The Federalist Papers*.

4353*

(S)Administrative Law. Legal powers, limits, and procedures of administrative agencies with emphasis on federal and state administrative procedure acts.

4363*

(S)Environmental Law and Administration. Statutory law, case law, and administrative practices relating to regulation of the environment including environmental impact statements, pollution, public lands, and preservation law.

4403*

(S)Urban Politics. Problems of governing American metropolitan areas.

4413*

Government Budgeting. The politics, planning and administration of government budgets.

4453*

(S)Public Personnel Administration. Problems, processes and procedures of public personnel administration.

4513*

(S)American Politics. Significant developments and issues in American politics, including American political behavior and political leadership.

4553*

(H)American Political Thought. A survey of the major developments in American political thought from the Colonial period to the present, followed by a topical analysis of important recent theoretical developments in political science.

4593*

(S)Natural Resources and Environmental Policy. Current issues in the law, politics and administration of energy, land, water, mineral and other natural resources policy with particular emphasis on relations to environmental policies and law.

4653*

(H)Contemporary Political Thought. An analysis of 19th and 20th century political ideas, with emphasis on the rise and fall of ideologies along side controversies over relativism, positivism, pragmatism, and resurgent religious faiths.

4663

Politics and Human Reason. An overview of past and present accounts of politics as a rational activity, with attention given to Aristotle, the Federalist, and modern social choice theory.

4693*

(S)Women in Politics. Changing role of women in government and politics. Voting behavior, public opinion, women in government and the women's movement.

4963*

American Constitutional Law: Equal Protection of the Laws. Prerequisite: 2023 or 3983 recommended. Development of principles of constitutional law by the Supreme Court concerning individual and group rights, with particular emphasis on equal protection of the laws concepts in matters of race, gender, wealth, citizenship, legislative reapportionment and voting rights, government employment and affirmative action programs. Legal research techniques.

4973*

American Constitutional Law: The Division of Governmental Powers. Prerequisite: 2023 or 3983 recommended. Development of principles of constitutional law by the Supreme Court concerning federalism and separation of powers with particular emphasis on political and doctrinal developments surrounding judicial review, regulation of commerce, taxing and spending and presidential power. Introduction to legal research methods.

4983*

American Constitutional Law: Due Process of Law. Prerequisite: 2023 or 3983 recommended. Development of principles of constitutional law by the Supreme Court concerning 5th and 14th Amendment due process concepts, with particular emphasis on suspect's rights, search and seizure, free speech and press, religious liberty, property rights and procedural requirements at national and state level. Legal research techniques.

4993

Political Science Honors Thesis. Prerequisites: departmental invitation, senior standing, Honors Program participation. A guided reading and research program ending with an honors thesis under the direction of a faculty member, with second faculty reader and oral examination. Required for graduation with departmental honors in political science.

5000*

Thesis. 1-6 credits, maximum 6.

5013*

Quantitative Methods of Political Analysis. Required of all graduate students. Fundamental methodological issues in the scientific study of politics. Logic of science, principles of research design and computer data manipulation and analysis.

5020*

Research in Public Administration, Public Policy and Politics. 1-6 credits, maximum 6. Individually supervised research.

5030*

Internship in Public Administration and Government. 1-6 credits, maximum 6. Individually supervised internships in administrative and governmental career areas. Paper required.

5040*

Readings in Politics, Public Policy or Public Administration. 1-6 credits, maximum 6. Prerequisite: consent of supervising professor. Readings in the student's major area of study.

5100*

Advanced Problems in Government, Politics, and Public Policy. 3 credits, maximum 6. Special seminar, topics vary from semester to semester.

5113*

Seminar in Public Program Evaluation. Methodology of evaluation research in public programs. Emphasis will be placed on designing and interpreting evaluative studies rather than the mastery of particular mathematical, statistical or computer skills.

5210*

Seminar in International Relations. 3 credits, maximum 6. Research on the dynamics and institutions of international politics.

5213*

Seminar in the International Political Economy. Prerequisite: graduate standing. Research on the mechanics and theories of interaction between economic and political phenomena. Same course as IS 5213.

5313*

Public Management. Introduction to the general principles of management as they are applied in the public sector. Systems theory, organization design, and techniques of supervision.

5320*

Seminar in Public Budgeting and Finance. 3 credit hours, maximum 6. Major processes and practices involved in governmental budgeting in the United States at national, state, and local level.

5323*

Urban Politics and Management. Introduction to the concepts, processes and techniques of managing urban political systems to include problems of leadership, decision making, general management, and group behavior.

5333*

Seminar in Public Personnel Administration. Current practices, problems and issues in public sector personnel administration, including merit system, civil service reform collective bargaining, and equal opportunity and affirmative action.

5343*
Seminar in Fire and Emergency Services Administration. Introduction to policies, procedures and administrative process required to deliver fire and emergency services; detailed examination of the social, political and economic issues that have an impact on service delivery and organizational approaches.

5353*
Seminar in Design, Structure and Processes of Public Organizations. Administration in the public sector, stressing traditional and emerging organization structures. Awareness of administrative processes and environment that include program design and implementation and administrative accountability.

5410*
Seminar in Comparative Politics and Government. 3 credits, maximum 6. Research in the political processes and governmental institutions of foreign countries.

5510*
Seminar in Political Behavior. 1-3 credits, maximum 6. Examination of contemporary theories of political behavior with emphasis on empirical studies.

5613*
Seminar in Public Policy. Public policy process including policy design, implementation and change. Approaches to public policy including design science, rational choice, policy sciences, normative models, and institutionalism.

5620*
Seminar in Natural Resource Policy, Law, and Administration. 3 credits, maximum 9. Analysis of the legal and public policy aspects of environmental regulation, including special emphasis on one of three components: environmental law, administrative law, and national resource law and policy.

5633*
Practical Environmental Compliance. Environmental decision making, reading and understanding environmental statutes and regulations, and effectively dealing with the EPA. Environmental permitting and enforcement, policies and procedures. Review of hazardous waste regulations with emphasis on ground water problems.

5643*
Regulatory Risk Analysis. Risk-based decision making, government's risk analysis paradigm, risk analysis policy, and social aspects of risk assessment. Review of the RCRA corrective action, CERCLA (Superfund) remedial action, and NEPA environmental impact study programs.

5710*
Seminar in American Political Institutions. 1-3 credits, maximum 6. American institutions, including Congress, the presidency, courts, political parties and interest groups.

5810*
Seminar in Women and Politics. 3 credits, maximum 9. Prerequisite: graduate standing. Research on a variety of topics concerning women and politics, including women's movements, women and elections, and public opinion.

Psychology (PSYC)

1113
(S)Introductory Psychology. Principles, theories, vocabulary, and applications of the science of psychology.

2313
Psychology and Human Problems. Prerequisite: 1113. Personality dynamics and their application to personal, cultural and vocational experience.

2593
Psychology of Human Sexuality. Prerequisite: 1113. Survey of behavioral, personality and psychophysiological components of human sexuality, with special emphasis on the delineation of facts from sexual myths.

3013
Psychology of Motivation. Prerequisite: 1113. Review of research and theory in such areas of motivation as hunger, sex, frustration, aggression, achievement, affiliation, and altruism.

3073
(N)Neurobiological Psychology. Prerequisite: 1113. Neural bases of human experience and behavior. Topics include sensation and perception, motivation and emotion, learning and thinking.

3113
(N)Comparative Psychology. Prerequisite: 1113. Comparative study of behavior characteristics of selected samples of the animal kingdom from protozoa to humans.

3173
Cognitive Neuroscience. Prerequisite: 1113, 3073. Multidisciplinary approach to understanding how mental activities of the mind are the result of the processing by the brain.

3214
Quantitative Methods in Psychology. Lab 2. Prerequisites: 1113, MATH 1513, or consent of instructor. Design and evaluation of research in psychology including scales of measurement, basic research designs, and quantitative procedures for data analysis, with emphasis on problems encountered in psychological research.

3223
(S)The Psychology of Work and Industrial Behavior. Prerequisite: 1113. Experimental literature in area of employee motivation. Techniques useful in measurement of employee attitudes and opinions.

3333
(S)Industrial and Organizational Psychology. Prerequisite: 1113. Behavior in task group and organizational context with emphasis on management, leadership and human relations.

3413
(S)Psychology of Social Behaviors. Lab 1. Prerequisites: 1113, 3212. Contemporary theoretical and methodological issues in social psychology with special emphasis on the social psychology of the experiment and experimentation with the social aspects of human behavior.

3443
(S)Abnormal Psychology. Prerequisites: 1113, and 60 credit hours or 45 hours with GPA of 3.25. Review of major approaches to conceptualizing abnormal behavior including dynamic, social and learning-based theories. Discussion and illustration of the major forms of mental illness such as neuroses, psychoses and character disorders.

3513
Psychology of Learning. Prerequisites: 1113, 3213. Behavior change as a function of experience from relatively simple learning processes such as classical and instrumental conditioning to relatively complex processes such as verbal learning and concept identification.

3583
(S)Developmental Psychology. Prerequisites: 1113, and 60 credit hours or 45 hours with GPA of 3.25. The nature of pertinent studies, causes, and theories of human developmental phenomena across the life span.

3643
(S)Applied Community Psychology. Prerequisite: 1113. Psychological principles for prevention, intervention and rehabilitation in the community model.

3713
Psychology of Memory. Prerequisites: 1113 and three additional hours of psychology. Body of contemporary research on human memory and the process of knowledge acquisition with a focus on processes and strategies inside the human mind.

3733*
Religion: Psychological Interpretations. Recommended: 2313 or REL 1103. A study of the development, theory and research of modern psychological perspectives on the religious experience.

3743
(S)Social Psychology. Prerequisites: 60 credit hours or 45 hours with GPA of 3.25. Theories and applications of social cognition, the self, pro-social and aggressive behavior, groups, attitudes and the environment.

3771
Careers and Professionalism in Psychology. Lab 1. Prerequisite: psychology major or minor. Current career options in psychology are reviewed and career skills developed. Skills and information that a professional psychologist needs in a work setting stressed.

3823
(S)Cognitive Psychology. Prerequisites: 1113, 3213 or equivalent. Cognitive processes. Thinking, problem solving, visual imagery, attention and memory search. Both theory and application emphasized.

3914
Experimental Psychology. Lab 4. Prerequisites: 1113, 3213 or equivalent and five additional hours in psychology. Problems, methods and applications of experimental psychology.

3990
Undergraduate Seminar. 1-6 credits, 6 maximum. Prerequisite: consent of instructor. For honors students and other outstanding students. Special topics in psychology.

4023*
Human Evolutionary Psychology. Prerequisite: 1113. The practical and theoretical application of natural selection to human behaviors including sexuality, gender roles, emotion, personality, politics and religion.

4123*
(S)Psychology of Women. Lab 1. Prerequisite: 1113. Sex differences and the development of sex role behavior. Encompasses the psychological dynamics of developmental and social issues for women.

4133*
(S)Psychology of Minorities. Prerequisite: 1113. Review of psychological theories and research pertinent to minority group status.

4143
(S)Psychology and Law. Lab 1. The new psycho-legal literature reviewed with emphasis on the psychological basis of voir dire, eyewitness behavior, courtroom persuasion, jury deliberation, and mental health issues.

4183*

Current Issues in Clinical Psychology. Prerequisites: 1113, 3443 and three additional credit hours in psychology. Problems of the individual in contemporary society and various clinical approaches that have been proposed as possible solutions to these problems.

4213*

(S)Conflict Resolution. Prerequisite: 1113. Interpersonal conflict studied from psychological perspectives. Types and uses of conflict, and conditions for constructive dispute settlement.

4333*

(S)Personality. Prerequisites: 1113, 3443, or consent of instructor. Basic assumptions, research, and clinical issues relating to the major personality theories.

4483*

(S)Psychology of Parent Behavior. Prerequisite: 1113. Historical and contemporary conceptions of parent-child relationship and approaches to communication and discipline; special problems in parenting.

4493*

(S)History of Psychology. Prerequisite: 1113. History of psychology as an aspect of European intellectual history. Psychological thought from early philosophical roots to modern conceptions of psychology as a science.

4813*

Psychological Testing. Prerequisites: 1113 and 3213. Quantitative aspects of measurement and testing, with emphasis on scaling, standardization, reliability and validity. Basic principles of construction and the ethics of use.

4823*

Computer Applications in Psychology. Prerequisites: 3213 and 3914 and consent of instructor. Organizing experimental data for computer-assisted analysis. Emphasis on problems peculiar to within-subject experiments used in psychology. Selection, modification and creation of data analysis programs. A thorough knowledge of statistical techniques is assumed.

4880

Senior Honors Thesis. 1-6 credits, maximum 6. Prerequisites: 3213, departmental invitation, senior standing, Honors Program participation. A guided reading and research program ending with an honors thesis under the direction of a senior faculty member. Required for graduation with departmental honors in psychology.

4883

Current Issues in Psychology. Prerequisites: 3213, 3914. A capstone course examining current issues in psychology, their relationship to current issues in other academic disciplines, and their relevance in an educated society.

4990*

Special Problems. 1-6 credits, maximum 6. Prerequisites: 1113, 3213 and consent of instructor. For honors students and other outstanding students. Experimental or library research.

5000*

Thesis. 1-6 credits, maximum 6. Required of all graduate students majoring in psychology and writing a thesis.

5011*

Proseminar in Biopsychology. Prerequisite: graduate standing in the Department of Psychology. Major theories, methodologies and substantive issues in biopsychology.

5021*

Proseminar in Cognitive Psychology. Prerequisite: graduate standing in the Department of Psychology. Major theories, methodologies and substantive issues in cognitive psychology.

5031*

Proseminar in Developmental Psychology. Prerequisite: graduate standing in the Department of Psychology. Major theories, methodologies and substantive issues in developmental psychology.

5041*

Proseminar in History and Systems of Psychology. Prerequisite: graduate standing in the Department of Psychology. Major theories, methodologies and substantive issues in history and systems of psychology.

5051*

Proseminar in Psychology of Learning. Prerequisite: graduate standing in the Department of Psychology. Major theories, methodologies and substantive issues in learning psychology.

5061*

Proseminar in Psychology of Personality. Prerequisite: graduate standing in the Department of Psychology. Major theories, methodologies and substantive issues in personality psychology.

5071*

Proseminar in Social Psychology. Prerequisite: graduate standing in the Department of Psychology. Major theories, methodologies and substantive issues in social psychology.

5081*

Proseminar in Tests and Measurements. Prerequisite: graduate standing in the Department of Psychology. Major theories, methodologies and substantive issues in tests and measurements.

5091*

Proseminar in Psychology. Prerequisite: graduate standing in the Department of Psychology. Major theories, methodologies and substantive issues of current relevance in the discipline.

5113*

Psychopathology. Prerequisites: 15 credit hours of psychology, graduate standing in the Department of Psychology or consent of instructor. Principles of diagnosis and treatment of major disorders.

5120*

Psychology Workshop. 2-6 credits, 6 maximum. Provides an opportunity to study specific psychological problems, both applied and theoretical.

5153*

Cognitive Assessment. Lab 1. Prerequisites: 3443, 4813; graduate standing in the clinical program of the Department of Psychology, the doctoral school or counseling psychology program or the psychometry program, or consent of instructor. Cognitive and intellectual assessment of children, adolescents and adults. Fundamental skills in administration, scoring, and interpretation of cognitive tests and report writing. Application of cognitive tests to specific clinical problems.

5183*

Seminar In Neuropsychology. Prerequisites: one introductory course in physiological psychology and cognitive psychology; graduate-level neurobiology recommended. Introduction to the experimental and clinical nature of congenital and acquired neuropsychological disorders and their treatments.

5193*

Ethics and Professional Development in Psychology. Prerequisite: graduate standing in the Department of Psychology. Principles of ethics with a focus on the guidelines and standards for psychology. Legal and ethical issues for the practice of clinical psychology.

5303*

Quantitative Methods in Psychology I. Prerequisite: 3213. Statistical methods of evaluating research hypotheses in psychology. Descriptive measures. Student's t, one-way analysis of variance, comparisons among groups and statistical robustness are stressed.

5313*

Quantitative Methods in Psychology II. Prerequisite: 5303. A continuation of 5303. Higher-order analysis of variance designs, correlation and regression techniques, and analysis of covariance, with emphasis on applications to psychological experimentation.

5333*

Systems of Psychotherapy. Prerequisites: 5113; graduate standing in the clinical program of the Department of Psychology or consent of instructor. The major approaches to psychotherapy. Methods for creating multiple impact for behavioral change, including interpersonal, social, community and preventative interventions.

5380*

Research. 1-12 credits, maximum 12. Prerequisite: consent of instructor. Research project on some psychological problem.

5620*

Seminar in Psychology. 1-9 credits, maximum 9. Prerequisite: consent of instructor. Consideration of special topics that are particularly timely or technical in nature.

5660*

Teaching Practicum. 1-2 credits, maximum 2. Prerequisite: consent of instructor. Primarily for graduate students with well-defined new teaching responsibilities.

5823*

Cognitive Processes. Theory and experimental research findings dealing with human thought processes from a developmental and functional standpoint.

6000*

Dissertation. 1-16 credits, maximum 60. Research and report thereon by graduate students in partial fulfillment of requirements for the Doctor of Philosophy degree.

6083*

Principles of Behavior Therapy. Prerequisite: graduate standing in the clinical program of the Department of Psychology or consent of instructor. Principles and procedures of behavior therapy and modification.

6133*

Ethnic and Cultural Diversity in Psychotherapy. Prerequisites: six credit hours of psychology and consent of instructor. Increasing understanding and appreciation of ethnic and cultural diversity in the psychotherapy context. Critical examination of theory and research related to psychotherapy with multicultural populations.

6143*

The Psychology of Substance Abuse. Prerequisite: consent of instructor. Introduction to psychological classification of psychoactive substance (alcohol and drug) use disorders. Theory and research on psychological, biological, and environmental factors that are concomitants of substance abuse. Overview of major research techniques and treatment modalities in this area.

6173*

Child Psychopathology and Treatment. Prerequisites: 3443, 3583 or equivalent; graduate standing in the clinical program of the Department of Psychology, the doctorate school psychology program or the psychometry program, or consent of instructor. Theoretical positions and issues in child psychopathology. Procedures used in the treatment of psychological disorders of children.

6223*

Research Design. Prerequisites: 3914 and doctoral level standing. Experimental techniques in psychophysics, sensory processes, attention and perception, motivation and emotion, and learning and memory.

6233*

Clinical Research Design. Prerequisites: 5303, 5313, and 6223 or consent of instructor. Methodology and research practices in clinical psychology, including experimental design, research practice, data analysis and interpretation, ethics, and dissemination of research findings.

6253*

Seminar in Human Development. Prerequisite: consent of instructor. Behavioral aspects of development from the prenatal period to senescence. Normal development contrasted to exceptional development.

6263*

Personality Theories. Prerequisites: nine credit hours of psychology and consent of instructor. Various theories of personality.

6283*

Factor Analysis. Factor analysis and implications for measurement of mental abilities, personality traits and learning.

6353*

Psychology of Motivation. Prerequisite: 3914. Outline of theory and research in human and animal motivation.

6383*

Community Psychology. Prerequisite: consent of instructor. Positive rehabilitative and preventive objectives; application of psychological knowledge and skills to problems of social change and general improvement of the quality of life. Physical, psychological and social factors viewed through system analysis.

6393*

Psychology of Language. Review of data and theories of speech and language behaviors. Laboratory techniques and experimental designs will also be reviewed to emphasize understanding of psycholinguistic research.

6413*

Systems of Psychology. Two different meanings of "system" considered: the traditional meaning dealing with the various schools of psychology, and the modern meaning in which contemporary social problems are viewed as sets of interrelated variables that produce unforeseen and remote effects.

6433*

Psychology of Information Processing: Development and Aging Aspects. Attention, list processing, pattern recognition and related areas in terms of contemporary facts, theory and application. Special attention paid to development and aging aspects of information processing.

6443*

Behavioral Medicine. Prerequisites: graduate standing in the clinical program of the Department of Psychology; consent of instructor. An advanced graduate course for students in training for a Ph.D. in clinical psychology. General considerations for psychophysiological disorders, general intervention strategies in behavioral medicine including biofeedback, and specific consideration and intervention strategies for specific disorders.

6453*

Pediatric Psychology. Prerequisites: graduate standing in the Department of Psychology; consent of instructor. Overview of the field of pediatric psychology, including historical perspectives, theoretical underpinnings and application to a variety of child health problems. Childhood chronic illness, injury prevention, pain management, and consultation and intervention in medical contexts.

6483*

Neurobiological Psychology. Prerequisites: 3073 and 3914 or consent of instructor. Physiological, neuroanatomical, and neurochemical underpinnings of human behavior. Emphasis on effects of central nervous system dysfunctions on behavioral processes ranging from sensation to concept formation.

6513*

Group Treatment Methods. Prerequisite: graduate standing in the clinical program of the Department of Psychology or the doctorate counseling psychology program, or consent of instructor. Introduction to major techniques of group treatment including Gestalt and transactional analysis as well as more conventional techniques.

6523*

Family Treatment Methods. Prerequisite: graduate standing in the clinical program of the Department of Psychology or the doctorate counseling psychology program. Introduction to techniques and philosophies of family treatment. Includes marital counseling and emphasis on family dynamics.

6553*

Advanced Practice in Marital and Family Treatment. Prerequisites: 6523, concurrent enrollment in counseling or clinical practicum; graduate standing in the clinical program of the Department of Psychology or the doctorate counseling psychology program, or consent of instructor. Advanced methods in assessment, diagnosis and treatment of marital and family problems. Skill development, professionalism, ethics and case management. Dynamics of co-therapy and conjoint treatment. Case consultation format. Same course as ABSE 6553.

6563*

Advanced Social Psychology. Prerequisite: 3743. History, theory and experimentation of dynamic interaction of group membership and individual behavior.

6583*

Developmental Psychobiology. Prerequisites: 3073 or equivalent; consent of instructor. An exploration of the biological aspects of human development, with particular emphasis on the physiological, ethological, and genetic perspectives.

6613*

Experimental Learning Theories. Prerequisite: nine credit hours of psychology. Basic concepts and empirical findings in animal and human learning.

6640*

Clinical Practicum. 1-12 credits, maximum 17. Prerequisite: graduate standing in the clinical program of the Department of Psychology. Practicum experience for graduate students in the clinical psychology program.

6643*

Psychopharmacology. Prerequisites: 3073 or 5054, consent of instructor. A comprehensive course dealing with the various classes of drugs that affect the central nervous system. Primary focus is on clinical research with humans. Covers topics ranging from drug-receptor interactions through substance abuse and behavioral disorders.

6650*

Practicum. 1-16 credits, maximum 16. Prerequisite: graduate standing in the clinical program of the Department of Psychology. For the marriage and family practicum only, doctoral level counseling psychology students may also enroll. Practicum experience for graduate students in the clinical program of the Department of Psychology who are doing supervised practicum in specific clinical areas of specialization.

6673*

Neuropsychological Assessment. Prerequisites: 5054 or 6483, and 5064 and 5153, 6753; graduate standing in the clinical program in the Department of Psychology or consent of instructor. Psychological assessments of the effects of cerebral damage or disease.

6713*

Projective Psychodiagnostic Methods. Prerequisites: 5113, 5153; graduate standing in the clinical program in the Department of Psychology or consent of instructor. Administration and interpretation of projective tests such as the Rorschach, TAT, DAP and their derivatives.

6723*

Child Diagnostic Methods. Prerequisites: 5153, 5173; graduate standing in the clinical program in the Department of Psychology or the doctorate school psychology program, or consent of instructor. Administration and interpretation of diagnostic instruments used specifically with children.

6753*

Assessment of Personality. Prerequisites: graduate standing in the clinical or counseling program or consent of instructor. Personality assessment and training in the practice of clinical assessment. Trait theory and assessment, techniques of test construction, contemporary assessment techniques including the MMPI-2, test result interpretation and communication, and behavioral methods of assessment.

6883*

Seminar in Psychological Testing. Prerequisites: 5153, 6713, 6753, and graduate standing in the clinical program of the Department of Psychology, or consent of the instructor. The administration, interpretation, and integration of projective and objective personality test data and intelligence test data with adult psychiatric patients.

6933*

Communication and Persuasion. Seminar concerning the communication process at all levels, from face-to-face encounters to the mass media, with emphasis on the social-psychological factors that influence persuasive attempts.

Rangeland Ecology and Management (RLEM)

3913*

(N)Principles of Rangeland Management. Prerequisites: 1213 or BIOL 1304, and SOIL 2124. Characteristics of rangelands; rangeland regions of the U.S.; rangeland plant response to the environment; the rangeland ecosystems; ecological basis of rangeland management; manipulating rangeland vegetation; grazing management; managing rangelands for wildlife and other values. Field trips required.

4934*
Landscapes and Community Ecology of Rangelands. Lab 2. Prerequisite: 3913. Ecological relationships between climate, soils, plants, and animals of rangeland ecosystems. Rangeland classification, succession, biodiversity, productivity, and sustainability at community and landscape levels. Two Saturday field trips could be required, as part of the lab, at an additional cost to student.

4954*
Rangeland Vegetation Management. Lab 3. Prerequisite: 3913. Methods of managing prairies, shrubland and forest vegetation for livestock and wildlife. Integrated application of prescribed fire, grazing management, herbicides, and mechanical treatments. Field trips and reports in laboratory.

4961
Rangeland Inventory and Monitoring. Lab 3. Prerequisite: 3913. Range resource survey, inventory and monitoring. Measurement of vegetation including production, cover, frequency and density. Setting and adjusting stocking rates. Sampling and statistical confidence. Field trips required.

4973
Rangeland Resources Planning. Lab 3. Prerequisites: 4954, ANSI 3612. Inventory of ranch resources, survey and evaluation of ranch practices, and economic analysis. Development of a comprehensive ranch management plan. Managing rangeland and ranch resources in a social context. Written and oral reports. Field trips required. Same course as ANSI 4973.

4990*
Special Topics in Range Management. 1-3 credits, maximum 3. Prerequisite: 15 hours of range management. Advanced topics and new developments in range management.

5000*
Master's Thesis. 1-6 credits, 6 maximum total credits under Plan I, and 2 maximum total credits under Plan II. Prerequisite: consent of adviser. Research planned, conducted and reported in consultation with a major professor.

5020*
Graduate Seminar. 1 credit, maximum per semester 1 credit on M.S. program and 2 credits on a Ph.D. program required. Prerequisite: graduate standing. Philosophy of research, methods of research, or interpretation of research.

5230*
Research. 1-4 credits, maximum 8. Prerequisite: consent of a faculty member supervising the research. Supervised independent research in selected topics.

5760*
Special Topics in Rangeland Science. 2-4 credits, maximum 4. Prerequisite: consent of instructor. Selected topics in rangeland research methods or other rangeland topics.

5954*
Rangeland Vegetation Management. Lab 3. Prerequisite: 3913. Methods of managing prairie, shrubland and forest vegetation for livestock and wildlife. Integrated application of prescribed fire, grazing management, herbicides and mechanical treatments. Field trips and reports in laboratory. No credit for students with credit in 4954.

5973*
Rangeland Resources Planning. Lab 3. Prerequisites: 4954, ANSI 3612. Detailed analysis of case studies of rangeland and ranch management problems. Resource inventory, evaluation of ranch operations, and economic analysis. Integrated planning for representative ranch firms. Written and oral reports. Field trips required. No credit for students with credit in 4973.

6000*
Doctoral Thesis. 1-6 credits, maximum 20. Requisite: consent of adviser. Independent research to be conducted and reported with the supervision of a major professor as partial requirement for the Ph.D. degree.

6010*
Advanced Topics and Conference. 1-6 credits, maximum 6. Prerequisite: M.S. degree. Supervised study of advanced topics. A reading and conference course designed to acquaint the advanced student with fields not covered in other courses.

Religious Studies (REL)

1103
(H)The Religions of Mankind. Major world religions such as Hinduism, Buddhism, Judaism, Christianity and Islam with a view to understanding the general nature of religion and its various dimensions.

3013
(H)The Old Testament and Its Study. A study of the Hebrew Scriptures with emphasis upon content, historical background, the history of its study and the critical analysis and theological interpretation of selected passages.

3023
(H)The New Testament and Its Study. A study of the writings of the New Testament in their historical contexts and the methods used in their study. Emphasis interpreting selected New Testament passages.

3123
(H)The Old Testament Prophets. Recommended: 3013. An interpretive study of the Hebrew prophets in historical perspective. Intensive study given to the more significant prophets.

3223
(H)The Teachings of Jesus in Historical Context. Recommended: 3023. The teachings of Jesus in light of modern historical research. Emphasis on interpreting selected passages from the Gospels.

3243
(H)Paul and the Early Church. Recommended: 3023. The letters of Paul in their historical context with special emphasis on his theology and ethics.

3573
(H)The Religions of Native Americans. Recommended: 1103. Selected tribal worldviews, belief systems and religious ceremonies, as depicted in oral traditions, songs and literature. Emphasis on Northern and Southern Plains Indians.

3613
(H,I)African Cultures and Religion. Key ideas, values and achievements in African culture and tradition as found in literature, art and music viewed in historical and religious perspective.

3713
(H)Religion, Culture and Society. Recommended: 1103, ANTH 2353, SOC 1113. An introduction to the scientific study of religion. Religious activity in both tribal and technological societies studied in the light of contemporary interpretations of culture and of social behavior. Same course as SOC 3713.

4050*
Studies in Religion. 2-6 credits, maximum 6. Independent studies, seminars and courses on selected topics in religion.

4113*
(H,I)The World of Islam: Cultural Perspectives. The cultural heritage of the world of Islam explored through its expression in the art, architecture and literature of the Muslim peoples.

4330*
Seminar in Biblical Studies. 3 credits, maximum 9. Prerequisites: two courses in Biblical studies. Selected topics in the academic study of the Bible.

Research, Evaluation, Measurement and Statistics (REMS)

4052
Measurement and Evaluation in the School. Prerequisite: full admission to Teacher Education. Construction and selection of classroom tests. Contrasts between criterion-referenced and norm-referenced measurement strategies. Grading techniques, rudiments of standardized test selection and score interpretation and the basic statistics used to summarize and analyze test results.

5000*
Master's Thesis. 1-6 credits, maximum 6. Prerequisite: consent of instructor.

5013*
Research Design and Methodology. Required of all graduate students in education. An introduction to the concepts of research design, methodology, sampling techniques, internal and external validity and the scientific method in educational problem solving. Critical analysis of educational research studies and the writing of proposals. No credit for student with credit in 5015.

5320*
Seminar in Research, Evaluation, Measurement and Statistics. 3-6 credits, maximum 6. Prerequisite: consent of instructor. In-depth exploration of contemporary problems of research, evaluation, measurement and statistics.

5373*
Educational Measurements. Appropriate applications of tests in the schools. Development of teacher-made tests, selection of standardized tests, interpretation of test results, understanding of the statistics reported in testing literature, uses of test results and recent developments in educational measurement.

5953*
Elementary Statistical Methods in Education. Elementary statistical methods needed by consumers of educational research. Descriptive and inferential statistics. No credit for students with credit in 5015.

6000*
Doctoral Dissertation. 1-25 credits, maximum 25. Prerequisite: consent of advisory committee chairperson. Required of all candidates for doctorate in applied behavioral studies. Credit given upon completion and acceptance of dissertation.

6003*
Analyses of Variance. Prerequisite: admission to a doctoral level program or consent of instructor. A thorough examination of analysis of variance procedures as they relate to principles of experimental design in education and behavioral sciences.

6013*
Multiple Regression Analysis in Behavioral Studies. Prerequisite: 6003. Applications of multiple regression as a general data analysis strategy for experimental and non-experimental research in behavioral sciences.

6023*

Psychometric Theory. Prerequisites: admission to doctoral program, completion of 6013, or consent of instructor. Theoretical basis for applying psychometric concepts to educational and psychological measurement. The Classical True Score model and applications to instrument development and design of studies for evaluating instrument quality.

6373*

Program Evaluation. Prerequisites: admission to doctoral level program or consent of instructor and completion of 5013. Contexts, purposes and techniques of evaluating educational programs. Evaluation design, information collection, analysis, reporting and uses of results for programs ranging from individual lessons to nation-wide multi-year projects. Special emphasis on evaluation requirements of federally funded programs.

6663*

Applied Multivariate Research in Behavioral Studies. Prerequisites: 6013 and admission to doctoral program. An overview and analysis of multivariate procedures commonly applied to educational and behavioral research. Emphasis on conceptual design and application of these procedures.

6850*

Directed Reading. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Directed reading for students with advanced graduate standing.

Russian (RUSS)

1115

Elementary Russian I. Lab 1 1/2. Understanding, speaking, reading and writing. Method of instruction is audio-lingual.

1225

Elementary Russian II. Lab 1 1/2. Prerequisite: 1115 or equivalent. Continuation of 1115.

2115

(I)Intermediate Russian I. Prerequisite: 1225 or equivalent. Continuation of 1225. Russian grammar, composition and conversation.

2225

(I)Intermediate Russian II. Prerequisite: 2115 or equivalent. Continuation of 2115.

3003

(I,S)The Soviet Union: History, Society and Culture. A comprehensive view of the Soviet Union, stressing those issues in the political, economic, technological, geographical and cultural situation. Accessible to beginning undergraduates. Same course as HIST 3003 and POLS 3003.

3053

(I,S)Introduction to Central Asian Studies. A comprehensive view of newly-emerged Central Asian states examining the history, politics, economics, geography, and culture of Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan as reflected in their thoughts, religion, literature, and architecture, in the past, and the strategic importance of their natural wealth for the present and future. Same course as HIST 3053 and POLS 3053.

3113

(I)Russian Conversation. Prerequisite: 2225. Development of conversational skills in formal and informal Russian language; study of oral communication and idioms; vocabulary enhancement.

3123

(H,I)Russian Culture and Civilization. Art, literature, music, architecture, and contemporary life of Russia. Course taught in English.

3223

(I)Russian Composition. Prerequisite: 2225. The development of all forms of written communication in Russian through practice in writing compositions, letters, reports and other documents in Russian.

4113

(H,I)Russian Literature in Translation I. Russian literature from its beginning to mid-19th century: Pushkin, Lermontov, Goncharov, Gogol, Turgenyev and Dostoevsky. Readings in English. Classes conducted in English.

4123

(H,I)Russian Literature in Translation II. Russian and Soviet literature from mid-19th century to present: Tolstoy, Chekhov, Gorky, Zamiatin, Sholokhov, Pasternak, Bunin, Solzhenitsyn, Arzhak (Daniel), Tertz (Sinyavsky), Voznesensky and Evtushenko. Readings in English. Classes conducted in English.

4253

(I)Reading Russian Literary Texts. Prerequisite: 3113 or 3223. A survey of original literary texts by major Russian authors of the 19th and 20th centuries. Conducted in Russian.

Social Foundations (SCFD)

3223

Role of the Teacher in American Schools. Prerequisites: junior standing and filed Declaration of Intention to Pursue a Program in Teacher Education. One half-day per semester on-site lab required. A review of the school as an institution and an introduction to the role of the teacher as a professional in the schools. Socialization of the student socio-economic class and education, the nature of multicultural education, school experiences of women and ethnic groups, school governance, professional organizations, ethics, and the nature of teaching.

4123

(S)History of Education. The development of major educational ideas and programs with emphasis on the growth of public education in the United States from the Colonial period to the present.

4913

(I)International Problems and the Role of the School. Prerequisite: junior or senior standing. Extends the student's intercultural awareness by focusing on international problems and expanding their meaning to include the school and its relationship to existing international concerns in other types of societies. Consideration of such international problems as natural resources, environment, food supply, urbanization and conflict resolution.

5000*

Master's Report or Thesis. 1-6 credits, maximum 6. Students studying for a master's degree enroll in this course for a total of 2 credit hours if they write a report, or 6 hours if they write a thesis.

5023*

Comparative Education. A systematic investigation of educational institutions in various nations for the purpose of an enlarged, critical view of American education.

5720*

Education Workshop. 1-8 credits, maximum 8. For teachers, principals, superintendents, and supervisors who have definite problems in instruction or administration. Students must register for the full number of credit hours for which the workshop is scheduled for a particular term.

5823*

Institutional History of Education. History of elementary, secondary, and higher education in Western Civilization with emphasis upon the development of the American educational institution.

5850*

Directed Study. 1-3 credits, maximum 3. Directed study for master's level students.

5883*

Educational Sociology. The manner in which social forces and institutions influence education and the educational system in the United States.

6000*

Doctoral Dissertation. 1-15 credits, maximum 15. Required of all candidates for the Doctor of Education degree. Credit is given upon completion of the dissertation.

6850*

Directed Reading. 1-6 credits, maximum 6. Directed reading for students with advanced graduate standing to enhance students' understanding in areas where they wish additional knowledge.

6880*

Internship in Education. 1-8 credits, maximum 8. Directed off campus experiences designed to relate ideas and concepts to problems encountered in the management of the school program.

6910*

Practicum. 1-6 credits, maximum 6. The student carries out an acceptable research problem (practicum) in a local school situation. Credit given upon completion of the written report.

Sociology (SOC)

1113

(S)Introductory Sociology. Coming to terms with the requirements for living in a complex social world. Sociological concepts used to assist students in understanding the social influences in day-to-day life.

2113

Principles of Sociology. Prerequisites: 15 semester credit hours. The science of human society. Emphasis on basic concepts and research studies. Required of all sociology majors and minors.

2123

Social Problems. Exploration in selected social issues in contemporary American society, such as deviance, poverty, sexism, racism and ageism.

2133

(S)American Racial and Ethnic Relations. The historical and sociological dimensions of race and ethnicity in American life, and understanding of the controversies and conflicts that race and ethnicity have generated in the American experience.

3113

Theoretical Thinking in Sociology. Prerequisites: 6 credit hours of sociology, including 1113. Sociological theory in three broad areas: the emergence of social theory, the major schools of social theory and the relevance of theory to sociological research.

3223

(S)Social Psychology. Social basis of personality development and behavior, including symbolic environment, self and group, motivation, attitudes and opinions, and social roles.

3323*

(S)Collective Behavior and Social Movements. Analyzes panics, crazes, riots and social movements emphasizing institutional and social psychological origins and consequences.

3413

Rural Sociology. Life in rural America and nonwestern societies examined with special emphasis on social relations, population movement, social change and problems of rural society.

3423

(S)Urban Sociology. Urbanization as a worldwide process. The demography and ecology of cities and metropolitan regions. Urban planning and future development.

3523*

(S)Juvenile Delinquency. Juvenile delinquency behavior in relation to family, school, church, peers, community and institutional structures. The extent of delinquent expressions, varieties of delinquency, comparative international perspectives and new trends of females in delinquency and gang behavior.

3623

Clinical Sociology. Prerequisites: nine hours of sociology including introductory sociology and two other sociology courses. Planned positive change through interventions of services, programs and policies. An examination of the field, practice concerns, clinical sociology in specific settings and with special populations.

3713

(H)Religion, Culture and Society. Recommended: 1113, ANTH 2353, REL 1103. An introduction to the scientific study of religion. Religious activity in both tribal and technological societies studied in the light of contemporary interpretations of culture and of social behavior. Same course as REL 3713.

3723*

(S)American Marriage, Family, and Male-Female Relationships. The sociological relationship between marriage and family and other institutional structures and systems, especially work and the economy. Male and female roles and relationships in mate selection, sexuality, marriage, divorce, and other intimate situations.

3823*

(S)Sociology of Death and Dying. Death and dying as social phenomena including cross-cultural perspective. An understanding of occupations and professions dealing with terminal patients in hospitals and with funerals. Students required to engage in original research from community sources.

3952

Applied Sociology. Prerequisite: sociology majors or consent of instructor or adviser. Application of sociological theory and methods to various job situations.

3993

(S)Sociology of Aging. Sociological problems of aging, including the analysis of the behavior of the aged within the framework of social institutions.

4003

Senior Thesis in Sociology. Prerequisites: 3113, 4013, 4133, STAT 4013, and consent of instructor. Conduct a research project (review literature, prepare proposal, gather and analyze data and report results) on a sociologically significant topic or issue.

4013*

Qualitative and Applied Social Research Methods. Prerequisites: 3113 and STAT 4013. Conducting, analyzing and reporting qualitative social research. Research design, data collection, analysis and write-up of evaluation research and social impact assessments. Individual research project included.

4023*

(S)Juvenile Corrections and Treatment Strategies. Prerequisite: 3523 or 4333. The juvenile justice system, emphasizing the juvenile court, diversion and youth service bureaus as well as the more traditional training schools and foster homes. Experimental treatment strategies with institutionalized delinquents.

4043

(S)Gender and Work. Prerequisite: one upper-division course. Consideration of unpaid, paid and volunteer work and gender differences. Linkages between economy, work and family with examples from United States and less developed countries.

4133*

Social Research Methods. Prerequisites: 3113 and STAT 4013. Applying sociological theory to designing quantitative and qualitative research; methods of data collection, processing and analysis; basic skills in computer analysis of social data. Research project included.

4213*

(S)Sexuality in American Society. Prerequisite: junior standing or consent of instructor. Sociological aspects of sexual behavior, attitudes and belief systems in society. Similarities and differences in males and females in all types of sexuality.

4233

(S)Sociology of Entrepreneurship: Race and Ethnicity Issues. Prerequisite: upper-division standing. Exploration of nature, philosophy and the role of entrepreneurship in societies. How entrepreneurship is organized around race, ethnicity, gender and migrant groups.

4323*

Sociology of Agriculture. Overview of U.S. agriculture focusing on changing markets and technologies and their impact on farm families and other social institutions and relationships. Emphasis on agricultural problems, policies and alternatives to traditional farming practices.

4333*

(S)Criminology. Summary of sociological and psychological research pertaining to crime causation and crime trends. Modern trends in control and treatment.

4343*

(S)Medical Sociology. Health and illness as social and societal phenomena including the doctor-patient relationship, distribution and etiology of disease, the social meaning of health and illness, basic epidemiology, and the social processes involved in medical practice. Cross-cultural comparisons and the sociology of the health professions.

4383*

(S)Social Stratification. Systems of class and caste, with special attention to the United States. Status, occupation, income and other elements in stratification.

4423*

(S)Community Organization and Development. Structure, change and development of the local community in rapidly changing society. Emphasis on community organization and planned change.

4433*

(S)Environmental Sociology. Critical assessment of the social causes and consequences of problems with resource scarcity and environmental degradation. Environmental problems viewed as social problems viewed as social problems, requiring an understanding of the structural conditions producing environmental problems and inhibiting resolutions.

4443*

(S)Sociology of Law and Legal Institutions. Prerequisite: 3523 or 4333. Criminal and civil law as mechanisms of social control; conflict and consensus models of legislation; legality doctrine and its application by police, prosecution and defense, courts and administrative agencies of control. Decision processes in the criminal justice system, personnel and case loads and related areas. Native American law; federal policy and trust status, criminal and civil law, tribal jurisdiction, tribal courts.

4513*

(S)Demography of Ethnic and Immigrant Population in Global Perspective. The population characteristics of immigrant, ethnic and racial groups along major demographic dimensions. Cross-national comparisons between minority groups on demographic and cultural factors.

4533*

(I,S)World Population Problems. Fertility, mortality and migration, and other factors related to population size, density, and composition; the population explosion, worldwide famine, birth control, and other serious social issues.

4623*

(I,S)International Industry and Work. Prerequisite: six hours of social sciences. A focus on work, industry and globalization within a sociocultural context. The impact of country cultures upon industry and work and adjustment to cross-cultural problem solving and development of global work teams.

4643*

(S)Women in Society. A sociological exploration of the image and status of women in society, including family, work and politics. Socialization, education and the women's movement. Introduction to feminist theory.

4850

Internship in Sociology. 1-4 credits, maximum 4. Prerequisites: 3952, completion of 12 hours of sociology, or consent of internship coordinator. Field experience in a variety of work settings.

4923*

The Field of Corrections. An overview of correctional work focusing on probation, parole and institutions. A survey of contemporary alternatives to conventional imprisonment.

4990*

Exploration of Sociological Issues. 1-3 credits, maximum 6. Prerequisite: consent of instructor. Examines sociologically significant topics and issues.

4993

Senior Honors Thesis. Prerequisites: departmental invitation, senior standing, Honors Program participation. A guided reading and research program ending with an honors thesis under the direction of a senior faculty member, with second faculty reader and oral examination. Required for graduation with departmental honors in sociology.

5000*

Thesis in Sociology. 1-6 credits, maximum 6.

5043*
Advanced Topics in Gender and Work. Prerequisite: graduate standing. In-depth examination of sociological theories of paid, unpaid and volunteer work with special emphasis on gender differences. Case studies including empirical research from the United States and less developed countries.

5113*
Classical Sociological Theory. Prerequisite: 3113 or equivalent. Major trends in sociological thought. The emergence of sociological theory in Europe and America.

5123*
Contemporary Sociological Theory. Prerequisite: 3113 or equivalent. Critical examination of significant theoretical formulations, 1920 to the present. Relation between theoretical development and current research emphasis.

5213*
Techniques of Population Analysis. Examination of primary sources of demographic data and techniques employed in collection and analysis of statistics. The use interpretation and application of population analysis techniques.

5243*
Social Research Design and Analysis. Techniques in design, data collection, analysis and interpretation of data for qualitative and quantitative sociological research.

5263*
Quantitative Methods of Social Research. Prerequisites: 4133, STAT 4013 or equivalent. Advanced techniques in sociological research and data analysis focusing on the formulation of substantive research questions and application of a variety of research procedures to answer such questions.

5273*
Qualitative Research Methods. Examination of ethnographic studies and implementation issues connected with qualitative research. Research project required.

5323*
Seminar on Collective Behavior and Social Movements. Prerequisite: graduate standing. Examination of major theoretical and empirical approaches employed in the study of social movements. Exploration of problems on the nature and current theories of social movements including individual versus group approaches. Grassroots resistance, community organizing, political conflicts, and revolutions.

5353*
Rural Social Systems. Prerequisite: graduate standing or consent of instructor. Rural social systems in contemporary societies examined historically, theoretically and empirically, focusing on social relations and institutions within rural societies and their relationship to urban social structures.

5463*
Seminar in Environmental Sociology. Critical overview of contemporary developments in environmental sociology. Environment concern, disasters, health issues, risk assessment and environmental conflict.

5533*
Correctional Institutions and Residential Treatment. Prerequisite: 4923 or equivalent. Nature and effects of custodial institutions on the inmates. Prison community, its structure, social processes and dynamics. Resocialization of prison inmates in new vocational and social skills.

5553*
Seminar in Medical Sociology. Advanced study in the sociology of medicine, including the doctor-patient relationship, the social meanings of health and illness, epidemiology, health care delivery, and the medicalization of American society. Analysis of the sociology of organic illness and mental illness using readings from both classical and contemporary sources.

5563*
Community Treatment of Offenders. Prerequisite: 4923 or equivalent. Treating offenders in the community without incarcerating them in prisons. Probation, parole and other rehabilitative services. Impact of new community treatment centers, group homes, probation hotels and halfway houses. Effectiveness of the individual, group and family therapies on the offenders.

5753*
Complex Organizations. Prerequisite: six hours of undergraduate sociology or equivalent. Nature and types of complex organizations: organizational structure; organizations and society; organizational changes.

5883*
Sociology of Education. Manner in which social forces and institutions influence education and the educational system in the United States.

5980*
Internship. 1-6 credits, maximum 6. Supervised field placement.

5990*
Advanced Problems and Issues in Sociology. 1-9 credits, maximum 9. Prerequisite: consent of instructor. Group enrollment or individual research enrollment as needed. Graduate level analysis of special problems and issues in sociology not covered in other department offerings.

6000*
Dissertation. 1-12 credits, maximum 18.

6213*
The Sociology of Knowledge. Prerequisite: six hours of undergraduate sociology or equivalent. Relationship between human thought and the social context within which it arises.

6233*
Sociology of Entrepreneurship: Economic Development Issues. Prerequisite: graduate standing. Exploration of the nature, philosophy and role of entrepreneurship in societies. Entrepreneurship organized around race, ethnicity, gender and immigrant groups.

6260*
Seminar in Current Research Literature. 2-3 credits, maximum 6. Methodological analysis of advanced research in major areas of sociology.

6390*
Seminar in the Family. 2-3 credits, maximum 6. Intensive analysis of published research in the sociology of the family.

6420*
Seminar in Urban Sociology. 2-6 credits, maximum 6. A theoretical and applied approach to cross-cultural urban studies. Examines different methodologies for urban community analysis.

6450*
Seminar in Industrial Sociology. 2-3 credits, maximum 6. Intensive analysis of selected problems in industrial sociology.

6460*
Advanced Studies in Environmental Sociology. 1-6 credits, maximum 6. Prerequisite: 5463 or consent of instructor. Intensive examination of selected topics in environmental sociology.

6550*
Seminar in Social Organization. 2-3 credits, maximum 6. Research and literature relating to macro-social analysis.

6653*
Seminar in Social Psychology. Development and critical analysis of theory and research in social psychology.

6750*
Seminar in Deviance and Criminology. 2-3 credits, maximum 6. Current research and theory in criminology, penology and deviance in modern society.

6853*
Seminar in Symbolic Interactionism. Symbolic interactionism, a major contemporary school of thought in sociology and psychology, emerging from philosophical pragmatism with special emphasis on the thoughts of George H. Mead and its derivatives including dramaturgy, existential social psychology and phenomenological.

6950*
Seminar in Social Gerontology. 2-3 credits, maximum 6. A theoretical and practical examination of the sociological implications, both individual and societal, of an aging population.

Soil Science (SOIL)

2124
(N)Fundamentals of Soil Science. Lab 2. Prerequisite: CHEM 1215. Principal physical, chemical and biological properties of the soil related to plant growth; soil testing and fertilizer usage; formation and classification of soils, rural and urban land use.

3433*
(N)Soil Genesis, Morphology, and Classification. Lab 3. Prerequisite: 2124. Basic principles dealing with how and why soils differ, their descriptions, geographic distributions and modern classification of soils. Soil genesis and classification a prerequisite to sound land use planning and land management.

3893*
(N) Soil Chemistry and Environmental Quality. Prerequisite: 2124. Soil chemical processes that affect plant nutrition, nutrient cycling, and fate of environmental pollutants. Chemistry of soil surfaces and soil solution, of important soil processes, and of agronomic and environmental topics such as water quality, soil acidity, pesticide residues, environmental chemistry and risk assessment, soil remediation and contaminant bioavailability, land application of municipal and industrial wastes, long-term reactions and environmental fate.

4210*
Describing and Interpreting Soils. 1 credit, maximum 3. Lab 3. Prerequisite: 2124. Describe and classify soil properties in the field and interpret for suitable agriculture, urban, and other land uses.

4213*
Precision Agriculture. Lab 2. Prerequisites: MATH 1513, senior standing. Introduction to the concepts of precision agriculture including analysis of spatial variability, relationships of fertility and crop response, geographical information systems, variable rate technology, optical sensing, global positioning systems, and yield monitoring. Case studies included for detailed analyses. Same course as BAE 4213.

4234*
Soil Nutrient Management. Lab 2. Prerequisite: 2124. Soil fertility and use of fertilizer materials for conservation, maintenance, and improvement of soil productivity and to minimize environmental concerns.

4363*

Environmental Soil Science. Prerequisites: BIOL 1304 and CHEM 1215. Presentations of soil processes and interpretation for natural resource management; land reclamation; identification of wetlands; oil and soil damages; impact of fertilizer, pesticide and other agricultural chemicals on soil and water quality; water resources; long-term soil erosion and landscape formation; transformations of manure, sewage sludge and other organic by-products.

4463*

Soil and Water Conservation. Lab 2. Prerequisite: 2124. Conservation and management of soils for the prevention of losses by wind and water erosion.

4470*

Problems and Special Study. 1-3 credits, maximum 12. Lab 1-3. Prerequisite: consent of the instructor. Problems in soil science selected from topics in soil chemistry and fertility, soil physics, soil biology, soil conservation and soil morphology.

4483*

Soil Biology. Prerequisite: 2124. Soil ecology of microorganisms, biological transformations, humus complex, pesticide decomposition, plant nutrient cycles, microflora of rhizosphere.

4563*

Dynamics of Wetland, Forest and Rangeland Soils. Prerequisite: 2124. Dynamics of soils that receive minimal or no production input. Identification of wetland soils and the biogeochemical reactions occurring in wetland soil environments. Nutrient cycling, physical, chemical and biological properties of forest and rangeland soil systems.

4683*

(N)Physical Properties of Soils. Prerequisites: 2124 and PHYS 1114. Soil physical properties and processes, and their influence on plant growth.

4863*

Soil Remediation and Waste Management. Prerequisite: 2124. Soil productivity as affected by contamination and land application of animal waste. Characterization of contaminated sites and remediation methodology for inorganic and organic constituents focusing on soil biological activity. Characterization, nutrient cycling and best management practices for animal waste products.

5000*

Master's Thesis. 1-6 credits, 6 maximum total credits under Plan I, and 2 maximum total credits under Plan II. Prerequisite: consent of adviser. Research planned, conducted and reported in consultation with a major professor.

5020*

Graduate Seminar. 1 credit, maximum per semester 1 credit on M.S. program and 2 credits on a Ph.D. program required. Prerequisite: graduate standing. Philosophy of research, methods of research, or interpretation of research.

5110*

Problems and Special Study. 1-4 credits, maximum 6. Prerequisite: consent of instructor. Supervised study of special problems and topics not covered in other graduate courses.

5193*

Spatial and Non-spatial Data Base Management of Natural Resources. Prerequisites: one course in statistics and programming experience. Methods of acquiring, managing and analyzing spatial data using geographic information systems. Management of non-spatial data using relational database managers. Development of applications using these tools for evaluating and managing natural resources.

5224*

Soil Chemical Processes and Impact on Environmental Quality. Lab 3. Prerequisites: 3893 and CHEM 2113 or CHEM 3324 or equivalent. A comprehensive study of chemical processes in soil systems that impact biogeochemical cycles and environmental quality. Modern theory of soil solution thermodynamics, kinetics of soil chemical processes, soil colloid chemistry, and soil geochemistry. Environmental soil science applications including environmental fate of toxic substances and remediation of contaminated soil. Laboratory component provides hands-on experience with techniques used for soil chemical investigations and with chemical speciation computer models.

5230*

Research. 1-4 credits, maximum 4. Prerequisite: consent of a faculty member supervising the research. Supervised independent research on selected topics.

5353*

Advanced Soil Genesis and Classification. Lab 2. Prerequisite: 3433. Processes and factors of soil formation. Comparison of world soil morphology and classification systems.

5583*

Soil Physics. Prerequisites: MATH 2265 or 2365, PHYS 1214. Fluid flow through saturated and unsaturated soils; temperature change and heat flow in soil; soil strength and deformation as it applies to plant response.

5613*

Laboratory Methods of Soil, Plant and Environmental Analysis. Lab 3. Prerequisites: CHEM 2122, 3324 or equivalent. Theory, principles and techniques of laboratory methods used for chemical analysis of soil, plant material and environmental samples. Modern analytical methods used for soil testing of plant available nutrients, determination of environmental contaminants, and chemical characterization of soil. Operational theory of applicable instruments including atomic spectroscopic (ICP, AA, UV-VIS, XRF), chromatographic (GC, GC-MS, HPLC, IC), and potentiometric methods. Laboratory component hands-on experience of chemical methods.

5813*

Soil-Plant Nutrient Cycling and Environmental Quality. Prerequisite: 4234 or equivalent. Theory and application of soil plant relationships in production and nonproduction environments. Nutrient cycling, mass balance, soil nutrient supply and plant response. Methods to reduce the impact of nutrients on environmental quality, soil-plant buffering and response models.

5990*

Soil Physical Analyses. 1-2 credits, maximum 2. Lab 1 or 2. Prerequisite: 4683. Principles and techniques.

6000*

Doctoral Thesis. 1-6 credits, maximum 20. Requisite: consent of adviser. Independent research to be conducted and reported with the supervision of a major professor as partial requirement for the Ph.D. degree.

6010*

Advanced Topics and Conference. 1-6 credits, maximum 12. Prerequisite: M.S. degree. Supervised study of advanced topics. A reading and conference course designed to acquaint the advanced student with fields not covered in other courses.

Spanish (SPAN)

1115

Elementary Spanish I. Lab 1 1/2. Pronunciation, conversation, grammar and reading.

1225

Elementary Spanish II. Lab 1 1/2. Prerequisite: 1115, or equivalent.

2112

(I)Intermediate Spanish I. Lab 1. Prerequisite: 1225 or equivalent. A continuation of SPAN 1225. Must be taken concurrently with SPAN 2113.

2113

(I)Intermediate Spanish II. Lab 1. Prerequisite: 1225 or equivalent. A continuation of SPAN 1225. Must be taken concurrently with SPAN 2112.

2222

(I)Intermediate Spanish III. Lab 1. Prerequisite: 2112 and 2113 or equivalent. Skill consolidation with emphasis on conversation and reading. May be taken concurrently with 2223.

2223

(I)Intermediate Spanish IV. Lab 1. Prerequisite: 2112 and 2113 or equivalent. Skill consolidation with emphasis on conversation and composition. May be taken concurrently with 2222.

3003

(H,I)Survey of Spanish Literature. Prerequisite: 20 credit hours of Spanish or equivalent. Development of Spanish and Spanish-American literature to the present. Class conducted in Spanish.

3200

(I)Advanced Conversation and Composition. 1-3 credits, maximum 3. Lab 0-6. Prerequisite: 20 credit hours of Spanish or equivalent. Practice in composition and stylistics, designed to bring students up to a high level of proficiency in speaking and in writing. Spanish majors must take all three credits in one semester.

3210

(I)Advanced Grammar. 1-3 credits, maximum 3. Prerequisites: 20 credit hours of Spanish or equivalent proficiency. Spanish majors must take all three credits in one semester.

3333

(H,I)Hispanic Civilization I. Prerequisite: 20 credit hours of Spanish or equivalent. Reading and discussion of selected texts outlining the development of contemporary Spanish civilization. Classes conducted in Spanish.

3463

(I)Advanced Diction and Phonetics. Lab 1. Prerequisite: 20 credit hours of Spanish or consent of instructor. Required course for teacher certification/licensure. Spanish speech sounds and intonation patterns, with practice to improve the student's pronunciation.

4113

(H,I)Chicano Literature and Civilization. Prerequisites: 20 credit hours of Spanish or equivalent competence. Reading, analysis, and discussion of the most outstanding works in Chicano literature produced since 1848. Contemporary works are emphasized. Classes conducted in Spanish.

4173

(H,I)Hispanic Drama. Prerequisite: 20 credit hours of Spanish or equivalent competence. Reading and interpretation of dramatic works selected from the Hispanic literatures.

4220
(I)20th Century Hispanic Literature. 1-3 credits, maximum 3. Prerequisite: 20 credit hours of Spanish or equivalent. Major 20th century Hispanic writers. Classes conducted in Spanish.

4243
(I)Translation and Writing of Documents. Prerequisite: 20 credit hours of Spanish or equivalent competence. Translation of documents produced by government agencies, universities, business and industrial organizations. Writing of letters, memos and contracts.

4253
(H,I)Masterpieces of Hispanic Literature I. Prerequisite: 20 credit hours of Spanish or equivalent competence. Reading and analysis of classics selected from the Hispanic literatures.

4263
(H,I)Masterpieces of Hispanic Literature II. Prerequisite: 20 credit hours of Spanish or equivalent competence. Reading and analysis of classics selected from the Hispanic literatures. An historical continuation of 4253. SPAN 4253 is not a prerequisite for this course.

4333
(H,I)Hispanic Civilization II. Prerequisite: 20 credit hours of Spanish or equivalent. Reading and discussion of selected texts outlining the development of contemporary Hispanic civilization outside the Iberian peninsula. Classes conducted in Spanish.

4550
(I)Seminar in Spanish. 1-3 credits, maximum 9. Prerequisite: 20 credit hours of Spanish or equivalent. Readings and discussion of vital subjects in Spanish.

5110*
Advanced Hispanic Studies. 1-3 credits, maximum 9. Lab TBA. Prerequisite: 22 hours of Spanish or graduate standing in foreign language.

Special Education (SPED)

3202
Education of Exceptional Learners. Learning characteristics, needs and problems of educating the exceptional learner in the public schools. Implications of the learning, environmental and cultural characteristics; planning and program assistance available for accommodating the exceptional learner in regular and special education programs; observation of exceptional learners.

3240
Observation and Participation in Special Education. 1-3 credits, maximum 6. Lab 1-3. Supervised activities with various types of exceptional learners and the educational provisions for them. Graded on a pass-fail basis.

3633
Assessment and Intervention for Exceptional Infants and Children-Birth to Age 6. Assessment techniques and intervention strategies appropriate for exceptional infants and young children. Basic theories of development and research supportive of various intervention strategies and assessment techniques.

4453*
Educational Diagnosis and Remediation. Prerequisites: 4052, MATH 2413 and CIED 3283. Provides skills in the application of standardized and informal assessment information for educational planning. Includes analysis of commonly used achievement, perceptual, motor and language tests and behavioral analysis techniques.

4513*
Introduction to the Emotionally Disturbed. Characteristics, identification and teaching of the emotionally disturbed or behavior disordered student; a variety of theoretical approaches to the subject.

4613*
Mental Retardation and Physical Handicaps. Nature, causes, and social consequences of mental retardation and physical handicaps.

4640
Student Teaching in Special Education. 1-12 credits, maximum 12. Supervised teaching experience in the area of special education in which the student is preparing to qualify for a teaching certificate. Graded on a pass-fail basis.

4643
Clinical Teaching Seminar. Lab 2. A supervised clinical experience with special needs individuals. Practical application of skills in instructional techniques and approaches, writing and implementation of IEP's and lesson plans, developing or selecting appropriate activities and materials.

4653*
Education of the Mentally Retarded. Education program needs and social-cultural environment of mentally retarded children, adolescents and adults.

4713*
Individualizing Education Programs for Exceptional Individuals. Techniques for teaching individuals with handicapping conditions.

4723*
Curriculum and Methods for Teaching Mentally Retarded Adolescents and Adults. Techniques for teaching the mentally retarded individual from adolescence through adulthood.

4753*
Techniques of Behavior Management and Counseling with Exceptional Individuals. Techniques to develop and evaluate programs of behavior change for exceptional students including counseling with the exceptional individual and conferencing with professionals and parents.

5000*
Master's Thesis. 1-6 credits, maximum 6.

5320*
Seminar in Applied Behavioral Studies. 3-6 credits, maximum 6. In-depth exploration of contemporary problems of applied behavioral studies.

5523*
Characteristics of Students with Severe and Profound Disabilities. Educational, psychological and physiological characteristics of students with severe and profound disabilities.

5573*
Communication Strategies for Individuals with Severe and Profound Disabilities. Methods for communicating with severely or profoundly disabled persons and for facilitating their communication through speech, sign, assistive devices and technology.

5583*
Methods for Teaching Persons with Severe and Profound Disabilities. Instructional procedures and resources available for working with the severely or profoundly disabled learner.

5620*
Practicum with Exceptional Learners. 1-8 credits, maximum 8. Lab 1-8. Supervised individual and group experience with exceptional learners. The particular experience (learning disability, mental retardation, gifted, etc.) is determined by the student's field of specialization.

5623*
Characteristics of Students with Disabilities. Educational, psychological and physiological characteristics of students with mild and moderate disabilities.

5633*
Behavior Characteristics of Exceptional Individuals. Individual differences and problems that exceptional individuals experience. Educational programs and resources available to assist administrators, teachers and parents in dealing with unique individual needs.

5643*
Counseling Parents of Exceptional Children. Aiding the classroom teacher and other professional personnel in the understanding of unique activities and interpersonal relations involved in counseling with parents of exceptional children.

5653*
Play Therapy in Special Education. Theories and practices of the principles of play therapy. The application of play therapy for special education children. Supervised clinical experience with children with emotional, social and psychological problems.

5673*
Developmental Language for the Exceptional Individual. Normal language development and variations from norms demonstrated by handicapped learners. Theoretical approaches to language training, formal and informal assessment techniques, and instructional methods.

5683*
Techniques and Consultation Models for Teaching Individuals with Disabilities. Current techniques, models and approaches used to teach students with mild and moderate disabilities and the theoretical bases for these techniques and approaches. Professional roles of the teacher of students with mild and moderate disabilities including communication with other teachers.

5733*
Teaching Strategies for the Physically Handicapped. Types of physical handicaps, their educational implications and various adjustments for optimal functioning.

5743*
Curriculum Modifications for Exceptional Individuals. Materials and resources designed for use by teachers and other professionals, paraprofessionals and parents in working with exceptional individuals. Includes commercial and teacher-student-made materials.

5783*
Psycho-educational Testing of Exceptional Individuals. Intensive practice in the selection, administration and interpretation of individual tests, appropriate for exceptional individuals.

5823*
Characteristics and Identification of the Emotionally Disturbed Learner. Characteristics and identification of the emotionally disturbed/behavior-disordered learner. Trains the teacher to identify the emotionally disturbed/behavior-disordered learner.

5853*
Advanced Methods for Teaching the Mentally Retarded. A review of research and methodological developments related to the instruction of mentally retarded children, adolescents and adults.

5873*
Instructional Strategies and Resources for the Emotionally Disturbed Learner. Instructional procedures and resources available for working with the emotionally disturbed/behavior-disordered learner. A wide range of theoretical approaches explored.

5883*
Behavior Management and Affective Education. The utilization of various approaches to the management of individual and group behavior; affective education in a wide range of instructional settings.

6000*
Doctoral Thesis. 1-25 credits, maximum 25. Required of all candidates for doctorate in applied behavioral studies. Credit given upon completion and acceptance of thesis.

6063*
Research Topics in Special Education. Prerequisites: a 6000-level research course on analyses of variance and a 6000-level course on multiple regression analysis. Classic and current significant research topics; review and reinforcement of professional inquiry skills in reading, utilizing, planning, conducting and reporting research in special education.

6183*
Legal Aspects in Special Education. Familiarization and analysis of legal rights and responsibilities of students, educators, and administrators in special education; federal and state mandates, case law and recent legal developments affecting special education.

6563*
Program Development in Special Education. Physical, social and psychological factors in communities such as power structure, economics, prejudice, religion, as well as national activities influential in establishing programs for the exceptional student.

6603*
Current Trends and Issues in Special Education. Current research and literature regarding the education of exceptional children.

6850*
Directed Reading. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Directed reading for students with advanced graduate standing.

6880*
Internship in Education. 1-8 credits, maximum 8. Lab 3-24. Directed off-campus experiences designed to relate ideas and concepts to problems encountered in the management of the school program.

Speech Communication (SPCH)

2713
(S)Introduction to Speech Communication. Principles and techniques of preparing for, participating in and evaluating communication behavior in the conversation, the interview, group discussion and the public speech. A competency-based approach.

3010
Speech Activity Participation. 1-3 credits, maximum 6. Preparation for, and participation in, speech communication and speech pathology activities.

3703
Small Group Communication. General systems approach to small group processes. Special consideration given to group roles, norms, leadership and decision making. Participation in various types of discussion groups.

3720
Practicum I. 1-2 credits, maximum 2. Prerequisite: speech communication major. Communication facilitation for the speech communication major, with student's initial role as interventionist.

3723
Business and Professional Communication. Oral communication encounters in business and professional settings. The interview, informative briefing, talking-paper, small group interaction and informative, integrative and persuasive speeches.

3733
(S)Elements of Persuasion. Principles and concepts of interpersonal and public persuasive encounters. The instrumental and interactive nature of persuasion. Designing and participating in actual persuasive campaigns.

3743
Advanced Public Speaking. The preparation and delivery of various types of public speeches.

3793*
Communication in Interviews. General principles of interviewing. Specific guidelines for the interviewer in survey, journalistic, counseling, selection, appraisal, legal, medical, and sales interviews.

4010
Independent Study in Speech Communication. 1-3 credits, maximum 3. Prerequisite: consent of instructor. Supervised research projects in speech communication.

4703
Communication Theory. Survey of current theories and models dealing with symbolic and communicative behavior.

4710
Topics in Speech Communication. 1-3 credits, maximum 6. Selected current topics in speech communication.

4720
Practicum II. 1-3 credits, maximum 3. Prerequisite: consent of instructor. Individual research projects providing practical experience for advanced undergraduate students on and off campus.

4723*
(H)History of Public Address. Analysis of speeches of selected American orators as artifacts and rhetorical responses. Content, structure and style of the speeches and the historical situations in which they were given.

4733
Legal Communication. Analysis and applications of oral communication and analytical skills required for effective performance in trial courts. Course culminates in a day-long mock trial.

4743*
Problems of Interpersonal Speech Communication. Application of communication theory to interactions in person-to-person settings. Identification and management of barriers related to the concepts of perception, attraction, self-disclosure, listening and conflict.

4753*
Intercultural Communication. Social and cultural differences between individuals from diverse backgrounds as possible barriers to effective communication.

4763
Organizational Communication. The interface between communication theory and organizational structure. Nature of communication problems in organizations, strategies for overcoming such problems and the design of effective communication systems in organizational settings.

4783
Research Methods in Speech Communication. Critical examination of experimental and nonexperimental methods used in the study of speech communication.

4793*
(S)Nonverbal Communication. Nonverbal aspects of speech communication.

4993
Senior Honors Thesis. Prerequisites: departmental invitation, senior standing, Honors Program participation. A guided reading and research program ending with an honors thesis under the direction of a faculty member. Required for graduation with departmental honors in speech communication.

5000*
Research and Thesis. 1-3 credits, maximum 6. Prerequisite: approval of major professor. Research in speech and audiology.

5013*
Introduction to Graduate Study. Research methods with special emphasis on those used most frequently in communication research; professional opportunities in the various speech fields; practical experience in outlining a piece of research.

5023*
Introduction to Quantitative Research in Speech. Methods and major findings of empirical research in speech.

5210*
Advanced Practicum. 1-3 credits, maximum 9. Prerequisite: consent of instructor. Practical experience for advanced students on and off campus.

5710*
Seminar in Speech. 1-3 credits, maximum 9. Individual and group investigations of problems in speech communication, theater, and speech pathology and audiology.

5713*
Rhetorical Theory. Contemporary rhetorical theory focusing on the processes of social influence.

5723*
Oral Communication Theory. Modern theories dealing with symbolic and communicative behavior.

5733*
Human Relations in Organizations. The place of oral communication in decision-making in organizations. Relationship of oral communication to organizational structure, organizational needs, patterns of leadership and techniques of information collection.

5763*
Seminar in Organizational Communication Consultancy. Diagnostic measures for identifying communication problems in organizations and the development of consulting or interventionist programs to solve such problems.

Statistics (STAT)

2013

(A)Elementary Statistics. Prerequisite: MATH 1513. An introductory course in the theory and methods of statistics. Descriptive measures, elementary probability, samplings, estimation, hypothesis testing, correlation and regression. There is a separate section for students in social sciences. No credit for students with credit in 2023.

2023

(A)Elementary Statistics for Business and Economics. Prerequisite: MATH 1513. Basic statistics course for undergraduate business majors. Descriptive statistics, basic probability, discrete and continuous distributions, point and interval estimation, hypothesis testing, correlation and simple linear regression. No credit for students with credit in 2013.

3013*

Intermediate Statistical Analysis. Prerequisite: 2013 or 2023. Applications of elementary statistics, introductory experimental design, introduction to the analysis of variance, simple and multiple linear regression, nonparametric statistics, survey sampling, time series and Bayesian analysis.

4013*

(A)Statistical Methods I. Lab 2. Prerequisites: 60 credit hours including MATH 1513. Basic experimental statistics, basic probability distributions, methods of estimation, tests of significance, linear regression and correlation, analysis of variance for data that are in a one way, a two-way crossed, or in a two-fold nested classification.

4023*

Statistical Methods II. Lab 2. Prerequisite: 3013 or 4013 or 4033. Basic concepts of experimental design. Analysis of variance, covariance, split-plot design. Factorial arrangements of treatments, multiple regression in estimation and curvilinear regression, enumeration data.

4033*

Engineering Statistics. Prerequisite: MATH 2155. Introduction to probability, random variables, probability distributions, estimation, confidence intervals, hypothesis testing, linear regression.

4043*

Applied Regression Analysis. Prerequisite: one of 4013, 4033, 5013 or equivalent. Matrix algebra, simple linear regression, residual analysis techniques, multiple regression, dummy variables.

4091*

Statistical Analysis System. Prerequisite: 4013 or equivalent. SAS dataset construction, elementary statistical analysis, and use of statistics and graphics procedures available in the SAS package.

4113*

Probability Theory. Prerequisites: MATH 2155 and one other course in MATH that has either 2145 or 2155 as a prerequisite. Basic probability theory, random events, dependence and independence, random variables, moments, distributions of functions of random variables, weak laws of large numbers, central limit theorems.

4203*

Mathematical Statistics I. Prerequisite: MATH 2155. Introduction to probability theory for students who are not graduate majors in statistics or mathematics. Probability, dependence and independence, random variables, univariate distributions, multivariate distributions, moments, functions of random variables, moment generating functions.

4213*

Mathematical Statistics II. Prerequisites: 4203 and MATH 3013. Statistical inference for students who are not graduate majors in statistics or mathematics. Sampling distributions, maximum likelihood methods, point and interval estimation, hypothesis testing.

4223*

Statistical Inference. Prerequisites: 4113 and MATH 3013. Sampling distributions, point estimation, maximum likelihood methods, Rao-Cramer inequality, confidence intervals, hypothesis testing, sufficiency, completeness.

4910*

Special Studies. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Special subjects in statistics.

4993

Senior Honors Project. Prerequisites: departmental invitation, senior standing, Honors Program participation. A guided reading and research program ending with an honors project under the direction of a faculty member, with a second faculty reader and an oral examination. Required for graduation with departmental honors in statistics.

5000*

Research in Statistics. 1-6 credits, maximum 6. Methods of research and supervised thesis or report.

5013*

Statistics for Experimenters I. Prerequisites: graduate standing and MATH 1513. Introductory statistics course for graduate students. Descriptive statistics, basic probability, probability distributions, fundamentals of statistical inference, hypothesis testing, regression, one-way classification, analysis of variance, comparative experiments, correlation and linear regression, introduction to categorical data analysis.

5023*

Statistics for Experimenters II. Prerequisites: graduate standing and 4023 or 5013. Analysis of variance, covariance, use of variance components and their estimation, completely randomized, randomized block and Latin square designs, multiple comparisons.

5033*

Nonparametric Methods. Prerequisite: one of 4023, 4043, 5023 or consent of instructor. A continuation of 4013 and 4023, concentration on nonparametric methods. Alternatives to normal-theory statistical methods; analysis of categorical and ordinal data, methods based on rank transforms, measures of association, goodness of fit tests, order statistics.

5043*

Sample Survey Designs. Prerequisite: one of 4013, 4033, 5013 or consent of instructor. Constructing and analyzing personal, telephone and mail surveys. Descriptive surveys including simple random, stratified random designs. Questionnaire design, frame construction, non-sampling errors, use of random number tables, sample size estimation and other topics related to practical conduct of surveys.

5053*

Time Series Analysis. Prerequisite: 4043. An applied approach to analysis of time series in the time domain and the frequency domain. Descriptive techniques, probability models for time series, autoregressive processes and forecasting. Box-Jenkins methods, spectral analysis and use of computers.

5063*

Multivariate Methods. Prerequisites: 4043 and 4023 or 5023. Use of Hotelling's T-squared statistic, multivariate analysis of variance, canonical correlation, principal components, factor analysis and linear discriminant functions.

5073*

Categorical Data Analysis. Prerequisites: 4223, 5023 or equivalent. Analysis of data involving variables of a categorical nature. Contingency tables, exact tests, binary response models, loglinear models, analyses involving ordinal variables, multinomial response models. Computer usage for analysis is discussed.

5113*

Intermediate Probability Theory. Prerequisites: 4113 and MATH 5143. Measurement of theoretical presentation of probability, integration and expectation, product spaces and independence, conditioning, different kinds of convergence in probability theory, statistical spaces, characteristic functions and their applications. Same course as MATH 5113.

5133*

Stochastic Processes. Prerequisites: 4113 and MATH 2233, MATH 3013. Definition of a stochastic process, probability structure, mean and covariance function, the set of sample functions, stationary processes and their spectral analyses, renewal processes, counting processes, discrete and continuous Markov chains, birth and death processes, exponential model, queueing theory. Same course as IEM 5133 and MATH 5133.

5203*

Large Sample Inference. Prerequisites: 4223 and 5113. Different types of convergence in probability theory, central limit theorem, consistency, large sample estimation and tests of hypotheses, concepts of asymptotic efficiency, nonparametric tests.

5213*

Bayesian Decision Theory. Prerequisite: 4223. Statistical spaces, decision spaces, loss and risk, minimum risk decisions, conjugate families of distributions, Bayesian decisions.

5303*

Experimental Design. Prerequisite: 5023 or 4203 with consent of instructor. Review of basic concepts and principles of comparative experiments, the role of randomization in experimentation, interpretation of effects and interactions in multi-factor designs, error term selection principles, multiple comparisons, split-unit experiments, incomplete block designs, confounding of factorial effects in $2n$ and $3n$ series of factorials, single and fractional replication optimum seeking designs, pooling of experiments over time and space, crossover and switch back designs.

5323*

Theory of Linear Models I. Prerequisites: 4223, and MATH 3013, and one of 4023 or 5023. Multivariate normal distributions of quadratic forms, general linear models, Markov theorem, variance components, general linear hypotheses of full rank models.

5333*

Theory of Linear Models II. Prerequisite: 5323. Maximum likelihood estimation; missing data structures; balanced incomplete block design; less than full rank models; general mixed models; intrinsically linear models; sequential estimation.

5403*

Theory of Sample Design. Prerequisite: 4113 or 4203. Deriving estimates and variances of estimates for different sampling designs. Mathematical development of sampling. Consideration of simple probability sampling including simple random, stratified random, cluster and multistage sampling. Estimation techniques including ratio and regression techniques. Determination of sample sizes and allocations.

5513*

Multivariate Analysis. Prerequisite: 5323. Multivariate normal distribution, simple, partial and multiple correlation, multivariate sampling distributions. Wishart distribution, general T-distribution, estimation of parameters and tests of hypotheses on vector means and covariance matrix. Classification problems, discriminate analysis and applications.

5910*

Seminar in Statistics. 1-6 credits, maximum 12. Special studies for master's students. Survey and discussion of research in mathematical statistics and statistical methods.

6000*

Research and Thesis. 2-10 credits, maximum 30. Prerequisite: consent of advisory committee. Directed research culminating in the Ph.D. thesis.

6123*

Advanced Probability Theory. Prerequisites: 5113 or MATH 5113, and MATH 4283. Sequences of random variables, convergence of sequences, and their measure theoretical foundations. Different kinds of convergence in probability theory. Characteristic functions and their applications. Laws of large numbers and central limit theorems. Conditioning. Introduction to stochastic processes. Same course as MATH 6123.

6213*

Advanced Statistical Inference. Prerequisite: 5213. Point estimation, maximum likelihood, Cramer-Rao inequality, confidence intervals, Neyman-Pearson theory of testing hypothesis and power of test.

6323*

Advanced Design of Experiments. Prerequisites: 5303 and 5323 or consent of instructor. Construction of various experimental designs, such as mutually orthogonal series of Latin Squares, balanced and partially balanced incomplete block designs, confounded and fractionally replicated designs. Response surface methodology. Theory of factorial arrangements of treatments. Confounding of factorial effects. Fractional replication of factorials, confounding in mixed series of factorials, randomization tests, transformations of data, plot techniques and principles of split-plot techniques. Analysis of series of experiments and analysis of covariance.

6910*

Special Problems. 1-6 credits, maximum 12. Investigation of special problems in the theory and application of statistics using current techniques. Special studies for Ph.D. level students.

Student Development (SDEV)

5000*

Master's Thesis. 1-6 credits, maximum 6. Prerequisite: consent of instructor.

5320*

Seminar in Student Development. 3-6 credits, maximum 6. Prerequisite: consent of instructor. In-depth exploration of contemporary problems of applied behavioral studies.

5333*

Effective Leadership in Student Services. Prerequisite: admission to graduate program in student personnel or consent of instructor. The organization and management of student services operations in postsecondary institutions. Models for policy and decision making as well as leadership and supervision issues.

6000*

Doctoral Dissertation. 1-25 credits, maximum 25. Prerequisite: consent of advisory committee chairperson. Required of all candidates for doctorate in applied behavioral studies. Credit given upon completion and acceptance of dissertation.

6173*

Higher Education Student Personnel Administration. Develops an understanding of the history, philosophy, student life, critical issues and administration of student personnel work in higher education.

6213*

Higher Education Student Personnel Services. Prerequisite: 6173. Higher education student personnel services such as: admissions, orientation, student activities, financial aids, housing and counseling.

6220*

Internship in Higher Education Student Personnel. 2-6 credits, maximum 6. Prerequisites: 6173 or 6213 and admission to the student personnel and guidance program and consent of supervisor. Provides work and study opportunities under supervision in areas of student housing, student activities, financial aid, foreign student advisement, student personnel administration, student union, group facilitation and other appropriate work situations.

6850*

Directed Reading. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Directed reading for students with advanced graduate standing.

Technical Education (TCED)

3103

Introduction to Technical Education. The role and function of technical education in the development of human resources. Historic and philosophic bases for technical education with emphasis on programs, purposes, and objectives and the variety of environments in which such programs exist.

5233*

Occupational Analysis. Techniques for determining educational requirements of technical occupations. Analysis systems used by educational institutions, the military and the United States Department of Labor.

5433*

Instructional Design for Training. Design and development of training to address performance problems in organizations, business and industry. In-depth study of a systematic approach to training for performance. Same course as HRAE 5433.

Technical and Industrial Education (TIED)

2000

Field Experience in Industrial Practice. 2-6 credits, maximum 16. Supervised work experience in student's proposed teaching area with special emphasis on occupational skill development. Written agreement between student, employer and department must be made prior to beginning of field experience program. Graded on a pass-fail basis.

3000

Trade and Industrial Occupational Experience. 1-24 credits, maximum 24. Credit to be determined by a special skill competency examination.

3203

Foundations and Services of Trade and Industrial Education. Opportunities provided by vocational education, with special emphasis on trade and industrial education and its relationship to other elements of the educational system. Legislative aspects of vocational education, general education, student guidance, and programs for disadvantaged and handicapped students.

4103*

Instructional Procedures in Trade and Industrial Education. Prerequisites: 4344 and full admission to Teacher Education. Methods and techniques for effective teaching and learning in classroom and shop instruction. Emphasis on the use of instructional aids and competency development. No credit for students with credit in OAED 4103.

4110*

Trade Technical Information. 1-4 credits, maximum 6. New developments in scientific and technical information and knowledge that are relevant to current trade practices.

4123*

Coordinating Vocational Student Organizations and Activities. Student organizations and activities in vocational education at local, state and national levels. Procedures for planning programs of work, incorporation of student organization activities into curriculum, adviser characteristics and responsibilities, fundraising activities, and techniques for recognizing outstanding members and community supporters.

4214*

Safety, Organization and Management of Learning Facilities. Prerequisite: full admission to Teacher Education. Techniques and procedures for organizing and managing shop and laboratory facilities and learner activities to enhance the quality of instruction and improve efficiency of equipment and space utilization including all safety rules and procedures.

4344*

Trade Analysis and Instructional Planning. Prerequisite: full admission to Teacher Education. Analysis of trades and occupational job activities; development of course outlines and specific instructional materials for shop and laboratory courses.

4773

Practices and Problems of School-to-Work Transition Programs. Problems of school-to-work transition and examination of practices designed to improve it. Planning, organizing and developing strategies to implement and evaluate school related work-based learning.

4883*
Practices and Problems in Integrating Academic and Vocational Education. Prerequisite: 4103 or consent of instructor. Experiences in learning, designing, and practicing strategies that technical and industrial teachers can use to integrate academic competencies into their particular curricula. Design and presentation of cognitive psycho-motor and affective occupational lessons that integrate math, social studies, science and/or English-related competencies.

5113*
School-to-Work Transition. Strategies and procedures for coordinating school-to-work transition programs (e.g., cooperative education, youth apprenticeship, career exploration). Planning, organizing, implementing, and evaluating school-related, work-based learning.

5153*
Supervision of Vocational Education. Prerequisite: consent of instructor. Role and function of administrators responsible for supervising the planning, implementation and management of vocational education programs.

5223*
Evaluation of Instruction. Principles of evaluation and methods for applying these principles to improve the effectiveness of vocational education programs.

5232*
Teaching Related Information. Selection of job-related topics common to most trades with procedures for incorporating those topics into the regular curriculum.

5233*
Advanced Instructional Procedures in Trade and Industrial Education. Advanced methods and procedures for effective teaching and learning in the trade and industrial classroom and laboratory. Teaching basic educational and employment skills and the selection of job-related topics common to most occupations with procedures for incorporating those topics into the regular curriculum.

5313*
Guidance, Placement and Follow-up in Occupational Education. Teacher-counselor cooperation in vocational student advisement, placement and follow-up.

5443*
Individualizing Competency-based Instruction Programs. Develops knowledge and skills utilizing the concept of open entry/open exit necessary for planning, developing and implementing a competency-based vocational education program.

5553*
Vocational Education, Community and Industry Relations. Exploration of strategies for developing meaningful relationships among vocational educators, industry representatives, and community members to increase the likelihood that the needs of students, workers, employers and community members are met.

5663*
Conference Leading. Developing skills in planning, organizing and leading conferences.

5910*
Developing and Analyzing Teaching Content. 1-3 credits, maximum 6. Provides opportunity for experienced teachers to incorporate the latest industrial technology into their course of study.

Technology Education (TE)

3002
Introduction to Industrial Technology Education. Industrial technology education in a modern educational system, including the historical and philosophic bases for such programs. Purposes, objectives and functions of contemporary industrial arts and technology education programs in public schools. Participation in on-site observation experience in the public schools.

3023
Applied Electricity. Lab 2. Fundamentals of electricity and its contribution to technological development. Electrical principles, circuits and systems; exercises in construction, installation, repair and maintenance of electrical equipment and facilities. Emphasis on preparation for teaching electricity in local school industrial arts and technology education programs.

3033
Materials and Processes. Lab 4. Introduces students to the basic properties of metallic, polymeric, wood, ceramic and composite materials and the proper techniques used to convert these materials into products. Special attention is given to the safety and care of industrial equipment.

3043
Constructing Structures. Lab 3. Prerequisite: 3033 or equivalent or consent of instructor. Comprehensive study of the activities involved in preparing to build, building, and completing residential, commercial, industrial, and civil structures.

3333
Industrial Communication Graphics. Lab 4. Methods and techniques for the visual communication of information and ideas. The elements of drafting, design, screen printing and photography into a total concept of modern graphic communication.

3423
Methods for Teaching Technology Education Systems. Lab 3. Prerequisites: 3033 and 3550 or consent of instructor. Unique methods and activities are specifically adapted for and related to the systems of technology education. Fundamental and specific methods preparation for those students planning to teach technology education in the public schools.

3553*
Manufacturing Enterprise. Lab 3. Prerequisite: 3033. The managed activities used to design, engineer, produce, and market manufactured products. Additional emphasis on providing financial and personnel support for these activities.

3653*
Fundamentals of Power Technology. Lab 3. The inputs, processes, and outputs associated with energy systems. Emphasis on the sources of energy; methods of controlling, converting, and transmitting energy; and the utilization of energy conversion systems. Practical experience in overhaul and tune-up of small two- and four-cycle engines.

4013*
Research and Development in Industrial Technology Education. Lab 3. Prerequisites: 3033 and 3553. The methodology and practices of technical research and development as conducted in an industrial and educational setting. Laboratory activities performing basic tasks associated with product and process research and development.

5020*
Seminar in Industrial Technology Education. 1-3 credits, maximum 3. Oral and written discussion of selected current interest topics concerning industrial arts and technology education. Forum for review of research proposals, student programs, other projects and timely topics having an impact on the industrial arts and technology education profession.

5340*
Special Problems in Technical Content in Industrial Arts and Technology Education. 1-3 credits, maximum 6. Prerequisites: 3033 and 3323 or equivalent or consent of instructor. Problems associated with the technical content areas in industrial arts and technology education. Introduction of new and advanced technical systems into the curriculum of public school technology education programs.

5563*
Critical Issues in Technology Education. Analysis of current trends, issues, directions, and research in technology education. Applications to current classroom and program practices.

Telecommunications Management (TCOM)

5012*
Telecommunications Laboratory. Prerequisite: ECEN 5553, TCOM 5123 or co-requisite. Familiarization with the hardware used to move voice, data and video traffic. Data network experiments include set up and operation of a small LAN, interconnection of these LANs via bridges or routers, and attachment of voice and video modules to the LANs. Telephone network experiments include installation of small PBXs and interconnection of them to the campus phone system, and interconnection of the lab PBXs with crosspoint switches and fiber. Video experiments include interconnection and operation of a small two-camera studio, and digitizing and transferring the video over the laboratory telephone system. Practical operating aspects and standards of distance transmission devices, switching equipment media for transmitting data, voice and video signals. Handling information problems within selected environments.

5113*
Industry Overview and Telecommunications Applications. Prerequisites: graduate standing and consent of program director. Overview of telecommunications industry, technology, regulatory environment, and current topics in telephone services (wireless and wireline), business data services, CATV, and Internet services and providers (including JAVA and HTML). Managerial and strategic aspects of telecommunications technologies. Guest speakers from the telecommunications industry.

5123*
Telecommunications Systems II. Prerequisites: ECEN 5553 and consent of program director. Applied technical coverage of selected topics from the upper layers of the OSI model. Network and Transport layers using, TCP/IP, IPX/SPX, and Netbeui, as well as security issues and other multi-layer protocol suites. Flow control, RSVP, encryption, compression, and LAN/WAN applications.

5143*
Telecommunications Analysis, Planning and Design. Prerequisites: ECEN 5553 and consent of program director. Introduction to the basic system analysis tools and the procedures for conducting a system analysis. System requirements, the initial analysis, the general feasibility study, structured analysis, detailed analysis, logical design, and the general system proposal. Current system documentation through use of classical and structured tools and techniques for describing flows, data flows, data structures, file designs, input and output designs, and program specifications.

5153*
International Telecommunications Management. Prerequisites: graduate standing and consent of program director. Investigation of the institutions that affect the use of telecommunications. The various parts of the federal government involved, such as the Department of Commerce, the FCC and the Department of State. The role of international institutions, including the ITU, UNESCO, and the various satellite organizations such as INTELSAT.

5163*
Telecommunications Practicum. Lab 3. Prerequisites: graduate standing and consent of program director. Application of knowledge and skills developed in core courses in an organizational environment to solve telecommunications management problems. Integration of concepts and adaptation of theory to fit organizational reality.

5213*
Network Design and Management. Prerequisites: ECEN 5553 and consent of program director. Technical as well as managerial aspects of developing an integrated communications network. Systems analysis and design of the communications networks covering voice, data and video. Management of a network.

5310*
Advanced Topics in Telecommunications Management. Prerequisites: graduate standing and consent of program director. Advanced topics in the interdisciplinary field of telecommunications management, such as legal and regulatory issues, electronic commerce, internet and intranet development.

5350*
Advanced Telecommunications Management Lab. 2-3 credits, maximum 3. Lab 2-3. Prerequisites: 5012 and consent of program director. Advanced state-of-the-art topics in voice, data and video. Hands-on network experiments beyond coverage in the required TCOM 5012 lab.

5990*
Directed Studies in Telecommunications Management. 1-6 credits, maximum 6. Prerequisites: graduate standing and consent of program director. Special advanced topics, projects and independent study in telecommunications management.

Theater (TH)

1500
Theater Practicum. 1 credit, maximum 6. Lab 2. Laboratory experience in theater production, acting and crew assignments. Graded on a pass-fail basis.

1533
Voice and Diction. Freeing the natural voice; development of proper breathing techniques, resonance, and range; use of International Phonetic Alphabet in developing articulation and pronunciation; exercises in phrasing and intonation; preliminary dialect work.

2413
(H)Introduction to the Theater. Character, plot, thematic, historical and production analyses of various types of play scripts; understanding the work of various theater artists; developing appreciative audiences.

2533
Oral Interpretation. Reading aloud effectively; training in voice improvement, platform techniques, selection criteria and audience analysis.

2543
Acting I. Ensemble techniques and creative improvisation; vocal and physical development for the actor; theories and techniques of acting; fundamental scene and character analysis; scene performance workshops.

2663
Technical Production I. Lab 4. Elementary techniques of stagecraft and costume for the stage. Basic stagecraft skills. Practical experience preparing departmental productions.

2673
Technical Production II. Lab 4. Elementary techniques of costume craft and stagecraft for the stage. Basic costuming skills. Practical experience preparing departmental productions.

3023
(H)Theater History I. Aesthetic and social relationships of theater and western civilization from primitive times to the mid-17th century.

3123
(H)Theater History II. Aesthetic and social relationships of theater and western civilization from the mid-17th century through the 19th century.

3223
(H)Theater History III. Aesthetic and social relationships of theater and western civilization from 1900 to the present.

3400
Upper-division Projects. 1-3 credits, maximum 6. Prerequisite: consent of instructor. Individual or group study of techniques, history, or literature of the theater. Required written survey of the project and self-evaluation of its results, or a term paper.

3733
Stage Movement for Actors. Techniques and exercises to build the actor's awareness and abilities for use of the bodily instrument on stage; preparation and readiness routines; rhythms, postures, and movement patterns appropriate to various styles of theater and to specific character roles.

3743
Acting II. Prerequisite: 2543. Continuation and refinement of 2543. Textual and character analyses, characterization and inner techniques. Audition techniques and realistic comedy through scene work with contemporary plays.

3973
Stage Makeup. Lab 2. Techniques of stage makeup. Application and relationship to character. Facial anatomy, prosthesis, wigs and hair. Laboratory work in preparation for departmental productions.

4123*
(H)Stage Costume History I. Comprehensive history of theatrical costume from ancient Egypt to 1700. Impact of fashion on the stage.

4143*
Acting III. Prerequisite: 3743. Continuation and refinement of 3743. Performance techniques in classic to modern styles. Shakespeare to Miller.

4183*
Scene Design for Theater and Television. The designer's approach to the script; execution of sketches, models and working drawings.

4323*
(H)Stage Costume History II. Comprehensive history of theatrical costume from 1700 to the present. Impact of fashion on the stage.

4403
Senior Honors Project. Prerequisites: departmental invitation, senior standing, Honors Program participation. A guided reading and research program ending with an honors thesis or performance under the direction of a faculty member, with second faculty committee member. Required for graduation with departmental honors in theater.

4593*
Lighting for Theater and Television. Lab 2. Stage lighting design, elementary electricity, design of lighting instruments. Practical experience in lighting in preparing and running departmental productions.

4753*
Stage Management. Prerequisite: consent of instructor. Procedures and skills of effective stage management. Authoritative coordination of performers and technicians during rehearsal and performance periods. Maintenance and use of the production prompt book, notation of ground plan and blocking; scene shifts; cues for lighting, sound, special effects, and performers; opening and calling the show; post-show wrap-up. Practical experience in stage managing student directed scenes.

4953*
Directing. Prerequisite: 2543. Play analysis for production, problems in staging, and the role of the director. Planning and direction of scenes in laboratory situations.

4963*
Theater Graphic Techniques. Fundamental theater graphic techniques to communicate theatrical design ideas.

4973*
Stage Costume Design. Lab 4. Approaches to basic costume design including research, conceptual analysis, figure drawing, and executions of sketches and renderings.

4983*
Scene Painting. Lab 3. Elementary techniques of scene painting. Individual projects in large scale in representing marble, rock to landscape, interiors. Color theory, forced perspective, ability to paint different styles. Practical experience preparing for departmental productions.

5013*
Theater Research Methods. Diverse methods of theater research appropriate to performance, design and technology, and history and theory. Developing familiarity with standard references and journals of the field, and introduction to professional organizations.

5063*
Scenography. Prerequisites: proven experience in scenery, lighting or costume design and consent of instructor. Scenographic design processes for the advanced theater design student. Investigation of design styles and theories and the designers whose works advanced these theories; practical application of designing scenery, lighting and costumes.

5213*
Script Analysis. Analytical and interpretive techniques in studying play scripts for theatrical production. Emphasis on writing skills appropriate to script analysis.

5243*
Problems in Advanced Acting. Prerequisites: 4143 and graduate standing or consent of instructor. Experimentation in psychological realism. Concentration on analysis, technical skills, and contacting the emotions. Special preparations for professional interviews and auditions.

5400*
Seminar in Theater. 1-3 credits, maximum 12. Prerequisite: consent of instructor. Individual or group studies of techniques, history or literature of the theater. A term paper or written report and self-evaluation of the study or project required.

5413*
Dramatic Theory. Concepts of play construction and audience effects: classic, neoclassic, romantic, realist, to post-modern.

5500*
Individual Theater Projects. 1-3 credits, maximum 6. Prerequisite: consent of instructor. Individual projects in directing, acting, or design and technology for a specified theater production, with concept, realization, and self-evaluation under faculty guidance.

5953*
Problems in Advanced Directing. Prerequisites: 4953, consent of instructor. Problems in directing period styles, especially Shakespeare. Restoration comedy, absurdist drama, and avant garde drama. Preparation, rehearsal and staging of a complete production by each student.

University (UNIV)

0111
Developmental Science Process Skills. Instruction on what scientists do as they study and investigate the natural world. Emphasis on critical thinking processes. Observation, classification, metric measurement, data table construction, graph construction and interpretation. May be used to fulfill the science remediation requirement as established by State Regents policy. Graded on a satisfactory-unsatisfactory basis.

1011
American Studies Survey. Provides an overview of the United States society and culture using an interdisciplinary approach. Study of U.S. culture from sociological, anthropological, language, educational, political, geographical, economic, and historical perspectives.

1111
University Academic Services Freshman Orientation. Prerequisite: beginning freshman standing in University Academic Services. Designed to help students ease the transition from high school to college; become aware of campus resources and administrative structures; explore various majors and careers; increase awareness of current issues in education; and enhance study skills and attitudes which can contribute to academic success.

2001
Academic Assessment and Evaluation. Prerequisite: acceptance into the University Academic Assessment Program or consent of instructor. Required for students in University Academic Assessment Program. Designed to help students identify reasons for experiencing academic difficulty; assess individual learning styles and personality types; understand the educational system and current issues in American education; develop goals, attitudes and study skills needed to achieve academic success; and explore careers, majors, and alternative educational experiences.

2510
Innovative Studies. 1-3 credits, maximum 6. Lab 0-6. May be used for not more than two semesters for new or experimental topics or techniques. Graded on a pass-fail basis.

3110
Directed Study. 1-18 credits, maximum 18. Prerequisite: written application approved by instructor, the department head, and the dean of the student's college. Independent study, research, field work or internship.

5940*
Career Orientation and Guidance. 1-3 credits, maximum 6. Developing models for career orientation: implementing programs of guidance for occupational choice. Employment opportunities and career development.

Veterinary Anatomy, Pathology and Pharmacology (VAPP)

5000*
Masters Thesis and Research. 1-6 credits, maximum 6 for PHSI; 1-6 credits, maximum 8 for VPATH. Prerequisite: graduate standing. Research in physiological sciences and veterinary pathology. Graduate credit in meeting requirements for M.S. degree.

5110*
Problems in Physiology. 1-5 credits, maximum 20. Prerequisite: consent of instructor. Investigations in physiology for graduate and advanced undergraduate students.

5224*
Integrative Vertebrate Cell Structure and Function. Prerequisites: BIOC 3653; ZOOL 3204 or ZOOL 4215; consent of instructor. The relationship between structure and function underlying essential processes occurring within individual cells and in interactions among cells. Emphasis on integration of knowledge of morphology, metabolism and physiology to facilitate a comprehensive understanding of the function of vertebrate organisms at the cellular level.

5225*
Veterinary Gross and Developmental Anatomy II. Lab 8. Prerequisite: 5116 or consent of instructor. Comparative and functional gross anatomy and developmental anatomy of domestic mammals. The integration of developmental gross, radiographic, and applied aspects of veterinary anatomy as they relate to a topographical appreciation of the living individual. Integrated lecture-dissection laboratory format.

5315*
Veterinary Pathology I. Lab 2. Prerequisite: second-year standing in the College of Veterinary Medicine or consent of instructor. Lectures and laboratories covering cellular and tissue pathology, pigments, inflammation, immunopathology, disturbances of growth and circulation. Introduction of pathology of the various systems. The functional disturbances that accompany changes in structures, as well as the cause, pathogenesis, and clinical correlations of diseases. Correlation of altered structure and function with clinical signs.

5353*
Veterinary Pharmacology I. Prerequisite: second-year standing in the College of Veterinary Medicine or consent of instructor. Introduction to the principles of pharmacodynamics, drug disposition and pharmacokinetics. Mechanisms of action, pharmacological effects, dosage considerations, and possible adverse effects of chemotherapeutic and anti-inflammatory agents. Appropriate selection of pharmacological agents used in the therapy of animal diseases and compliance with statutory and regulatory guidelines using a combination of didactic student-centered learning.

5413*
Clinical Pathology. Prerequisite: second-year standing in the College of Veterinary Medicine or consent of instructor. Data interpretation and laboratory methods used in evaluation of pathologic conditions in animals. Hematology, urinalysis and clinical chemistry.

5425*
Veterinary Pathology II. Lab 2. Prerequisite: 5315 or consent of instructor. Continuation of 5315. Lectures and laboratories covering the pathology of those systems not covered in preceding course.

5434*
Veterinary Pharmacology II. Lab, 8 hours per semester. Prerequisite: 5353 or consent of instructor. A continuation of 5353 that includes pharmacodynamics, pharmacokinetics and toxicities of drugs acting on the nervous, cardiovascular, respiratory, renal, gastro-intestinal, endocrine, and reproductive systems. Within each system, the relationship between the basic pharmacology of the drugs and the pathophysiology of the most important diseases treated.

5550*
Pathological Techniques and Special Problems. 1-4 credits, maximum 20. Prerequisite: graduate standing in biological sciences. Techniques and methods used in diagnosis, technical work and research in pathology.

6000*
Doctoral Thesis and Research. 1-15 credits, maximum 50 for PHSI; 1-10 credits, maximum 40 for VPATH. Prerequisite: graduate standing. Research in physiological sciences and veterinary pathology. Graduate credit in meeting requirements for the Ph.D. degree.

6132*
Theory of Electron Microscopy. Theory of the preparation of specimens for, and the operation of, the electron microscope. Methods of evaluation of electron micrographs and special electron microscopical techniques.

6200*
Topics in Advanced Pharmacology and Toxicology. 1-5 credits, maximum 15. Prerequisite: consent of instructor. Selected topics in advanced pharmacology and toxicology such as cardiopulmonary, gastrointestinal or neuropharmacology; chemotherapeutics; heavy metal, chemical or plant toxicology or biotoxicology. Repeatable; re-enrollment permits study of additional topics.

6222*
Fertilization and Early Development. Lab 3. Prerequisite: consent of instructor. Gametogenesis, fertilization, and the activation of embryonic development, described at the cellular and molecular level. Emphasis on current literature.

6233*
Laboratory in Electron Microscopy. Lab 12. Prerequisite: consent of instructor. Student learns to prepare specimens for, and to operate, the electron microscope, and techniques for printing and preparation of electron micrographs for publication.

6440*
Applied Veterinary Agronomics. 1-3 credits, maximum 6. Lab 2-6. Applications of soil-plant-animal interrelationships to the practice of veterinary medicine.

6524*
Pathology of Infectious Diseases. Prerequisite: 5425. Pathology of domestic and exotic infectious diseases of food and companion animals and methods employed in diagnosis.

6550*
Problems in Functional Morphology. 1-3 credits, maximum 12. Lab 3-9. Prerequisite: consent of instructor. Investigations in comparative, gross, developmental or histologic morphology for graduate students.

6560*
Advanced Pathology Techniques and Special Problems. 1-6 credits, maximum 20. Prerequisites: graduate standing in biological sciences and consent of instructor. Investigations of contemporary techniques and methods used in diagnosis, technical work and research in pathology.

6564*
Veterinary Toxicology. Lab 2. Prerequisite: third-year standing in the College of Veterinary Medicine or consent of instructor. Veterinary toxicological problems and therapeutics. Identification of selected poisonous plants and discussions of their toxicity.

6570*
Seminar. 1-6 credits, maximum 6. Consideration of literature and research problems pertaining to physiological sciences.

6612*
Poultry and Laboratory Animal Diseases. Prerequisite: 5425 or consent of instructor. Biological characteristics, husbandry, diagnosis, prevention, and treatment of diseases of domestic poultry and selected species of animals used in teaching and biomedical research.

6701*
Veterinary Physiological Science Topics. Lab 1. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Elective topics in physiological sciences related to veterinary medicine. Course can fulfill one of elective options of fourth-year veterinary medical students.

6733
Diagnostics. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Participation in animal necropsy, clinical pathology, and other investigative methods to study diagnosis, prognosis, prevention and treatment of diseases. Graded on a pass-fail basis.

6811*
Differential Diagnosis. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Exercises in the differential diagnosis of diseases of domestic animals.

6910*
Seminar. 1-2 credits, maximum 6. Prerequisite: medical degree or graduate standing in biological sciences. For students with medical degrees: interpretation of histologic materials. For students with graduate standing in biological sciences: review of literature and discussion of research problems.

6920*
Diagnostic Pathology. 1-4 credits, maximum 20. Prerequisite: graduate standing in the College of Veterinary Medicine or written consent of department head. Weekly review of current cases submitted to the department and the methods employed in diagnosis. Examination of necropsy reports, specimens, and preparations. Students required to formulate diagnoses.

6930*
Laboratory Animal Pathology. Prerequisite: 6701 or consent of instructor. Etiology and pathogenesis of spontaneous and experimentally induced diseases of common-used species of laboratory animals.

6950*
Advanced Systemic Pathology. 2-4 credits, maximum 12. Prerequisites: 5425, graduate standing, consent of instructor. Total credit not to exceed six for the M.S. degree and 12 for the Ph.D. Re-enrollment permits the study of two to four different groups of organs and systems of the animal body. A consideration of the pathogenesis and the morphological, biochemical, and comparative aspects of lesions found in organs and tissues of the domesticated animals.

6963*
Advanced Clinical Pathology. Lab 3. Prerequisites: 5425 or equivalent, graduate standing and consent of instructor. Applied clinical biochemistry, organ function tests and related cytologic examination.

6973*
Advanced Hematology. Lab 3. Prerequisites: 5425 or equivalent, graduate standing and consent of instructor. The etiology and pathogenesis of the diseases of the blood and bone marrow.

Veterinary Infectious Diseases and Physiology (VIDP)

3123
Animal Disease Control and Prevention. Prerequisite: junior standing in the College of Agriculture. Principles of sanitation and of prevention and control of common diseases of livestock and other animals.

5000*
Thesis. 1-6 credits, maximum 6. Prerequisite: senior standing with registration for graduate credit or graduate standing. Research problem for credit in meeting requirements of the M.S. degree under the supervision of a graduate faculty member and with permission of the department head.

5110*
Special Problems. 1-6 credits, maximum 6. Prerequisite: graduate standing or consent of department head. Special research problems in veterinary microbiology and parasitology.

5113*
Veterinary Immunology. Lab 3. Prerequisite: first-year standing in the College of Veterinary Medicine or consent of instructor. Basic principles of immunology and their application to veterinary medicine.

5120*
Current Topics in Veterinary and Biomedical Science. 1 credit, maximum 4. Prerequisite: a minimum of one undergraduate introductory course in microbiology. Development of oral presentation skills, critical thinking and deductive reasoning through the use of discussion of current literature from the field of veterinary and biomedical science as it pertains to the study of infectious disease in humans and animals.

5213*
Diseases and Parasites of Wild Animals. Lab 1. Prerequisite: consent of instructor. A systematic approach to bacterial, viral and parasitic diseases of wild animals. Principles of disease transmission as it relates to individuals and populations of wild animals. Principles applicable to all areas of zoology, veterinary medicine and wildlife management.

5224*
Veterinary Bacteriology and Mycology. Lab 2. Prerequisite: first-year standing in the College of Veterinary Medicine or consent of instructor. The basic principles of bacteriology and mycology that are applicable to the understanding of the pathogenesis, diagnosis, treatment, and control of bacterial and fungal infections of veterinary importance.

5242*
Veterinary Biometry and Principles of Public Health. Prerequisite: first-year standing in the College of Veterinary Medicine. Statistics applied to biological observations applicable to veterinary medicine and principles of public health and epidemiology.

5245*
Veterinary Metabolism and Nutrition. Prerequisite: first-year standing in the College of Veterinary Medicine. Functional metabolism in domestic animals; metabolic disorders using certain diseases as models. Principles of veterinary nutrition and their application in the prevention and treatment of diseases of animals.

5313*
Veterinary Virology. Lab 3. Prerequisite: second-year standing in the College of Veterinary Medicine or consent of instructor. Viruses responsible for disease in domesticated animals.

5404*
Techniques in Parasitology. Lab 1. Prerequisites: graduate standing and general parasitology; helminthology or concurrent enrollment. Experimental application of basic research and teaching techniques in helminthology and protozoology. Individual participation and analysis of experimental situations and techniques applicable to all areas of zoology.

5413*
Basic Reproductive Physiology. Prerequisite: ZOOL 3204. Female and male reproductive processes, the influences of environmental factors upon these processes and the application of reproductive physiology to animal production. Same course as ANSI 5113.

5444*
Veterinary Parasitology. Lab 2. Prerequisite: second-year standing in the College of Veterinary Medicine or graduate standing with major in certain biological sciences. Internal helminth parasites of domestic animals.

5523*
Advanced Helminthology. Lab 3. Prerequisite: senior or graduate standing in zoology or entomology or graduate standing or consent of department head. Structure, taxonomy, life cycles and host-parasite relationships of helminth parasites affecting invertebrate and vertebrate animals.

5533*
Veterinary Virology. Prerequisites: 5313, MICRO 4124 or equivalent. Discussion of theoretical and practical problems relating to the molecular biology of virus replication including virus structure and replication strategies, virus-host cell interactions, and anti-viral mechanisms.

5613*
Biology of Parasites. Prerequisites: graduate standing, general parasitology, or consent of instructor. A systematic and ecologic approach to the study of parasitology. Host-parasite relationships, physiology, ecology and behavioral aspects of parasitic organisms.

5723*
Parasitic Protozoa. Lab 3. Prerequisite: graduate standing in zoology or entomology or consent of instructor. Structure, life cycle, physiology, host-parasite relationships, and diagnosis concerned with protozoan parasites.

5833*

Veterinary Diagnostic Microbiology. Lab 2. Prerequisite: graduate veterinarian status or consent of instructor. Laboratory methods employed in the isolation of microorganisms and application of these methods in the diagnosis of specific animal diseases.

6000*

Research Thesis. 1-11 credits, maximum 45. Prerequisite: candidacy for the Ph.D. degree. Research problems for graduate student to meet thesis requirement of the Ph.D. degree.

6110*

Seminar. 1-6 credits, maximum 6. Prerequisite: graduate standing. Subjects for study and discussion for graduate students.

6120*

Advanced Physiology of Selected Systems. 2-10 credits, maximum 10. Prerequisite: 5125 or ZOOL 4215. Advanced studies in gastrointestinal, cardiovascular, respiratory, excretory and neuroendocrine physiology. Each part of this sequential course may be taken for two hours credit. Student should ascertain the topics before registering for this course a second time.

6203*

Advanced Concepts in Veterinary Immunology. Prerequisite: 5113 or BIOC 3653 or MICR 3254. Induction of immune responses, host defense mechanisms, immunoregulation, antigen presentation and immune recognition by B and T lymphocytes, using contemporary research publications.

6273*

Comparative Neurophysiology. Lab 2. Prerequisite: 5263. Physiology of mammalian nervous systems.

6410*

Endocrine Control of Fuel Metabolism. 1-5 credits, maximum 5. Lab 0-2. Prerequisite: consent of instructor. Emphasis on cellular and molecular aspects of hormone action in target tissues as basis for understanding endocrine regulation of organ and whole body metabolism. Special reference to endocrine pancreas regulation of ketone, carbohydrate (glucose) and lipid (FFA) metabolism in pregnancy, lactation, fasting, obesity and diabetes. Content applicable to health and disease in humans and domestic animals. Course offered in spring semester of alternate years.

6613*

Public Health and Preventive Medicine. Prerequisite: third-year standing in the College of Veterinary Medicine or consent of instructor. The relationship of zoonotic diseases to community and environmental health. Epidemiological principles in the practice of veterinary preventive medicine.

6701*

Veterinary Physiological Science Topics. Lab 1. Prerequisite: fourth-year standing in College of Veterinary Medicine. Elective topics in physiological sciences related to veterinary medicine. Course can fulfill one of elective options of fourth-year veterinary medical students.

6753*

Advanced Veterinary Epidemiology. Prerequisite: STAT 2013 or equivalent. The application of epidemiologic techniques to disease investigations in veterinary medicine. A group discussion format. Also a project involving the application of epidemiologic principle to population disease problems.

6763*

Special Topics in Veterinary Immunology. Prerequisite: one course in immunology or consent of instructor. Selected areas of current interest in veterinary immunology. The subject matter varies from year to year.

Veterinary Medicine (VMED)

5111

Veterinary Medical Orientation I. Prerequisite: first-year standing in the College of Veterinary Medicine. Veterinary medical terminology, history and ethics of the profession, veterinary surveys of the biological kingdom, selected techniques and clinical presentations, and special topics. Graded on a pass-fail basis.

5115*

Cell and Tissue Form and Function I. Prerequisite: first-year standing in the College of Veterinary Medicine or consent of instructor. Cell and tissue organization and structure at the microscopic level and physiology of organ systems. (8-week module).

5126*

Cell and Tissue Form and Function II. Prerequisite: 5115 or consent of instructor. Continuation of VMED 5115. (8-week module).

5144*

Gross and Developmental Anatomy. Prerequisite: first-year standing in the College of Veterinary Medicine or consent of instructor. Embryology and anatomy of domestic mammals using the dog as the primary model. Integrated lecture-dissection-laboratory format. The integration of developmental gross, radiographic and applied aspects of veterinary anatomy as they relate to a topographical appreciation of the living individual. An overview of domestic bird and laboratory animal anatomy.

5152

Zootechnology. Prerequisite: first-year admission to College of Veterinary Medicine fall semester. Animal breeds and identification, animal production and marketing systems and animal handling and restraint as it applies to production and marketing.

5162

Jurisprudence and Ethics. Prerequisite: first-year standing in College of Veterinary Medicine. Introduction to veterinary jurisprudence, ethics, licensing, government regulations, human-animal bond, and evolving issues in animal law and animal welfare.

5211

Clinical Techniques I. Prerequisite: first-year standing in College of Veterinary Medicine. Clinical orientation including rotations in instruction and service units in the College.

5221

Veterinary Medical Orientation II. Prerequisite: 5111. Major breeds of animals; veterinary perspectives concerning animal production and marketing systems; selected techniques and clinical presentations; and special topics.

5234*

Cell and Tissue Form and Function III. Prerequisite: first-year standing in the College of Veterinary Medicine or consent of instructor. Three inter-related areas of fuel metabolism endocrine system, and reproductive physiology and endocrinology.

5243*

Comparative Anatomy. Prerequisite: 5144 or consent of instructor. Comparative and functional gross anatomy and developmental anatomy of domestic mammals. The integration of developmental, gross, radiographic, and applied clinical aspects of veterinary anatomy as they relate to a topographical appreciation of the living individual. Integrated lecture-dissection-laboratory format.

5255*

Infectious Diseases I. Prerequisite: first-year standing in College of Veterinary Medicine or consent of instructor. Introduction to infection and immunity in domestic animals and the use of epidemiology to study disease in populations. Basic biology of bacteria, fungi and viruses as related to disease, diagnosis and therapeutics. The constitutive and induced defenses of animals to infectious agents. Basic principles of epidemiology including biometry, disease transmission, use of diagnostic tests, risk assessment and prevention of disease.

5264*

General Pathology. Prerequisite: first-year standing in College of Veterinary Medicine or consent of instructor. Cellular and tissue pathology, pigments, inflammation, immunopathology, disturbances of growth and circulation, and neoplasia. Functional disturbances that accompany changes in structures as well as the causes and pathogenesis of diseases.

5312*

Food Safety and Quality Assurance. Prerequisite: second-year standing in the College of Veterinary Medicine or consent of instructor. The effect of veterinarians on food safety and quality assurance throughout the food chain. Potential human health hazards in foods of animal origin and principles of safe food production, processing, handling, and inspection, including pathogen reduction, HACCP regulations, and pre-harvest food safety.

5323*

Veterinary Parasitology I. Lab 2. Prerequisite: second-year standing in the College of Veterinary Medicine or consent of instructor. Introduction to the general principles of parasitism including classification, the biology of parasites and host-parasite relationships. Demonstrations and discussions on morphology, biometry, transmission, infectious processes, pathogenicity, diagnosis, treatment and control measures and public health significance of parasites of veterinary medical importance.

5333*

Pharmacology I. Prerequisite: second-year standing in College of Veterinary Medicine or consent of instructor. Introduction of the principles of pharmacodynamics, drug disposition and pharmacokinetics, pharmacological effects, mechanisms of actions, metabolism, disposition, clinical indications and toxic effects of drugs acting on the autonomic, central nervous, cardiovascular, respiratory, and renal systems.

5342*

Clinical Anatomy. Lab 6. Prerequisite: second-year standing in College of Veterinary Medicine. Aspects of gross anatomy as they relate to clinical applications.

5354*

Infectious Diseases II. Lab 1. Prerequisite: second-year standing in College of Veterinary Medicine or consent of instructor. Important animal diseases caused by bacteria, fungi and viruses covered on a systems basis. Selected diseases covered in depth to convey the mechanisms of infectious disease processes and the relationship of such processes to disease development, diagnosis, treatment and control. The relationship of zoonotic diseases to community and environmental health as well as important zoonoses. Coverage includes the integumentary, respiratory, urinary and lymphatic systems.

5362*

Clinical Pathology. Lab 20. Prerequisite: second-year standing in College of Veterinary Medicine or graduate standing with consent of instructor. Basic concepts pertinent to data interpretation and laboratory methods used in evaluation of disease.

6610

Basic Science Elective. 1-8 credits, maximum 8. Prerequisite: third-year standing in the College of Veterinary Medicine. Problems in the basic sciences. Graded on a pass-fail basis.

6611*

Veterinary Medical Specialty Conference. Prerequisite: third-year standing in the College of Veterinary Medicine. Specialty conferences for third-year veterinary medical students presented by visiting professionals. A limited number of field trips will be conducted in which special presentations will be made.

6620

Clinical Science Elective. 1-8 credits, maximum 8. Prerequisite: third-year standing in the College of Veterinary Medicine. Problems in the clinical sciences. Graded on a pass-fail basis.

6721

Veterinary Medical Clinic Conference I. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Presentation and discussion of selected clinical cases by fourth-year students and interdepartmental faculty groups. Graded on a pass-fail basis.

6821

Veterinary Medical Clinic Conference II. Prerequisite: 6711. Presentation and discussion of selected clinical cases by fourth-year students and interdepartmental faculty groups. Graded on a pass-fail basis.

Veterinary Medicine and Surgery (VMS)

5412*

Jurisprudence and Medical Economics. Prerequisite: second-year standing in the College of Veterinary Medicine. Veterinary jurisprudence, medical economics, ethics, public relations, records, banking, insurance, U.S.D.A. and F.D.A. regulations. Visiting lecturers in specialty areas assist in this course.

5422

Veterinary Surgery I. Prerequisites: PHSI 5353; completion or enrollment in PHSI 5434, VPATH 5413; second-year standing in the College of Veterinary Medicine. The pathophysiology of surgery including an introduction to techniques in veterinary surgery and anesthesiology.

5441

Clinical and Surgical Techniques I. Prerequisite: second-year standing in the College of Veterinary Medicine. Behavioral traits, physical examination and restraint of animals, introduction to clinical techniques of medicine and surgery relating to clinical handling of animals. Graded on a pass-fail basis.

6003

Elective I. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Continuation of clinical rotations.

6013

Elective II. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Continuation of clinical rotations.

6023

Elective III. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Continuation of clinical rotations.

6033

Elective IV. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Continuation of clinical rotations.

6043

Elective V. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Continuation of clinical rotations.

6053

Elective VI. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Continuation of clinical rotations.

6501*

Avian Medicine and Surgery. Prerequisite: third year standing in the College of Veterinary Medicine. Clinical aspects of diseases of pet, zoo, exotic, and wild birds.

6516*

Systemic Medicine and Diseases of Domestic Animals I. Prerequisite: third-year standing in the College of Veterinary Medicine. Diagnosis, prognosis, treatment and prevention of diseases of food and fiber animals.

6523

Veterinary Surgery II. Prerequisites: 5422 and third-year standing in the College of Veterinary Medicine. Lectures and discussions in operative techniques and practices in veterinary surgery.

6533*

Diagnostic Imaging. Prerequisite: third-year standing in the College of Veterinary Medicine. Diagnostic imaging with emphasis on radiographic interpretation; also alternate imaging. Presented in a problem-based format.

6542

Clinical and Surgical Techniques II. Prerequisites: 5441 and third-year standing in the College of Veterinary Medicine. Continuation of 5441. Graded on a pass-fail basis.

6614*

Systemic Medicine and Diseases of Domestic Animals II. Prerequisite: third-year standing in the College of Veterinary Medicine. Diagnosis, prognosis, treatment and prevention of diseases of horses.

6615*

Systemic Medicine and Diseases of Domestic Animals III. Prerequisite: VPATH 6524, third-year standing in the College of Veterinary Medicine. Diagnosis, prognosis, treatment and prevention of diseases of companion animals.

6642

Veterinary Surgery III. Prerequisites: 6523 and third-year standing in the College of Veterinary Medicine. Lectures and discussions in anatomical topics, operative techniques and practice in veterinary surgery.

6653

Clinical and Surgical Techniques III. Prerequisites: 6542, third-year standing in the College of Veterinary Medicine. Continuation of 6542. Graded on a pass-fail basis.

6700

Preceptorship Clinic. 1-8 credits, maximum 8. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Diagnosis, prognosis, prevention and treatment of diseases of animals presented in the preceptorship program. Graded on a pass-fail basis.

6703*

Intensive Care Clinic. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Receiving and managing of emergency and critical care cases in companion animals. Graded on a pass-fail basis.

6710

Non-OSU Clinic. 1-8 credits, maximum 8. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Approved clinical rotations off the OSU campus. Graded on a pass-fail basis.

6713*

Radiology Clinic. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Diagnostic radiography, ultrasound, and other special imaging modalities.

6720

Special Clinic I. 1-8 credits, maximum 8. Prerequisite: fourth-year standing in the College of Veterinary Medicine or graduate veterinarian. Special assignments for introductory clinical studies in the following: selected species clinic; herd-health program; necropsy, clinic pathology and parasitology; diagnostic laboratory; and special aspects of the basic sciences.

6723*

Equine Medicine Clinic I. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Diagnosis, prognosis, treatment and prevention of equine medical diseases.

6730

Special Clinic II. 1-8 credits, maximum 8. Prerequisite: fourth-year standing in the College of Veterinary Medicine or graduate veterinarian. Special assignments for continuing clinical studies in the following: selected species clinic; herd-health program; necropsy, clinical pathology and parasitology; diagnostic laboratory; and special aspects of the basic sciences.

6733*

General Medicine and Surgery Clinic I. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Receiving and managing emergency and general medical and surgical cases in companion animals.

6743*

Small Animal Medicine Clinic I. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Diagnosis, treatment and prevention of companion animal medical diseases.

6753*

Small Animal Surgery Clinic I. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Diagnosis, prognosis, treatment and prevention of companion animal surgical diseases.

6763*

Food Animal Medicine Clinic I. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Diagnosis, prognosis, treatment and prevention of diseases of food animal medical and surgical diseases.

6773

Production Medicine Clinic I. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Health studies of animals in herds, bands and flocks entered in health programs of the Boren Veterinary Medical Teaching Hospital.

6783*

Field Services Clinic I. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Diagnosis, prognosis and treatment of animal disease cases presented to the Field Services unit.

6793

Equine Surgery Clinic I. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Diagnosis, prognosis, treatment and prevention of equine surgical diseases.

6803

Clinic Pool I. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Semi-elective clinical assignment.

6811
Special Lectures and Discussions. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Special lectures and discussions of selected topics in veterinary medicine and surgery.

6813*
Anesthesiology Clinic. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Management of clinical anesthesia in various domestic species.

6823
Equine Medicine Clinic II. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Diagnosis, prognosis, treatment and prevention of equine medical diseases. Continuation of 6723.

6833*
General Medicine and Surgery Clinic II. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Receiving and managing emergency and general medical and surgical cases in companion animals. Continuation of 6733.

6843
Small Animal Medicine Clinic II. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Diagnosis, prognosis, treatment and prevention of companion animal medical diseases. Continuation of 6743.

6853
Small Animal Surgery Clinic II. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Diagnosis, prognosis, treatment and prevention of companion animal surgical diseases. Continuation of 6753.

6863
Food Animal Medicine Clinic II. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Diagnosis, prognosis, treatment and prevention of food animal medical and surgical diseases. Continuation of 6763.

6873
Production Medicine Clinic II. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Health studies of animals in herds, bands and flocks entered in health programs of the Boren Veterinary Medical Teaching Hospital. Continuation of 6773.

6883
Field Services Clinic II. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Diagnosis, prognosis, treatment of animal disease cases presented to the Field Services unit. Continuation of 6783.

6893*
Equine Surgery Clinic II. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Diagnosis, prognosis, treatment and prevention of equine surgical diseases. Continuation of 6793.

6900*
Clinical Problems and Investigation. 1-6 credits, maximum 6. Prerequisite: third-year standing in the College of Veterinary Medicine. Diseases of animals.

6910*
Advanced Clinics. 1-6 credits, maximum 6. Prerequisite: third-year standing in the College of Veterinary Medicine. Diseases of animals.

6920*
Seminar. 1-3 credits, maximum 3. Prerequisite: graduate standing in the College of Veterinary Medicine or biological sciences. Literature and research problems pertaining to veterinary medicine and surgery.

6930*
Comparative Anesthesiology. 1-3 credits, maximum 3. Prerequisite: graduate standing in the College of Veterinary Medicine or consent of the head of the department. Anesthesiology of animals.

6950*
Special Surgical Problems and Techniques. 1-5 credits, maximum 5. Lab 3-5. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Advanced training in surgical problems and techniques especially as they are related to research.

6981
Clinic Pool II. Prerequisite: fourth-year standing in the College of Veterinary Medicine. Semi-elective clinical assignment. Graded on a pass-fail basis.

Zoology (ZOOL)

2104
Human Anatomy. Lab 3. Prerequisite: BIOL 1604. Gross anatomy of the human body and its systems based on comparisons with nonhuman mammals dissected in the laboratory. Minor emphasis on embryology and histology.

3013*
Biological Microtechnique. Lab 3. Prerequisite: BIOL 1403 or 1604. Techniques for preparation of biological materials for microscopic examination. Same course as BOT 3013.

3104*
Invertebrate Zoology. Lab 4. Prerequisite: BIOL 1604. Morphology, physiology, reproduction and ecology of major invertebrate groups.

3113
(N)Human Evolution. An evolutionary perspective on human biology. No credit for students with prior credit in 3133.

3115*
Vertebrate Morphology. Lab 6. Prerequisite: BIOL 1604. Comparative gross anatomy of representative vertebrates with consideration given to embryology, histology and evolution.

3123*
(N)Human Heredity. The impact of genetics on human endeavor. No credit for students with prior credit in BIOL 3024.

3133*
Evolution. Prerequisite: 3123 or BIOL 3024. Development of the evolutionary concept: speciation, evolutionary mechanisms and phylogenetic concepts.

3143
Oceanography. Prerequisite: CHEM 1225. Ocean basins, geology, chemistry, biology, waves, tides, ocean exploration, ocean communities, and resources.

3153
(N)Animal Behavior. Prerequisite: junior standing. Survey of theory and application in basic and applied animal behavior. Interdisciplinary analysis of animal behavior in the field, captive settings and laboratories.

3204*
Physiology. Lab 2. Prerequisites: CHEM 1215 or equivalent and BIOL 1214 or equivalent. Anatomy and function of the human body. Human and domestic animal physiology considered in laboratories. No credit for students with prior credit in 4215.

3500
Colloquium on the Environment and Conservation. 1 credit, maximum 4. Current conservation and environmental concerns presented by scholars and experts emphasizing discovery and solutions. Natural resource agencies and conservation organizations.

3502
Wildlife Law Enforcement. Prerequisites: junior standing and consent of instructor. Survey of state and federal wildlife laws with emphasis on Oklahoma statutory and regulatory laws pertaining to wildlife. Lectures, guest lectures, videotapes, and field exercises.

3513*
Principles of Conservation Biology. Prerequisites: 60 credit hours including BIOL 3034. Application of ecological principles to the maintenance and restoration of biological diversity at genetic, population, and community levels.

3700
Readings and Special Studies in Zoology. 1-3 credits, maximum 6. Prerequisites: BIOL 1604 and consent of instructor. Discussion of selected readings.

4103*
General Parasitology. Lab 2. Prerequisites: BIOL 3104 or BIOL 1604 and consent of instructor. Fundamentals of parasitism with emphasis on: life cycles, disease conditions, epidemiology, diagnosis, treatment, historical significance, terminology, taxonomy and parasitological techniques.

4113
Conservation Genetics. Prerequisites: BIOL 3024 or equivalent, MATH 1513. Principles of population genetics as they pertain to issues in conservation biology. Evolutionary relationships, hybridization, natural selection, factors affecting small populations, gene flow, captive populations, and META populations. No credit for students with credit in 5113.

4114*
Biology of Fishes, Amphibians and Reptiles. Lab 5. Prerequisite: BIOL 1604. Systematics, evolution, and natural history of fishes, amphibians and reptiles; laboratory emphasis on Oklahoma species. Offered spring semester of even-numbered years. Weekend field trips required.

4124*
Biology of Birds and Mammals. Lab 3. Prerequisites: BIOL 1604. Classification, identification, evolution, zoogeography, life histories, and techniques of study for wild birds and mammals. Weekend field trips required.

4134*
Embryology. Lab 4. Prerequisite: 3115, BIOL 3014, or consent of instructor. Biochemical basis of development with emphasis on gene regulation. Comparative development of sea urchin, frog, chick and pig. Experiments using frog and mouse, including the molecular level.

4215*
Mammalian Physiology. Prerequisites: CHEM 3015 and BIOL 1604. Descriptive and quantitative functional analysis of the mammalian nervous, endocrine, respiratory, excretory, digestive, cardiovascular, musculoskeletal and reproductive organ systems. For majors in basic biological (including premedical, pre-dental and pre-veterinary) sciences.

4222*
Mammalian Physiology Laboratory. Lab 6. Prerequisite: 4215. Laboratory experiments that illustrate function of organs, organ systems or mechanisms of whole body physiological control. For students majoring in basic biological sciences.

4231
Seminar in Physiology. Research and the integration of experimental biology with applied biology. Active participation by the student.

4243*

Introductory Pharmacology. Prerequisite: 3204 or 4215 or consent of instructor. Major drug classes based on their predominant use or principal activity in the body; basis for drug action; and modification of drugs and their action by physiological processes.

4253*

General Vertebrate Histology. Lab 3. Prerequisite: 3115 or consent of instructor. Cellular structure of tissues and organs.

4264*

Cell Physiology. Lab 3. Prerequisite: BIOC 3653 or BIOL 3014. Cellular activities and fundamental physiological processes. Same course as CLML 4264.

4273

Comparative Physiology. Prerequisite: 3204 or 4215 or equivalent. Comparative, environmental and ecological physiology of nonhuman animals, with emphasis on vertebrates. Thermoregulation, osmoregulation, comparative aspects of respiratory, circulatory, digestive, muscle, and sensory physiology, and adaptations to extreme environments. Same course as 5273.

4283*

Endocrinology. Prerequisites: 3204 or 4215, and CHEM 3015 or consent of instructor. Mechanisms of endocrine, autocrine and paracrine regulation in non-human species, with emphasis on vertebrates. Function of the hypothalamus, pituitary, adrenal, thyroid, testes, ovary and pancreas; hormonal effects on various target tissues; homeostatic control of endocrine function; comparative endocrinology.

4303*

Environmental Toxicology. Prerequisites: BIOL 1114 or equivalent; CHEM 1215 or 1314; junior standing. Introduction to the basic theories, principles, and techniques of environmental toxicology. Comparative study of the groups of toxicants (e.g. heavy metals, PCB's, insecticides) and discussion of the environmental problems created by these chemicals and their implications for survival of populations (including humans) on earth.

4414*

Fisheries Management. Lab 4. Prerequisite: BIOL 3034. Techniques and principles involved in management of fishes. Field trip fee required.

4434*

Limnology. Lab 3. Prerequisite: BIOL 3034. Physical, chemical and biological factors in lakes and streams.

4513*

Wildlife Management. Prerequisite: 3513. Biological basis for the management of wildlife populations and habitats, with emphasis on current management problems.

4523*

Wildlife Management Techniques. Prerequisite: 4513, ENGL 3323 strongly recommended. The semistructured format includes problem identification, project planning and design, land use surveys and mapping, wildlife populations and habitat analysis, data interpretation, development of project area research and management recommendations, and report preparation and presentation.

4532*

Zoo Biology and Management. Lab 3/day. Prerequisite: 4 hours of zoology or biology. Conservation and propagation of endangered species, animal acquisition and transport, restraint, sanitation and animal health, exhibit planning and design, public relations, administration and research. Lectures by professional zoo staff members. Extension course taught at the Oklahoma City and Tulsa zoos.

4700

Undergraduate Research Problems. 1-4 credits maximum 4. Prerequisite: consent of instructor. Participation in faculty research or execution of a problem formulated by the student.

4750

Honors Study in Zoology. 1-5 credits, maximum 5. Prerequisites: 90 credit hours, GPA of 3.30 in 16 or more hours in zoological courses, consent of department head and proposed supervising instructor. Individual study in the development of zoological concepts. Extensive reading, literature search and special experimentation. An individual problems course for the gifted student.

5000*

Research for Master's Thesis. 1-6 credits, maximum 6. Independent research for the M.S. thesis under the supervision of graduate faculty member.

5010*

Graduate Seminar. 1-3 credits, maximum 10. Discussion of selected topics.

5020*

Special Problems. 1-4 credits, maximum 10. Prerequisites: graduate standing and consent of instructor. A report of results obtained is to be placed in department files.

5030*

Teaching Zoology. 1-4 credits, maximum 4. Prerequisites: senior or graduate standing and consent of department head. Supervised teaching in the department laboratories. Attendance at seminar on problems involved in teaching zoology in college.

5113*

Conservation Genetics. Prerequisites: BIOL 3024 or equivalent, MATH 1513. Theory and principles of population genetics as they pertain to issues in conservation biology. Evolutionary relationships, hybridization, natural selection, factors affecting small populations, gene flow, captive populations, META populations, and data analysis. No credit for students with credit in 4113.

5123*

Behavioral Ecology. Prerequisite: BIOL 3034 or equivalent. Analysis and description of the behavior of animals in their natural environment, especially in terms of natural selection and adaptation. A synthesis of ethology, population genetics, sociobiology, and evolutionary theory. Largely descriptive and generalized with limited emphasis on mathematical theory.

5133*

Evolutionary Ecology. Lab 2. Prerequisite: BIOL 3034. Ecological concepts dealing with contemporary evolutionary processes, not phylogeny. Life history traits, R and K selection, sociality, kin and group selection, speciation, competition, predation, plant-animal coevolution, niche theory, species diversity and biogeography. General models and mechanisms, with examples drawn from all kingdoms.

5143*

Ecological Computer Modeling. Lab 3. Prerequisite: BIOL 3034; BIOL 5133 strongly recommended. Use of BASIC to write programs that model simple concepts in ecology and behavioral biology. Use of interactive program packages that model more complex ecological and evolutionary phenomena at the computer console. No prior experience with computers or programming necessary.

5153*

Ecosystem Analysis. Prerequisites: BIOL 3034; CHEM 3015 or equivalents. Theory and principles of ecosystem ecology focusing on metabolism and biogeochemical cycling in terrestrial and aquatic systems. Application of principles to current issues of environmental change and management. Same course as BOT 5153.

5273*

Comparative Physiology. Prerequisites: 3204 or 4215 or equivalent. Comparative, environmental and ecological physiology of nonhuman animals, with emphasis on vertebrates. Thermoregulation, osmoregulation, comparative aspects of respiratory, circulatory, digestive, muscle, and sensory physiology, and adaptations to extreme environments. Same course as 4273.

5314*

Wildlife Toxicology. Lab 6. Examination of methods used for evaluation of toxic responses of wildlife to pollutants; demographic surveys, biomarkers, toxicity tests. Emphasis on terrestrial ecosystems.

5323*

Principles of Toxicology. Basic toxicological principles, mechanism of toxicity, and toxicological testing procedures. Toxic effects of environmental exposure to xenobiotics.

5413*

Principles of Ecotoxicology. Integration of major processes involved with transport, exposure and response of biological systems to xenobiotics.

5424*

Analysis of Environmental Contaminants. Lab 6. Analytical methods for measuring environmental contamination or pollution; toxicity bioassay, gas chromatography, atomic absorption, infrared and ultraviolet spectrometry.

5433*

Fisheries Science. Prerequisite: 4414 or equivalent or consent of instructor. Principles of fisheries science as they relate to fish and aquatic biota, their habitats, and the humans who utilize them.

5463*

Stream Ecology. Lab 1. Prerequisite: BIOL 3034 or equivalent. Ecology of streams and rivers with emphasis on physical and chemical processes, adaptations of aquatic biota to riverine environments, and human impacts on riverine ecosystems.

5553*

Wildlife Nutritional Ecology. Prerequisite: 4523. Basic nutritional principles for application in solving wildlife and fisheries management problems. Importance of nutrition in regulating wild animal populations through examination of the effects of malnutrition on recruitment, growth, disease, and survival. Techniques and skills for assessing both the nutritional suitability of the habitat and condition of the population.

5563*

Woodland Wildlife Ecology. Lab 3. Prerequisite: 4513 or BIOL 3034. Vertebrate species diversity in the world's woodland and forested biomes. Changes imposed by land clearing and development and their effects upon wildlife diversity and populations. Options for wildlife conservation, from strict nature reserves to integrating wildlife habitat management into land use practices. Field trip required.

5573*

Grassland and Desert Wildlife Ecology. Prerequisite: BIOL 3034. Ecology of grasslands and deserts with emphasis on vertebrate species diversity, adaptations to semi-arid and arid ecosystems, and management problems associated with such habitats.

5583*

Wetland Wildlife Ecology. Lab 3. Prerequisite: 4513 or consent of instructor. Ecology of various types of wetlands with emphasis on the management problems for waterfowl and fur-bearers.

5593*

Diseases and Parasites of Wild Animals. Lab 2. A systematic approach to bacterial, viral and parasitic diseases of wild animals. Principles of disease transmission as it relates to individuals and populations of wild animals. Principles are applicable to all areas of zoology, veterinary medicine and wildlife management. Same course as VPARA 5213.

6000*

Research for Ph.D. Dissertation. 1-15 credits, maximum 30. Independent research for the Ph.D. dissertation under the supervision of a graduate faculty member.

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