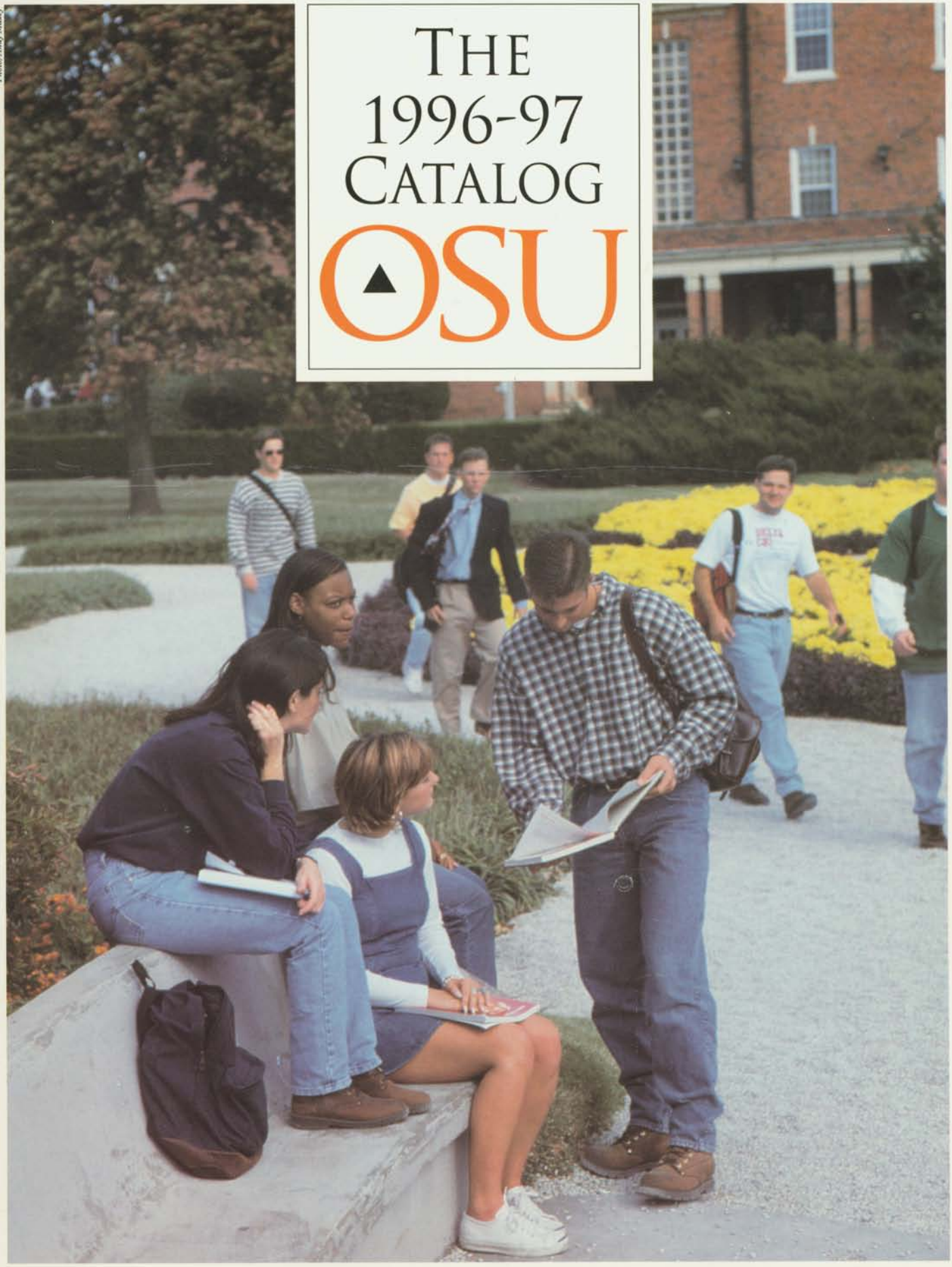
THE 1996-97 CATALOG

OSU



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OKLAHOMA STATE UNIVERSITY

CATALOG

1996-97

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.* OSU information is also available via the Internet (www.okstate.edu). Publications concerning a number of topics are also available upon request.

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 $5.25 for Library Rate or $7.00 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.

Photographs are courtesy of Centennial Histories, Special Collections, *The Daily O'Collegian,* and various OSU offices and colleges.

This publication, issued by Oklahoma State University as authorized by the Office of the Registrar, was printed by Custom Printing Company at a cost of $19,098.00 for 18,000 copies.

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University Administration

Selected administrators directly responsible for academic and service programs for students.

JAMES E. HALLIGAN, Ph.D., *President*
MARVIN S. KEENER, Ph.D., *Interim Provost and Vice-President for Academic Affairs*
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PATRICIA K. KNAUB, Ph.D., *Dean of the College of Human Environmental Sciences*
THOMAS WESLEY ALLEN, D.O., *Provost and Dean of the College of Osteopathic Medicine (Tulsa)*
JOSEPH W. ALEXANDER, Ph.D., D.V.M., *Dean of the College of Veterinary Medicine*
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ANTHONY BROWN, Ph.D., *Coordinator of Programs, University Center At Tulsa (offices are located in Tulsa)*
CHARLES BRUCE, Ph.D., *Director of Financial Aid*
LARRY KRUSE, M.S., *Director of High School and College Relations*
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ROBERT E. GRAALMAN, Ph.D., *Director of University Scholarships*
ROBIN H. LACY, Ed.D., *Registrar*

Contents

University Calendar

First Semester 1996-97, Fall 1996

August 12-16, Monday-Friday
Enrollment

August 16, Friday
Last day to cancel enrollment

August 19, Monday
Class work begins

August 23, Friday
Last day to enroll

August 23, Friday
Last day for 80% refund on withdrawal

August 26, Monday
Last day to add

August 30, Friday
Last day to file a diploma application

August 30, Friday
Last day to drop a course with no grade and no fees charged for course

August 30, Friday
Last day for 50% refund on withdrawal

September 2, Monday
University holiday

September 9, Monday
Last day for 25% refund on withdrawal

September 27, Friday
Last day to drop or withdraw with an automatic "W"

October 7, 8, Monday, Tuesday
Fall break (tentative)

October 9, Wednesday
"Monday" classes will meet

October 11, Friday
Progress reports for freshmen due from faculty

October 25, Friday
Last day to drop with an assigned "W" or "F"

November 4, Monday
Enrollment for Spring begins

November 27, Wednesday
Last day to withdraw with an assigned "W" or "F"

November 28, Thursday
University holiday begins

December 2, Monday
Class work resumes

December 2-6, Monday-Friday
Pre-finals week

December 9-13, Monday-Friday
Final examinations

December 13, Friday
Class work ends

December 17, Tuesday
Grades due from faculty

December 24-January 1, Tuesday through Wednesday
University holidays

Winter Intersession

December 2-6, Monday-Friday
Enrollment

December 16, Monday
Intersession begins

December 27, Friday
Intersession ends

Second Semester 1996-97, Spring 1997

January 6-10, Monday-Friday
Enrollment

January 10, Friday
Last day to cancel enrollment

January 13, Monday
Class work begins

January 17, Friday
Last day to enroll

January 17, Friday
Last day for 80% refund on withdrawal

January 20, Monday
Last day to add

January 24, Friday
Last day to file a diploma application

January 24, Friday
Last day to drop a course with no grade and no fees charged for course

January 24, Friday
Last day for 50% refund on withdrawal

January 31, Friday
Last day for 25% refund on withdrawal

February 21, Friday
Last day to drop or withdraw with an automatic "W"

March 7, Friday
Progress reports for freshmen due from faculty

March 8, Saturday
Spring break begins (tentative)

March 17, Monday
Class work resumes

March 24, Monday
Enrollment for Fall begins

March 28, Friday
Last day to drop with an assigned "W" or "F"

April 25, Friday
Last day to withdraw with an assigned "W" or "F"

April 28-May 2, Monday-Friday
Pre-finals week

May 5-9, Monday-Friday
Final examinations

May 9, Friday
Class work ends

May 10, Saturday
Commencement

May 13, Tuesday
Grades due from faculty

Summer 1997, Regular 8-Week Sin caner Session

May 26, Monday
University holiday

June 5-6, Thursday, Friday
Enrollment

June 6, Friday
Last day to cancel enrollment

June 9, Monday
Class work begins

June 10, Tuesday
Last day for 80% refund on withdrawal

June 11, Wednesday
Last day to enroll

June 11, Wednesday
Last day to add

June 12, Thursday
Last day for 50% refund on withdrawal

June 13, Friday
Last day to file a diploma application

June 13, Friday
Last day to drop a course with no grade and no fees charged for course

June 13, Friday
Last day for 25% refund on withdrawal

June 27, Friday
Last day to drop or withdraw with an automatic "W"

July 4, Friday
University holiday

July 11, Friday
Last day to drop with an assigned "W" or "F"

July 18, Friday
Last day to withdraw with an assigned "W" or "F"

August 1, Friday
Class work ends

August 5, Tuesday
Grades due from faculty

Short summer sessions are usually held for three weeks in May, for four weeks in June, and for four weeks in July.

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

First Semester 1997-98, Fall 1997

August 18-22, Monday-Friday
Enrollment

August 22, Friday
Last day to cancel enrollment

August 25, Monday
Class work begins

August 29, Friday
Last day to enroll

August 29, Friday
Last day for 80% refund on withdrawal

September 1, Monday
University holiday

September 2, Tuesday
Last day to add

September 5, Friday
Last day to file a diploma application

September 8, Monday
Last day to drop a course with no grade and no fees charged for course

September 8, Monday
Last day for 50% refund on withdrawal

September 15, Monday
Last day for 25% refund on withdrawal

October 3, Friday
Last day to drop or withdraw with an automatic "W"

October 17, Friday
Progress reports for freshmen due from faculty

October 20, 21, Monday, Tuesday
Fall break (tentative)

October 22, Wednesday
"Monday" classes will meet

October 31, Friday
Last day to drop with an assigned "W" or "F"

November 10, Monday
Enrollment for Spring begins

November 27, Thursday
University holiday begins

December 1, Monday
Class work resumes

December 5, Friday
Last day to withdraw with an assigned "W" or "F"

December 8-12, Monday-Friday
Pre-finals week

December 15-19, Monday-Friday
Final examinations

December 19, Friday
Class work ends

December 23, Tuesday
Grades due from faculty

December 24-January 1, Wednesday through Thursday
University holidays

Winter Intersession

December 8-12, Monday-Friday
Enrollment

December 22, Monday
Intersession begins

January 2, Friday
Intersession ends

Second Semester 1997-98, Spring 1998

January 5-9, Monday-Friday
Enrollment

January 9, Friday
Last day to cancel enrollment

January 12, Monday
Class work begins

January 16, Friday
Last day to enroll

January 16, Friday
Last day for 80% refund on withdrawal

January 19, Monday
Last day to add

January 23, Friday
Last day to file a diploma application

January 23, Friday
Last day to drop a course with no grade and no fees charged for course

January 23, Friday
Last day for 50% refund on withdrawal

January 30, Friday
Last day for 25% refund on withdrawal

February 20, Friday
Last day to drop or withdraw with an automatic "W"

March 6, Friday
Progress reports for freshmen due from faculty

March 14, Saturday
Spring break begins (tentative)

March 23, Monday
Class work resumes

March 23, Monday
Enrollment for Fall begins

March 27, Friday
Last day to drop with an assigned "W" or "F"

April 24, Friday
Last day to withdraw with an assigned W or "F"

April 27-May 1, Monday-Friday
Pre-finals week

May 4-8, Monday-Friday
Final examinations

May 8, Friday
Class work ends

May 9, Saturday
Commencement

May 12, Tuesday
Grades due from faculty

Summer 1998 Regular 8-Week Summer Session

May 25, Monday
University holiday

June 4, 5, Thursday, Friday
Enrollment

June 5, Friday
Last day to cancel enrollment

June 8, Monday
Class work begins

June 9, Tuesday
Last day for 80% refund on withdrawal

June 10, Wednesday
Last day to enroll

June 10, Wednesday
Last day to add

June 11, Thursday
Last day for 50% refund on withdrawal

June 12, Friday
Last day to file a diploma application

June 12, Friday
Last day to drop a course with no grade and no fees charged for course

June 12, Friday
Last day for 25% refund on withdrawal

June 26, Friday
Last day to drop or withdraw with an automatic W

July 3, Friday
University holiday

July 10, Friday
Last day to drop with an assigned W or "F"

July 17, Friday
Last day to withdraw with an assigned "W" or "F"

July 31, Friday
Class work ends

August 4, Tuesday
Grades due from faculty

Short summer sessions are usually held for three weeks in May, for four weeks in June, and for four weeks in July.

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 Osteopathy 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. OSU's 1.7 million volume library, its 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, all 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 25,800 students, approximately 19,150 are on the Stillwater campus, (including 750 students at the University Center at Tulsa), 2,200 at Okmulgee and 4,150 at Oklahoma City, and 300 students at the College of Osteopathic Medicine in Tulsa. Eighty-three percent of the undergraduate enrollment is from Oklahoma; nine percent from other states; and eight percent from more than 90 foreign countries. Of the undergraduate population, 54 percent are men and 46 percent are women. Minorities make up 14 percent of the undergraduate student body. The graduation rate of full-time, degree-seeking undergraduate students is 49 percent.

The graduate student enrollment totals 4,300. Of these students, approximately 400 enroll through the University Center at Tulsa. Sixty-nine percent are from Oklahoma; 13 percent from other states; and 18 percent from foreign countries. Of the graduate population, 55 percent are men and 45 percent are women. Minorities make up 12 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 200 permanent buildings. These facilities include one of the largest libraries in the entire Southwest, a large Student Union complete with hotel facilities, the Colvin Physical Education Center, the Bartlett Center for the Studio Arts, and the Seretean Center for the Performing Arts.

Recently three state-of-the-art facilities were constructed which nicely complement the University's campus design and overall mission. The Noble Research Center is a major interdisciplinary research facility that enhances collaboration of basic research among various departments throughout the University. The Center for International Trade Development focuses on identifying and developing overseas markets for Oklahoma products and services. The first-in-the-nation Wellness Center is dedicated to developing contemporary health maintenance programs.

In November 1992 the people of Oklahoma approved a higher education bond issue that funded at least 15 new projects for OSU. The first of three major projects was the relocation of the College of Education to Willard Hall in the spring of 1996. Willard Hall is a stately Georgian-style facility in the heart of campus. The two remaining projects include the Food Processing Center and the Advanced

Technology Research Center; they will be completed in Fall 1996 and Fall 1997 respectively.

The Food and Agricultural Products Processing Center for Research and Technology will advance Oklahoma's position and the College of Agricultural Sciences and Natural Resources as a world leader in value-added food processing technology. The Advanced Technology Research Center will provide state-of-the-art research facilities for the College of Engineering, Architecture and Technology as well as replace aging facilities.

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 which 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 approximately 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 both a depth of knowledge in their major fields of study and a breadth of knowledge outside their majors, the best graduate being one with a mastery of a specific subject matter and a solid and diversified general education. As a result of this commitment to breadth and general education, the following 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 both 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

Not only has Oklahoma State University enjoyed accreditation by the North Central Association of Colleges and Secondary Schools, but programs within the colleges are also accredited.

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. 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; and the music department is accredited by the National Association of Schools of Music. The program of clinical psychology is accredited by the American Psychological Association; the program in speech and language pathology 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, a nationally-recognized accrediting body for programs in business and management. 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, the only nationally-recognized accrediting body for programs in aviation. OSU was the first university in Oklahoma with a program that received this designation. The counseling psychology program is provisionally accredited by the American Psychological Association. Programs in the School of Health, Physical Education and Leisure are accredited by the National Recreation and Park Association as well as the American Association for Leisure and Recreation. All teacher education programs are accredited by the Oklahoma State Board of Education and the North Central Association of Colleges and Secondary Schools. Vocational education programs in business education, technical education, and trade and industrial education are also accredited by the Oklahoma State Department of Vocational-Technical Education.

In the *College of Engineering, Architecture and Technology,* engineering and technology programs are reviewed for accreditation by separate commissions of the Accreditation Board for Engineering and Technology as measured against general and program-specific criteria. Consult the program descriptions in the *Catalog* for details of current accreditation status. The National Architecture Accrediting Board has accredited the bachelor's program in architecture.

Professional programs in the *College of Human Environmental Sciences* are recognized by prestigious accreditations and approvals. 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. The Foundation of Interior Design Education Research has accredited the undergraduate interior design program. The Child Development Laboratory that serves as a model teaching laboratory for students in early childhood education is licensed by the state of Oklahoma Department of Human Services. The American Association of Marriage and Family Therapists (AAMFT) has accredited the master's program in marriage and family therapy. The American Dietetic Association has approved the Dietetic Internship and the Didactic Program in Dietetics (DPD).The School of Hotel and Restaurant Administration is accredited by the Accreditation Commission for Programs in Hospitality Administration (ACPHA). The early childhood education program is accredited as a part of the OSU Teacher Education unit.

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 has been accredited by the American Animal Hospital Association.

Programs at OSU's branch campuses have also received accreditation from national agencies. The College of Osteopathic Medicine-OSU is accredited by the Bureau of Professional Education of the American Osteopathic Association. The nursing program at OSU-Oklahoma City is accredited by the National League for Nursing and approved by the Oklahoma Board of Nurse Registration and Nursing Education.

OSU-Okmulgee is accredited by the Commission on Institutions of Higher Education of the North Central Association of Colleges and Secondary 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.

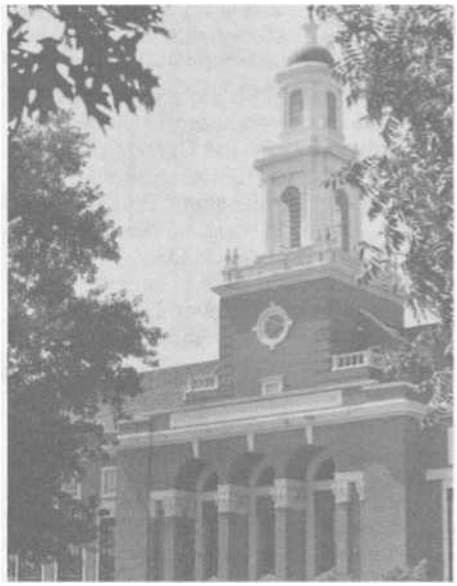
Refer to the appropriate college sections in the *Catalog* for further information on accreditation of specific programs.

Affirmative Action Program

Carolyn Hernandez, *Director*

OSU's Affirmative Action Program reflects the commitment of the University to equal opportunity and outlines the procedures necessary to fulfill this commitment. OSU is committed by policy of its Board of Regents to promote equal opportunity in all phases of university life for all persons within its constituency. The Affirmative Action Program complies with the legal requirements for federal and state civil rights laws and implements directives. Members of ethnic minority groups, women, disabled individuals, disabled veterans, and veterans of the Vietnam era, and the aged in society have faced many complex barriers to equal opportunity in the past. OSU has devised action-oriented programs designed to remove tangible and intangible barriers to equal opportunity, thereby demonstrating through the success of these programs that the goals of equal opportunity held by American society are attainable.

To adequately meet the needs of protected groups, such as the qualified disabled, self-identification 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 nondiscriminatory 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*

Darlene Wilson, *Administrative Associate*

Paulette Cundiff, *Coordinator, Admissions Operations*

Linda Peale, ***Coordinator, Admissions Programs***

Karen Power, ***Coordinator, International Admissions***

Karen R. ***Mott, Coordinator,*** *Transfer Credit Evaluations*

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 $15 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 the 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 1996-97 academic year, students must meet the curricular requirements listed below, graduate from an accredited high school, participate in either the American College Test (ACT) or a similar acceptable standardized test, and 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 classes;

   or

2. attain an ACT composite score of 22 or higher or a total SAT composite score of 1010 or higher, if taken prior to April 1, 1995, or a 1030 if taken April 1, 1995 or after.

Curricular Requirements. All students beginning college work after July 1, 1988 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

It is also recommended that students complete at least four units (years) from the following subjects:

Computer science	Government
Economics	Psychology
Foreign language	Sociology
Geography	Speech

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

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 unit, 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, 1997.

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, ora total SAT composite score of 1010 or higher, if taken prior to April 1, 1995, or a 1030 if taken April 1, 1995 or after, 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. He or she must meet freshman admission requirements (other than high school graduation and curricular requirements). This includes having participated in the American College Testing program (ACT) or Scholastic Aptitude Test (SAT).
   b. He or she must 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. He or she must have achieved a composite score which places him or her at or above the 90th percentile on the ACT using Oklahoma norms, or
   b. He or she must have a combined verbal and mathematical score on the SAT that places him or her 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.

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. He or she must be 17 years of age or older and meet the standardized test admission requirements; or
   b. He or she must be 16 years of age and have achieved a composite score which places him or her at or above the 90th percentile on the American College Test (ACT) using Oklahoma norms or whose combined verbal and mathematical score on the Scholastic Aptitude Test (SAT) places him or her 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.

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. If the subject score(s) is below 19, the student may enroll in college-level course work if, through OSU's predictive research formula, the student shows readiness for college-level work or takes an assessment test that indicates placement in college-level work.

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 $15 for all applicants. The fee must accompany a student's Application for Admission.

Oklahoma Residents

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.) 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 Association 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.
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 of (1-a) and (1-b) 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 score of 500 or above 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. $15.00 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 or above on the examination taken within the last two years.
4. Documented evidence of financial support.

Freshman Admission (International Students). For the purpose of determining 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 1-20 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 1-20 processed for transfer by the Office of International Student Services 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 1-20 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 Student Services 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 participate 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. The student will receive the form Medical History and Immunization Schedule at enrollment, or the student may contact the OSU Wellness Center.

Physical Examination. All new students must complete a physical examination as part of the admission process. 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

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.
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 issuance of a permanent resident alien card, who has resided in Oklahoma for at least 12 consecutive months following issuance of a permanent resident alien card, 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***

Gordon L. Reese, ***Interim Associate Registrar***

Darlene Wilson, ***Administrative Associate***

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

Joan M. Payne, ***Coordinator, Certification Services***

Carl E. Jordan, ***Coordinator, Enrollment Services and Student Data***

Linda J. Bentley, ***Coordinator, Publications***

Shirilyn Dehls, ***Coordinator, Student Records***

Doug Reed, ***Manager, Computer Systems***

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 Office of Student Affairs fall orientation program designed for all students new to Oklahoma State University. It is a combined effort of many units of the University and the local community to provide a sense of belonging and well being for new students. ALPHA allows new students to move into their housing units two days ahead of the upperclassmen, to become aware of the services, resources, and people available to them, and to foster peer friendship, development, and support. ALPHA begins on the Thursday before classes start in August. Specific information is mailed during the summer months to all new students who have applied for admission.

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. The advisers can sign a Trial Schedule form for students wishing to enroll in the Sectioning Room of the Student Union, or they can 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. Certain groups of students are extended the option of enrolling prior to the time continuing students begin enrolling. Physically handicapped students are extended the option of priority enrollment. Those students actively participating in the University Honors Program are extended the option of priority enrollment. Current OSU students who accept University scholarships which require that the student perform a service for the University at a regular time specified by the University, will be given priority enrolling. Scholarships that qualify students for priority in turning in trial schedules are University band, athletic, and graduate teaching assistantships for teaching or research assignments. Wentz Scholars, President's Distinguished Scholars (PDS), President's Leadership Council (PLC) recipients, and participants in the OSRHE Academic Scholars program are also extended the option of priority enrollment. Working part-time for the University or outside the University does not qualify the student for priority enrollment.

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 sixth class day of a regular semester or the third class day of a summer session is the last day a course may be added. A short course may be added no later than the first day of the short course.

Dropping Courses. 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.

After the deadline for dropping with no record, but prior to the end of the sixth week of a regular semester or the third week of a summer session, or proportionate periods for block or short courses, a student may drop a course and receive the grade of "W" (dropped).

After the sixth week of a regular semester or the third week of a summer session but prior to the end of the 10th week of a regular semester or the fifth week of a summer session, a student may drop a course with the grade of "W" (dropped) or "F" (failing) as assigned by the instructor. The grade of "F" will be calculated in the grade-point average.

After the 10th week of a regular semester, or the fifth week of a summer session, or proportionate periods for block or short courses, a student may not drop a course and shall 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

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. A student who withdraws prior to the end of the sixth week of a regular semester or the third week of a summer session will receive a grade of "W" (withdrawn). A student who withdraws after the sixth week of a regular semester or the third 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 "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 shall 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 scan 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.

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. 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. 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; class schedule; 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; parents' names and addresses.

"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 1996-97 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

$52.00	General fee
$3.11	Student activity fee
$ .85	Student assessment fee
$4.30	Facility fee
$1.50	Library automation and mainframe fee
$5.00	Technology fee*
$66.76	Total per credit hour
$2.00	*The Daily O'Collegian* fee per semester
$46.00	Student Health Center fee per semester**
$5.00	Records maintenance fee per semester

Upper-division courses

$55.50	General fee
$3.11	Student activity fee
$ .85	Student Assessment fee
$4.30	Facility fee
$1.50	Library automation and mainframe fee
$5.00	Technology fee*
$70.26	Total per credit hour
$2.00	*The Daily O'Collegian* fee per semester
$46.00	Student Health Center fee per semester**
$5.00	Records maintenance fee per semester

Graduate-division courses

$73.50	General fee
$3.11	Student activity fee
$ .85	Student assessment fee
$4.30	Facility fee
$1.50	Library automation and mainframe fee
$5.00	Technology fee*
$88.26	Total per credit hour
$2.00	*The Daily O'Collegian* fee per semester
$46.00	Student Health Center fee per semester**
$5.00	Records maintenance fee per semester

Nonresidents of Oklahoma

Lower-division courses

$52.00	General fee
$3.11	Student activity fee
$ .85	Student assessment fee
$4.30	Facility fee
$1.50	Library automation and mainframe fee
$5.00	Technology fee*
$115.50	Nonresident tuition
$182.26	Total per credit hour
$2.00	*The Daily O'Collegian* fee per semester
$46.00	Student Health Center fee per semester**
$5.00	Records maintenance fee per semester

Upper-division courses

$55.50	General fee
$3.11	Student activity fee
$ .85	Student assessment fee
$4.30	Facility fee
$1.50	Library automation and mainframe fee
$5.00	Technology fee*
$130.50	Nonresident tuition
$200.76	Total per credit hour
$2.00	*The Daily O'Collegian* fee per semester
$46.00	Student Health Center fee per semester**
$5.00	Records maintenance fee per semester

Graduate-division Courses

$73.50	General fee
$3.11	Student activity fee
$ .85	Student assessment fee
$4.30	Facility fee
$1.50	Library automation and mainframe fee
$5.00	Technology fee*
$160.00	Nonresident tuition
$248.26	Total per credit hour
$2.00	*The Daily O'Collegian* fee per semester
$46.00	Student Health Center fee per semester**
$5.00	Records maintenance fee per semester

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

College of Veterinary Medicine

Oklahoma Residents

$2,444.00	General fee per semester
$3.11	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	*The Daily O'Collegian* fee per semester
$46.00	Student Health Center fee per semester**
$5.00	Records maintenance fee per semester

Nonresidents of Oklahoma

$2,444.00	General fee per semester
$3.11	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
$4,509.00	Nonresident tuition per semester
$2.00	*The Daily O'Collegian fee* per semester
$46.00	Student Health Center fee per semester**
$5.00	Records maintenance fee per semester

**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 additional amount per credit hour for Oklahoma residents and nonresidents. Nonresidents will also be charged additional 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 fee which includes a fee for comprehensive health and pharmacy services and a fee for bond indebtedness. Students enrolled in six or fewer hours will be assessed the bond indebtedness fee only (which does not allow use of the medical services); however, health and pharmacy services are available 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 students $15.00

Application fee for all graduate students $25.00

Audit without credit same as Oklahoma residents general fee

Automobile parking permit (per year):
- Campus residents $35.00
- Off-campus residents $45.00

Correspondence course fees (per credit hour) $55.00

Graduation fees:
- 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:
- first day $5.00
- maximum $10.00

Remedial
- Supplementary fee (per credit hour, in addition to the general fee) $24.00

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.

International Students. It is the long-established practice of Oklahoma State University to charge a special administrative/management/programming fee for international students who need extra assistance and/or whose sponsors have indicated a requirement or desire for supplementary assistance. This assistance is beyond the content of the regular academic program of the University established for domestic students. The amount of the fees will be based on the

level of professional assistance needed, and the customary fee is $250.00 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 international students. The Office of International Programs at OSU is the designated office 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 Programs, 307 Center for International Trade Development.

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 employed 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 three weeks of a regular semester or during the first week of a summer session will receive a refund of a percentage of total fees. The percentage of fees to be refunded:

Prior to the first week of a semester or summer session-
100 percent

During the first week of a semester or the first two days of a summer session-
80 percent

During the second week of a semester or the third or fourth days of a summer session-50 percent

During the third week of a semester or the fifth day of a summer session-
25 percent

After the third week of a semester or the first week of a summer session-
0 percent

A student withdrawing from a short session will receive a prorated refund based on the above schedule.

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.

Refunds and repayments are allocated to Title IV programs in the following order:

Refund: Part B Loans (Stafford, SLS); Direct Loans; Perkins Loans; Pell; SEOG.

Repayment: Perkins; Pell; SEOG.

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 1995-96.

Residence Halls

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

Meal Plan Charges (All halls.)

	Semester Charge
300 passes/semester	$1,040.00
175 passes/semester	$860.00
20 passes/week	$968.00
15 passes/week	$920.00
10 passes/week	$824.00

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 1.6 times the double room rate.

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

	Semester Charge
Double Room	$964.00

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

	Semester Charge
Double Room	$940.00

East and West Bennett Residence Halls

	Semester Charge
Double Room	$804.00

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

	Semester Charge
Double Room	$908.00

Stout Residence Hall (Stout is open only to students who are sophomores and above.)

	Semester Charge
Double Room	$744.00

Wentz Hall 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	$1,026.00

Bennett Apartments

(Air-conditioned and room cable TV.)

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
3 or 4 Per Apartment	$1,084.00
2 Per Apartment	$1,396.00

University Apartments

(Rates include a telephone instrument and local phone service in each apartment. There is an additional $9.75 per month charge for cable TV service.)

The University operates complexes and apartments to house married and single parents, and a limited number of single graduate and upperclass students. Priority is given to former residence hall single students and families. 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 1957 area.

The following 1995-96 rates include all utilities (gas, water and electricity). A required local digital telephone service charge of $20.00 per month is included in the basic apartment rent listed below.

	Monthly Charge
1957 Apartments (AC optional)	$344.00
Air conditioning, optional	$65.00
Apartment furnishings, optional	$28.00
Basic cable television, optional	$9.75
1964 and 108 Apartments (AC optional)	$359.00
Brumley and Graduate Apartments (AC included)	$428.00

Estimated Total Expenses for Students

An estimated budget (based on 1995-96 figures) for an undergraduate student at OSU is as follows:

Resident

Tuition and Fees (Based on 14 credit hours)	$1,020.00
University Housing and Board (Based on average, double occupancy, residence hall charges)	$1,870.00
Textbooks and Supplies	$405.00
Ave. Misc. Personal Expenses	$1,260.00
Total Per Semester	$4,555.00

Nonresident

Tuition and Fees (Based on 14 credit hours)	$2,810.00
University Housing and Board (Based on average, double occupancy, residence hall charges)	$1,870.00
Textbooks and Supplies	$405.00
Ave. Misc. Personal Expenses	$1,260.00
Total Per Semester	$6,345.00

Financial Obligation

Robert E. Dixon, Jr., *Bursar*

Brenda Whitworth, *Associate Bursar*

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

Jim Gaiko, *Manager, Bursar Systems*

Danny Jurgens, *Manager, Collections*

Jan Pratt, *Manager, Student Loan and Counseling*

Margene Payne, *Manager, Teller Operations*

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. 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 addresses in either office. 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 in excess of $40 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.

Financial Aid

Charles W. Bruce, ***Director***

Patrick Kennedy, *Assistant Director,* ***Administrative Services***

Gary Garoffolo, *Assistant Director, Programs*

Cindy Prater, ***Coordinator, College*** *Work Study Programs*

Margaret Betts, ***Coordinator, Information Services***

Cathy Bird, ***Coordinator, Records Management***

Jackie Allen, ***Coordinator, Reports***

Bonnie Joerschke, ***Senior Counselor***

Amanda Walls, ***Counselor***

Gary Davidson, ***Counselor***

Judith Finnegan, ***Counselor***

Beverly Morris, ***Counselor***

Sandra Dearing, ***Counselor***

Students who need financial assistance to attend college are encouraged to consider the many types of financial aid available through the OSU Office of Student 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 Student Financial Aid as well as at most colleges and high schools. Early application is encouraged due to the high demand for available money.

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 fee waivers.

There are also programs available for students who do not demonstrate financial need. A number of fee 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 Student 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.

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 Student 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 nonprofit 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 Student Financial Aid.

Long-term loan programs consist of the Federal Perkins Loan, William D. Ford Federal Direct Subsidized and Unsubsidized 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.

Scholarships

A large number of OSU undergraduate and graduate students receive fee waivers. Numerous other cash scholarships are awarded through the various OSU departments, colleges and other offices.

Fee and Tuition Waivers

Fee 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. Freshman fee waivers are awarded to entering students who have attained a high scholastic standing in high school. Transfer fee 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. Further information may be obtained from the offices of High School and College Relations and University Scholarships.

Fee and 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. Applications for these scholarships can be obtained from the offices of Student Financial Aid and University Scholarships, and must be received by March 1.

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

Nonresident students should also inquire about policies for waivers of out-of-state tuition.

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.

Wentz Scholarships and Projects

High-achieving, continuing OSU students should inquire at the Office of University Scholarships about opportunities through the Wentz Foundation. A qualified applicant may receive a scholarship ($2,000) or be selected to complete a mentor-directed project in an academic setting ($3,500).

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 and graduate students are encouraged to explore other scholarship opportunities that may be offered by the various colleges and academic departments at OSU. The University Scholarships Office 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 offices of Student Financial Aid and University Scholarships. The FundFinder scholarship search program, available in the Office of Student Financial Aid, can provide information for over 3,000 national and state sources of aid. Both FINDS and FundFinder are available free of charge ona first-come, first served basis.

Student Employment

University Placement provides assistance to OSU students seeking part-time employment. Students are informed of on-campus job opportunities by accessing the University Placement database at one of the on-campus computer labs. Students may obtain job applications and referral information at 360 Student Union. The largest number of jobs are available at the beginning of each semester; however, jobs do become available throughout the year.

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. Ideally, students seeking on-campus work should schedule their classes to allow for a block of four hours free time during the morning or afternoon, Monday

through Friday. Off-campus job opportunities are posted at 360 Student Union, University Placement. More flexible hours may be available in off-campus jobs.

Student Services

Residential Life

Bob Huss, *Director of Residential Life*
Eddie Denman, *Assistant Director of Residential Life-Administrative and Business Services*
Bill Ryan, *Assistant Director of Residential Life*
Kent Sampson, *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 are more likely to graduate in four years 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 food 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 inquiries should be addressed to the appropriate office, depending on the student's housing needs. All accommodations are rented on a contract date priority basis. Applications and contracts are encouraged to be sent in 10 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 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 in some halls.) The 20-meal plan costs approximately $3.80 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, such as floors and houses for fine arts, foreign languages, honors, intensive study, engineering, and wellness. 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 the 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 advising 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 who live on campus enjoy the opportunity to participate in the on-campus meal plan. Students may choose from five different meal plans, (freshmen are required to take at least 10 meals per week) 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 as well as the standard cafeteria selection. Specialty menus include delicatessen, health club, country cooking, Italian, fast food, Mexican, Asian, and others. These specialty plans vary as the students' needs change. A pizza restaurant and a convenience store are housed in Kerr-Drummond.

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

Mobility Impaired Student Housing

All residence halls offer some housing for students who have impaired mobility. Upon notification, the Department of Residential Life routinely modifies rooms 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: car seat loans, toy library, adolescent sexuality, child care information, and pot luck dinners.

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 -1207 *W.* McElroy

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

Adult Student Organization - 030E Student Union

Student Government Association - 040 Student Union

Student Activities

Jan Carlson, *Manager, Student Activities*

Barbara Dunn, ***Program Coordinator, Allied Arts***

Marie Basler, ***Coordinator, Nontraditional Student Services***

Muhrizah Brunken, ***Program Coordinator, SUAB and Student Union Programs***

Joyce Montgomery, ***Coordinator,*** *Volunteer Center*

The Department of Student Activities is located in the basement level of the Student Union. This office is responsible for the program development for student organizations and serves as the liaison with student groups. The staff of this unit advises the Student Government Association, Off-Campus Students Association, Adult Student Organization, as well as other student leadership groups. This office also develops training programs for student leaders.

Included in Student Activities is the Office of Student Union Programs. The staff of this area advises the Student Union Activities Board and is responsible for program development within the Student Union. These programs include films, speakers, exhibits, Freshman Follies, as well as other special events within the Student Union.

Counseling Services

Patrick M. Murphy, *Director*

The University Counseling Services provides confidential professional counseling assistance to students. Students experiencing a variety of concerns may find this service helpful to them.

Assistance can be provided with emotional problems, as they affect personal and academic goals, intellectual functioning or relationships with others. Services include a broad range of developmental, remedial and preventive activities.

Help is available with the selection of an academic major, when such selections are more complicated or difficult than usual.

The Counseling Services also assist 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.

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

All information regarding appointments and content of meetings is confidential.

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

Personal Counseling Services

Suzanne M. Burks, *Coordinator*

Sherry Almquist, ***Senior Clinical Counselor***

Jack Davis, *Clinical Counselor*

Rex Finnegan, ***Senior*** *Clinical Counselor*

Connie Fox, ***Senior Clinical Counselor***

Personal counseling is offered in either an individual or group setting. Discussions between counselor and student in personal counseling can center on any situation which keeps the individual from fully realizing his or her personal or academic potential. Among the variety of concerns dealt with in personal counseling are stress, anxiety, depression, eating disorders, substance use/abuse and interpersonal relationships.

Additional services provided to the academic community are developmental programs and workshops and psychiatric consultation services.

Career Counseling Services

Counselors are available to assist students in personal assessment of career interests, values, and abilities to identify possible career directions related to a major area of study. Several services are provided for career decision making: individual counseling, the Career Information Center, Career Interest Testing, and Career Outreach Programs.

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.

International Student Services

Elaine Burgess, *Coordinator*

Regina Henry, *International Student Counselor*

Anna Ramirez, *International Student Counselor*

The International Student Services office (ISS) provides assistance to more than 1,800 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 Student Services 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 and consulates, legal referrals, academic referrals, immigration matters, and orientation programs, are among the services offered. Non-immigrant students 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. In collaboration with other OSU departments and community groups, a variety of programs are presented throughout the year. Interested student volunteers participate and assist with many activities.

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

Student Health Center

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

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

Phillip A. Nokes, D.O., *Staff Physician and Assistant Clinical Professor, OSU-COM*

Kenneth B. Smith, D.O., *Staff* *Physician and Assistant Clinical Professor, OSU-COM*

Thomas L. Hansen, M.D., *Staff Physician*

Huc X.Ngheim, M.D., *Staff Physician*

Lanny F. Trotter, M.D., *Staff Physician*

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. 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.

There are no charges for office visits to see the physicians. This service is covered by the designated health fee paid by the student. A fee is charged to cover direct costs on laboratory, x-ray, pharmacy and elective services.

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*

Teresa Newson, *Coordinator, African American Students*

Rolando J. Diaz, *Coordinator, Hispanic and Vietnamese-American Students*

Pete G. Coser, *Coordinator, Native American Students*

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*

Suzanne Hackney, *Honors Adviser*

Duke Holden, *Honors Adviser*

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 also are 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 tran-

script, 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 bachelor's degree with honors, including a special entry on their transcripts and special honors diplomas.

Additional advantages for active participants in the Honors Program (minimum of three honors credit hours per semester and nine honors credit hours per two consecutive semesters) include use of the Honors Program Study Lounge in the Edmon Low Library (with Apple Macintosh computers), extended checkout 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 27-29 with a high school grade-point average of 3.75 or higher (or ACT composite score of 30 or higher with a high school grade-point average of 3.50 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. It is the practice of many professional schools to 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 law, medicine, dental hygiene, dentistry, engineering, library science, medical technology, nursing, occupational therapy, optometry, osteopathy, 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.

Students interested in the Bachelor of University Studies Extended Studies Option (BUS-ESO) should visit with the dean or designated administrative officer of the college. This option may be available in some colleges. It is designed especially to meet the needs of the adult learner who has amassed either a number of credits from a variety of institutions of higher education or life-experience learning which can be documented and substituted for credits via a portfolio or other form of examination.

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 the 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 ACT's Proficiency Examination Program (PEP). The University Testing and Evaluation Service administers PEP examinations in business, the 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, PEP 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.*

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 particiation 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 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, 001 Classroom Building or electronic mail to ICS-INF@okway.okstate.edu.

National Student Exchange

National Student Exchange is a program designed to provide the opportunity for OSU students to attend over 120 other colleges and universities in the United States or utilize their study abroad programs to attend other institutions throughout the world without paying the high cost of out-of-state tuition. It also allows students from other member colleges and universities to attend OSU, at an in-state tuition rate. For additional information contact the coordinator of special programs, Office of the Vice-President for Student Affairs, 201 Whitehurst.

Oklahoma Scholar-Leadership Enrichment Program

The Oklahoma Scholar-Leadership Enrichment Program (OSLEP) is a statewide 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, University Honors Program, 509 Edmon Low Library.

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 assistant director, Residential Life, Kerr Drummond.

Study Abroad

Students at OSU are encouraged to broaden their education by adding an international dimension through study abroad. Students may earn OSU credit through reciprocal exchange programs or by participation in international programs offered by OSU extension. Students may earn transfer credit while studying in many other countries such as China, England, France, Germany, Japan, Mexico, Russia and Spain. Work abroad programs are also available.

OSU offers outstanding undergraduate and graduate students the opportunity to apply for the Bailey Trust Memorial Scholarship for study abroad in the liberal arts. National scholarships for study in foreign countries are available.

Students interested in information on study or work abroad or in scholarships for study abroad should inquire at the Arts and Sciences Student Academic Services office, 202 Life Sciences East.

University Center at Tulsa

The University Center at Tulsa (UCT) was established in 1982 to provide the third and fourth years of undergraduate study and master's degree programs for the Tulsa metropolitan area. The UCT Board of Trustees exercises governmental control of the Center, contracts with participating universities for courses and degree programs, and provides state-appropriated funds for delivery of those programs.

Programs of study are offered by four participating universities-Oklahoma State University, Langston, Northeastern State, and the University of Oklahoma. The four universities are not permitted to duplicate programs. Oklahoma State University is approved to offer courses leading to 18 graduate degrees, three certification programs and three undergraduate degrees.

Faculty from the participating universities provide instruction. UCT is not authorized to hire its own faculty. To ensure programs at UCT are comparable to those on the Stillwater campus, Oklahoma State University assigns UCT classes as part of the regular teaching load of OSU faculty when possible.

Courses taken through the University Center at Tulsa are treated as residence credit at the university teaching the course. Courses taken at UCT that are offered by Langston, Northeastern State, or the University of Oklahoma are accepted at Oklahoma State University as transfer credits. For information on transfer of credits, refer to the section "Transfer of Credits" elsewhere in the *Catalog.*

Students wishing to take courses at UCT enroll and pay tuition and fees at the Center. Tuition and fee rates for courses offered at UCT are set by the Oklahoma State Regents for Higher Education and are published in the UCT class schedule each semester.

Admission requirements for students seeking admission to programs offered by Oklahoma State University through the University Center at Tulsa are the same as if they were pursuing the degree program on the Stillwater campus. Students pursuing a degree from OSU through UCT are also eligible to apply for financial aid.

Degrees are granted by each of the participating universities. UCT is not authorized to grant degrees under its own auspices. Graduates may participate in their home university's graduation ceremonies and in a commencement program sponsored by UCT and held in Tulsa.

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 tjie 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, while 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 fqr providing academic advisement and other related academic services to students who are admitted provisionally to OSU through the Alternative Admission and Adult Admission programs. 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 full access to the University, provided they have never completed prior 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 requirements. Advisers also help clarify University policies and assist students in exploring career goals. UAS advisers are knowledgeable about the degree programs in all six undergraduate academic colleges, and 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 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 through their freshman orientation

classes to help them feel welcome and to assimilate into campus life.

University Academic Assessment Program. UAS also provides academic advising and counseling to students enrolled in the University Academic Assessment Program (UAAP). This program is designed for transfer students who are admitted on probation and OSU students who have experienced academic difficulty, many of whom are on probation or have been readmitted after suspension. UAAP gives students an opportunity to re-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.

In addition to the teaching, academic advising and counseling functions of UAS, the office serves as a central information center through which referral to a variety of campus academic and non-academic support services may be obtained.

Tutorial Service. Qualified tutors for common general education courses are available for students enrolled through University Academic Services. Applicants are thoroughly screened to guarantee quality tutors and are matched with students who need their services. Tutors are paid from UAS funding; however, students who fail to keep their appointments will be billed directly for the cost. Information regarding free departmental tutoring programs and 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 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, Compass Test, 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 Survey.

The program of tracking has four functions:

1. Following each student cohort.
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 faculty involved.

Computing and Information Services

Computing and Information Services (CIS), provides computing services to support the University's instruction, research and administrative functions. CIS also provides telephone services to the campus and technical assistance, training, publications, and videoconferences to the OSU community. Other services include implementation of institutional information systems, campus system security and integrity, and service level agreements.

The CIS Help Desk provides diagnostic support by phone, by electronic mail at *helpdesk@vml.ucc.okstate.edu,* or in person at 113 Math Sciences building.

CIS provides remote computing facilities (seven labs and two terminal clusters) in various locations around campus with a total seating capacity of about 450. A new SUN Workstation cluster is located in 113 Engineering South. All OSU students have user identification and passwords that permit access to these facilities. Students can also access some CIS computers from their homes.

CIS supports several data communication networks linking terminals and host computers across the campus, the nation and the world. CIS, a charter member of MIDnet, provides access to the Internet, the World Wide Web, and other media. The department also offers access to national supercomputing centers and provides electronic mail facilities on all platforms.

The mainframe computer at CIS is an IBM 3090-200S with Vector Facility, operating MVS/ESA and VM/ESA. Two time-sharing systems, TSO and CMS, are available on the mainframe. CIS also has a VAX 6340 operating VMS LAVC and a DEC 5000-240 RISC computer operating ULTRIX.

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. Scholarships ranging from $2.00 - $45.00 per session are awarded to those with family incomes less than $36,000. 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.

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 well as 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.

University Placement

University Placement 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.

Services include facilitating the campus interview program, providing job vacancy information to registrants, responding to employers' requests for referral of qualified job applicants, assisting with resume and interview preparation, and sending placement credentials to employers.

Special events sponsored by University Placement to provide opportunities

for interaction between registrants and employers include, but are not restricted to, Arkansas/Oklahoma Job Fair, Multicultural Career Fair, MBA Job Fair, University Career Day, Summer Employment Placement Day, and Teacher Placement Days.

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 Department of Applied Behavioral Studies, through 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; biofeedback; 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 and counseling psychology training programs, that are accredited by the American Psychological Association. The staff also includes supervising clinical counseling and developmental psychologists from the departments of Psychology and Applied Behavioral Studies. 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 $50 per session, depending on one's financial situation.

The Center is open from 8:00 a.m. until noon and 1:00 p.m. until 10:00 p.m. Monday, Tuesday and Thursday. On Wednesday and Friday, it is open from 8:00 a.m. until noon and 1:00 p.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 Center contains eleven new studios, 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 rear screen projection, 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 Laboratory

The F.M. "Pete" Bartlett family, with a dream of independent living for all, funded a gift to renovate a residential structure on campus. This dream of a research and demonstration laboratory illustrates universal design, that is, "design for the life span of all people regardless of age, sex, ability or change in ability."

The laboratory currently serves as a day treatment facility in a cooperative project with Willow View, a mental health facility. Students may conduct case study research related to functionality of the design features, specialized technology, and code standards for accessibility. The special features of the laboratory include computerized environmental control systems, motorized windows, blinds, and draperies; adjustable-height work centers and other devices related to everyday functioning.

Research in progress allows the numerous visitors to the laboratory to assess attitudes, knowledge, and functionality of "Independence Hall." This provides a base of knowledge for builders, architects, interior designers, and other professionals who work with clients experiencing life span changes.

Colvin 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, noncredit activity courses and outdoor recreation programs. Activity areas available include racquetball, indoor and outdoor swimming, gymnastics, 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.

Oklahoma Museum of Higher Education-Old Central

Old Central, the oldest building on campus, is on the National Register of Historic Places and it is operated by the Oklahoma Historical Society as a museum. The building was dedicated June 15, 1894, and classes were held there beginning September 12, 1894 with 144 students and a faculty of eight. Centennial observances begin June 15, 1994 and continue through the Fall 1994 Semester. The building has exhibits relating to OSU's early history, and some rooms have been recreated as they would have looked in 1894.

Information and exhibit materials are collected from other state higher education institutions to offer a comprehensive history of higher education for the entire state. Permanent exhibits trace Oklahoma's general educational progress from territorial days to the present. Rotating displays feature specific institutions and related educational subjects.

The museum is generally open to the public Tuesday-Friday, 9:00 a.m.-5:00 p.m., and Saturday 10:00 a.m.-4:00 p.m.; visitors may wish to call before coming by. It is closed Sunday, Monday and legal holidays. A minimal admission fee is charged. Special tours and slide presentations are available for groups by appointment. Groups may also rent areas of the building, such as the Assembly Hall. Reservation agreements are available at the Museum, or by calling (405) 624-3220.

Edmon Low Library

Conveniently situated in the center of the campus, and open 102 hours each week when classes are in session, the Edmon Low Library contains more than 5.5 million books, documents and microforms, and 17,000 serials that support the diverse academic and research programs of the University. The collections are arranged in broad subject divisions based upon the Dewey Decimal Classification system. Librarians at three reference desks-General Reference, Science and Engineering, and Government Documents-provide assistance to students and faculty. Most books and periodicals are shelved in open stacks available to all students and faculty.

PETE, the Library's computerized information system, enables students and faculty to search the OSU Library Catalog and several bibliographic databases using workstations in the Library or by remote access. The OSU Library Catalog contains records for all library books as well as a significant number of government documents. It also indicates which journals and magazines are owned by the Library.

Other PETE Databases-Periodical *Abstracts, Newspaper Abstracts,* and ABI/INFORM-index articles in magazines, journals and newspapers. These databases contain short summaries of the articles. *ISI's Current Contents* databases index the most recent articles appearing in 6,200 significant research journals. Additional bibliographic databases are available through PETE.

Other commercial indexing databases are available through the Library's CD-NET. Terminals located near the three reference desks may be used to search 20 additional bibliographic databases on a wide variety of subjects. All PETE and CD-NET terminals are equipped with printers so search results may be printed.

World Wide Web Home Page. The Library has a World Wide Web site on the Internet (http://www.library.okstate.edu) to provide the campus community with easy access to worldwide information resources. The Library web site includes information regarding the services and facilities of the Edmon Low Library as well as access to PETE. Visitors to the web site will also find Internet links to national and international library catalogs, information databases, electronic journals and indexes, and unique Oklahoma resources published on the Internet by the OSU Library.

Interlibrary Services. Books or copies of articles that the Library does not own are obtained from other libraries through the Interlibrary Service office located on the first floor, southwest.

Documents. Located on the fifth floor of the Library, the documents collection, considered by many to be the best in the Southwest, contains information on all subjects. The documents area is a regional depository for publications distributed by the United States Government Printing Office and the state of Oklahoma. Nondepository materials acquired from federal agencies supplement the depository collection. Publications of states, foreign governments, and international organizations are obtained to support fields of special interest to the University.

Patent and Trademark Library. The Library was designated as a U.S. Patent Depository in 1956. As a depository the Library has access to the CASSIS database and receives the *Official Gazette* as well as a microfilm copy of every patent issued by the U.S. Patent and Trademark Office. The Library's patent collection is part of its Patent and Trademark Library located in room 206 of the Center for International Trade Development. Search assistance for CASSIS is provided by appointment. Most searches take between four and eight hours to complete.

Maps. The Map Room houses one of the largest and most comprehensive collections of maps in the state. This collection contains more than 200,000 maps, as well as aerial photographs of Oklahoma and most metropolitan areas in North America. The Map Room is a depository for maps from both the Defense Mapping Agency and the United States Geological Survey. The collection provides complete USGS topographic coverage of the United States. A fast-growing collection is the MPSI urban aerial photographs. This collection consists of high-quality, large-scale aerial photographs of urban areas throughout North America, dating from 1980.

Microforms. Numerous manuscripts, research reports, theses, books, periodicals, documents, and newspapers are available on the more than three million microforms which are housed in the Microform and Media Room and the Documents Department. In addition to the back files of newspapers on microfilm, including the *New York Times* and the *London Times,* the collection in the Microform and Media Room also contains large sets of material, such as Landmarks of Science, Early American Imprints, Early English Books, and Western Americana, as well as video cassettes, slide/tape programs, and taped lectures.

Special Collections and University Archives. The Library's Special Collections consist of rare books, photographs, selected material on Oklahoma history, and several manuscript collections. The collecting focus is on Oklahoma politics and rural development, as well as journalism and natural resources. Among these collections are Oklahoma historian Angie Debo's books and papers; papers from the files of Paul Miller, the noted

newspaperman; fine first editions of 19th and 20th century British and American authors which were collected by Henry G. Bennett; the papers of Henry S. Johnston, former governor of Oklahoma; and the Finnell, Fly, and McBride Collections on soil conservation and water resources. A growing area of interest is the Women's Archives that documents the contributions of women to society. The University Archives house official records and other material depicting the development of Oklahoma State University. This area is located at the east end of the second floor and is open from 8:00 a.m. to 5:00 p.m. on Monday through Friday. Material in these collections must be used in the adjacent reading room.

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 a 900-seat auditorium and a 600-seat continental theater 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 543,441 square feet, it stands as one of the largest and most comprehensive unions 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 student activities as it houses the offices for most 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 11 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), 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 and a full-service wellness laboratory. These rooms are available to OSU student groups for OSU-sponsored events, in cooperation with the Wellness Center.

Student Life

Allied Arts

Allied Arts, a unit of the Office of Student Activities, is responsible for presenting professional, touring, live performing arts events for the university community. Selection of these events is the function

of a committee composed of students, faculty, staff and representatives from the local community. Events are selected from a broad range of performing arts, and include orchestras and choral groups, chamber ensembles, theatrical productions, mime, jazz, opera, ballet and dance, international and traditional ethnic performing arts, and vocal and instrumental soloists. The goal of the Allied Arts program is to provide the university community with the opportunity to experience quality, live performing arts in the university setting. Each academic year Allied Arts presents five to six performances, and persons attending do so either through the purchase of a season subscription or by purchasing individual tickets to specific events. OSU students can attend with either a student-discount season subscription or reduced-price individual tickets to specific events.

Allied Arts is the oldest continuously functioning university-related performing arts series in the state and has maintained a tradition of quality and variety in its presentations for more than 70 years.

Greek Life

Marilon Morgan, ***Manager, Greek Life***

Darin Behara, ***Coordinator, Greek Life***

Karen Smith Woods, ***Program Assistant***

Since 1917, fraternities and sororities have not only enriched and influenced campus life programs at Oklahoma State University, but the lives of their members as well. There are approximately 2300 students who are members of the 23 national fraternities for men and 13 national sororities for women. The majority of these Greek letter organizations provide housing for their membership that is University recognized, allowing fraternities and sororities to house freshmen. The primary goals of fraternities and sororities are to enhance and promote brotherhood/sisterhood, academic achievement, community service, leadership and social awareness. Fraternities recruit informally by contacting potential members throughout the year. Sororities sponsor a formal recruitment period, traditionally held in August, followed by informal recruitment periods in the fall and spring. For additional information about fraternities and sororities, write to Greek Life, 050 Student Union, OSU, Stillwater, Oklahoma, 74078.

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)

Mortar Board (junior and senior honor society)

Orange and Black Quill (honor society for sophomore women)

Order of Omega (honor society for sorority and fraternity members)

Phi Eta Sigma (freshman and sophomore honor society)

Phi Kappi Phi (national honor society for seniors and graduate students)

(See college sections for organizations within each college.)

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 Forum Committee, 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.

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 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.

Recreation. Through the recreation program, the staff of the Colvin Center offers a variety of non-credit instructional programs each semester to students, faculty, staff and their dependents. Instructional programs for adults include noon, early morning and evening fitness, martial arts, tennis, racquetball, swimming, scuba, yoga, lifeguarding, water exercises, aerobic dance, weight training, and country western dance. Instructional programs for dependents include swimming and golf. Free children's activity programs are offered Saturday mornings each semester.

Intramurals. The intramural program at Oklahoma State University is an important part of student life on campus. The goal is to offer a wide variety of sports experiences for each student, regardless of skill or ability, to develop carry-over sports skills for life, to encourage physical activity, to develop habits of fair play and to provide for leadership development. Programs are available for both men and women (52 different activities), as well as participation in co-recreational activities.

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. Another thrust of the program is the OSU Outdoor Recreation Program. Organized trips are led by professional staff and trained students.

The student's choice of activity will lead to the top of the mountains, over rocks and down rivers. The wilderness trips are designed to offer an opportunity for developing outdoor skills, but even more importantly, to develop and explore the individual, other people and the surroundings.

Camp Redlands, Lake Carl Blackwell, and a challenge ropes course at the Redlands site, and the Aquatic Center (Lake Carl Blackwell) are included in the varied offerings. The management and development of the 80-acre Camp Redlands for use by University and community groups has recently been incorporated into this program. The purpose of the challenge course is team building and self-esteem development.

Rental of quality outdoor equipment is available in the Colvin Center. A state-of-the-art indoor climbing wall is available for beginner and advanced rock climbers.

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 committee, and sports and athletic activities.

Theater

The four to six plays produced each year range from classical to contemporary; from sublime to ridiculous; from high seriousness to low comedy. So too, variety in casting is assured by a policy of choosing actors from the entire range of the OSU student body, regardless of major. While one play may be of greatest interest to students of history or philosophy, the next may appeal most to those who need escape for an evening's light entertainment.

OSU Theater extends beyond OSU student productions in the Seretean Center. In recent years the local department has hosted statewide versions of the American College Theater Festival, displaying outstanding theater from other Oklahoma colleges and universities enroute to regional and national festivals.

Alumni Programs and Services

The Alumni Association serves as a liaison between OSU and its former students, and provides members immediate and direct contact with the University. The mission of the OSU Alumni Association is to serve its members and alumni and to support and serve the needs of Oklahoma State University, its students, faculty, staff and friends.

All graduates, former students, and friends of OSU are eligible for membership in the Alumni Association by paying an annual or life membership fee.

The OSU Alumni Association is governed by a board of directors. Alumni programs are directed by an executive director and six professional staff members.

The Alumni Association promotes involvement of alumni and friends in many ways.

Chapters. There are approximately fifty alumni chapters in the state of Oklahoma. Other chapters are located across the United States. Chapter activities include membership drives, social functions, and other programs to support OSU.

Student Recruitment. The Alumni Association helps the alumni clubs to sponsor programs for the top academic achievers in Oklahoma high schools. Key alumni clubs outside of Oklahoma are trained by Alumni Association staff to recruit out-of-state students. Expanded activities include organizing alumni across the state to personally contact students and to raise scholarships for students in their areas.

Homecoming and Reunions. Alumni are invited to return to campus to renew friendships and participate in a series of informative and social activities.

Travel. The Alumni Association organizes travel packages designed to meet educational and social objectives of alumni and friends.

Awards and Recognition. Each year students and alumni are honored for outstanding service to OSU or for outstanding personal achievement.

Publications. The *Oklahoma State Magazine is* the featured publication that is sent to all Association members. This publication provides information about the University and alumni programs.

The Alumni Office is located in Room 212 of the Student Union. Opinions and suggestions are welcome and will receive the full attention of the professional staff.

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, balancing 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

James E. Hooper, *Provost and Vice-President of Oklahoma State University*

Jerrilee K. Mosier, *Vice-Provost for Academic Affairs*

Jerry Brooks, *Vice-Provost for Fiscal Affairs*

Paul R. Dauphinais, *Interim Vice-Provost for Student Affairs*

Having served the metropolitan area for more than three decades, Oklahoma State University-Oklahoma City (OSU-OKC) truly reflects the Oklahoma City Chamber of Commerce motto, "Growing With Pride." From its beginning 1961 to today's thriving learning environment of more than 6,000 full-time, part-time and continuing education students, the Oklahoma City campus has become the institution most directly related to the education of professional technicians in the United States. OSU-OKC offers college courses leading to an associate degree, preparing the student in two years for employment in various career fields, as well as providing credits that are transferable to bachelor's degree programs and general education courses.

Accredited by the North Central Association of Colleges and Schools, OSU-OKC offers two-year programs leading to associate of science degrees in four areas-EMS/health care management, fire protection, horticulture and police science-and to associate of applied science degrees in the following areas: accounting, architecture, avionics, civil engineering technology, computer programming, construction, electronics, environmental systems, energy/environmental resources management, general engineering, heating ventilation and air conditioning (HVAC), industrial drafting and design, industrial loss prevention, interpreter training, management, nurse science, surveying and technical communication technologies.

Teaching methods emphasize the application of theory through state-of-the-art laboratories and equipment. Many of the faculty are working professionals with in-depth business and industry experience in their areas of expertise.

The curricula are designed to prepare students for a variety of positions in business, government and industry. Specialized technical courses enable graduates to understand the underlying purposes of the operations and functions for which they are responsible and to utilize basic scientific principles in developing ideas. General courses in communication skills, personal development, and social and economic principles broaden the students' interests and aid them in the further development of their abilities.

Oklahoma State University-Oklahoma City is located at the crossroads of Oklahoma City, Interstate 44 and Interstate 40, at 900 North Portland, Oklahoma City, Oklahoma, 73107.

OSU-Okmulgee

Robert Klabenes, *Provost and Vice-President of Oklahoma State University*

Linda Avant, *Assistant Provost*

Ken Morris, *Interim Vice-Provost*

Tobie Titsworth, *Interim Vice-Provost*

***Larry* Williams,** *Executive Vice-Provost*

Oklahoma State University-Okmulgee offers post-secondary advancing technology programs of study that culminate in an associate in applied science degree. This branch campus is a residential one, 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 is divided into 11 departments offering a total of 34 degrees and six diplomas in addition to the General Education 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; manufacturing technology; small business occupations; and visual communications.

OSU-Okmulgee's post-secondary, 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 those 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. Their well-honed skills run the gamut from manual arts and computer wizardry to business and high technology. 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.

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 conduct 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 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 through the OSU Gopher and the World Wide Web (on the OSU home page), accessible through the University computer labs. Additionally, printed copies may be obtained by students on request in the offices of the Provost and Vice-President for Academic Affairs, the Vice-President for Student Affairs, the Associate Vice-President for Multicultural Affairs, Director of Affirmative Action, Student Conduct Office, University Residential Life, Student Activities, the Student Union Information Desk and the Edmon Low Library Reserve Desk.

Campus Security

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 handpicked to meet the high standards and multidimensional mission of a public safety department.

Even though the OSU Police's overall strength has been reduced, as a cost cutting measure, from thirty-one sworn police officers to the current total of twenty-five members, the demands for services have increased. The number of part-time employees has increased slightly, by using student employees to replace commissioned officers in those low-threat areas of parking enforcement, entrance assistance and selected security assignments.

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.

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. Even with reduced staffing, people programs, such as motorist assistance, money transportation, and emergency notification services, continue. OSU's emergency phone system, promising campus citizens immediate help, has been operating for fifteen years and is still being copied by other universities. Campus organizations needing reliable and professional-appearing drivers often arrange to use members of the student cadet force.

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 underage drinking.

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.

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, 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, and the media. 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.

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 rate is one of the lowest. In fact, OSU has fewer crimes occurring on campus than any other Big Eight university (7 years in a row).

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

Actual Reported Part I Crimes At OSU

Year	1992	1993	1994	+/-%*
Part 1 Crimes				
Criminal Homicide	0		0	-100%
Forcible Rape	3		1	0%
Attempt to Rape	0		0	-100%
Robbery	1		0	-100%
Aggravated Assault	2	4	6	50%
Breaking & Entering	84	67	53	-21%
Forcible Entry	14	20	19	-5%
No **Force**	64	42	31	-26%
Attempt Force Entry	6	5	3	-40%
Larceny	**258**	181	184	2%
Motor Vehicle Theft	3		2	100%
Autos	3		2	100%
Trucks	0	0	0	
Other Vehicles	0	0	0	
Arson	2	**5**	3	-40%
Total (Part 1)	353	261	249	-5%
Other Sexual Offenses	3	1	1	0%
Total Stolen Property	$91,793	$69,759	$105,914	52%
Alcohol Violations Arrests	211	136	135	-1 %
Drug Violations Arrests	3	3	5	67%
Weapon Law Violation Arrests	4	3	2	-33%
All Other	133	45	61	36%
Arrest Total	351	187	203	9%
Adults (All Offenses)	343	171	199	16%
Juveniles (All Offenses)	8	16	4	-75%
Cases Cleared (Part 1)	48	69	**53**	-23%
Clearance Rate	14%	26%	21%	-19%

*Base Year 1993.

Larceny is reported here even though not required in the Crime Awareness Act of 1990. In 1994, there were no Part I crimes that fell under the Hate Crimes Statistics Act.

the more notable efforts are:

Emergency telephone system

Emergency 911 dialing

24-hour preventive patrols

Campus foot patrol by uniformed officers

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 - 744-6063

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 25 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.

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.

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 3.2 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 3.2 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.

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

Contents-Academic Regulations

In addition to these minimal regulations, there may be additional college, department or program requirements which 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 score of 500 or higher on the *Test of English as a Foreign Language* (TOEFL). Applicants seeking admission by transfer who have attended an accredited college or university for a minimum of 24 semester credit hours with passing grades shall be admitted on the same basis as other transfer students. (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, 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 in a minimum of 12 hours of regularly-graded course work, not to include activity, performance 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-pointaverage for retention purposes excluding any courses repeated or reprieved, and excluding remedial courses and physical education activity courses. (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.

Part-time student status must be determined prior to the last day of the second week of classes. Students who are part-time must have a 2.00 semester GPA in order to continue. Full-time probation students who drop below 12 hours (six hours in a summer session), without prior approval, after the last day of the second week of classes, will be academically suspended. Such students will have the same right of appeal as other suspended students. However, if reinstatement is granted to a student in this category with a semester GPA of 2.00 or higher, academic suspension will not be noted on the student's transcript. If dropping below full-time status during the semester becomes necessary, students should contact their student academic services directors regarding procedures.

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 a minimum of 12 hours of regularly-graded course work not including activity, performance 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, 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 reprieved and excluding remedial courses and physical education activity courses. (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.

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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 Provost and Vice President for Academic Affairs.

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.

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. The withdrawal process is initiated in the student's dean's office.

A student who withdraws prior to the end of the sixth week of a regular semester or the third week of a summer session will receive a grade of "W" (withdrawn). A student who withdraws after the sixth week of a regular semester or the third 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 "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 shall 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."

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 there is a University-wide 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:

a. 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);
b. three semester credit hours of American history (HIST 1103), and three semester credit hours of American government (POLSC 1113);
c. at least six semester credit hours in 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);
d. at least one course in the International Dimension area and one course in the Scientific Investigation area.

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 Provost and Vice-President for Academic Affairs.

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

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 receive 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 extension or correspondence) 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. Credits earned through extension plus any earned through correspondence cannot exceed one-fourth of the credits required for a baccalaureate degree.

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 plus any earned through extension cannot exceed one-fourth of the credits required for a baccalaureate degree.

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), Proficiency Examination Program (PEP) and OSU Advanced Standing Examinations.

a. credit earned by examination will not be placed on a student's transcript until he or she has successfully completed 12 or more semester credit hours of academic work at OSU;

b. credit will be recorded with a 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 student must need 15 or more semester credit hours at OSU (excluding the hours in which currently enrolled) toward meeting requirements for the degree.

d. the amount of credit by exam which may be applied to a degree program is subject only to meeting the residency requirements of OSU (see "Residence Requirements");

e. 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");

f. the student must need the course to meet some requirement for a certificate or degree being pursued at OSU;

g. be enrolled at OSU;

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:

h. not have taken an exam over the course within the preceding six months;

i. receive the recommendation of the Office of Admissions, the approval of the head of the department in which the course is offered and the dean of the student's college;

j. 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 sixth class day of a regular semester or the third class day of a summer session is the last day a course may be added. (Exception: A course may be added at the time another course is dropped, if approved by the student's adviser and the instructor of the added course, and if the course is added prior to the last day to drop with no grade recorded.) A short course may be added no later than the first day of the short course.

5.4 Dropping Courses. 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.

After the deadline for dropping with no record, but prior to the end of the sixth week of a regular semester or the third week of a summer session, or proportionate periods for block or short courses, a student may drop a course and receive the grade of "W" (dropped). After the sixth week of a regular semester or the third week of a summer session but prior to the end of the 10th week of a regular semester or the fifth week of a summer session, a student may drop a course with the grade of "W" (dropped) or "F" (failing) as assigned by the instructor. The grade of "F" will be calculated in the grade-point average.

After the 10th week of a regular semester, or the fifth week of a summer session, or proportionate periods for block or short courses, a student may not drop a course and shall 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, extension, advanced standing examinations, 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. Certain groups of students are extended the option of enrolling prior to the time continuing students begin enrolling. Physically handicapped students are extended the option of priority enrollment. Those students actively participating in the University Honors Program are extended the option of priority enrollment. Current OSU students who accept University scholarships will be given priority in enrolling. Scholarships that qualify students for priority in turning in trial schedules are University band, athletic, and graduate teaching assistantships for teaching or research assignments. Wentz scholars, President's Distinguished Scholars (PDS), President's Leadership Council (PLC) recipients, and participants in the OSRHE Academic Scholars program are also extended the option of priority enrollment. (These are not to be considered

inclusive, but the scholarship must require that the student perform a service for the University at a regular time specified by the University.) 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. Working part-time for the University or outside the University does not qualify the student for priority in turning in a trial schedule.

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 normally mailed to the student's local 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, performance 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:

a. have passed 28 or more semester credit hours;

b. have at least a 2.50 grade-point average in all hours attempted;

c. have met all of the prerequisites for enrollment in the course in question;

d. do not need the course in question for meeting any requirements for graduation or certification other than as a general (unrestricted) elective;

e. 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.")

(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. *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 reprieved were earned and the reprieve request; (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 reprieved; (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 Provost and Vice-President for Academic Affairs. 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 reprieved 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.") The last 18 hours completed by a student immediately prior to graduation must be taken in residence at this institution. Under special circumstances, permission may be given to allow three of the last 18 hours to be taken out of residence. 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 Premedical 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.

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
Aerospace Studies (B) A&S
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
Agronomy (B,M) Ag/Gr
  Crop Science (D) Gr
  Soil Science (D) 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
Applied Mathematics (M) 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
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
Computer Science (B,M,D) A&S/Gr
Construction Management Technology (B) T
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
Electronics Technology (B) T
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
General Technology (B) T
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
Journalism and Broadcasting (B) A&S
Mass Communications (M) Gr
Leisure (B) Ed
Management (B) Bus
Management Information Systems (B) Bus
Management Science and Computer Systems (B) Bus
Manufacturing Systems Engineering (M) Gr
Manufacturing Technology (B) T
Marketing (B) Bus
Mathematics (B,M,D) A&S/Gr
Mechanical Engineering (B,M,D) En/Gr
Mechanical Design Technology (B) T
Mechanical Power Technology (B) T
Medical Technology (B) A&S
Microbiology (B) A&S
Microbiology, Cell and Molecular Biology (M,D) Gr
Military Science (B) A&S
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
Philosophy (B,M) A&S/Gr
Physical Education (B) Ed
Physics (B,M,D) A&S/Gr
Physiological Science (M,D) Gr
Physiology (B) A&S
Plant Pathology (M,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
Speech Pathology (B) A&S
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 Parasitology (M,D) Gr
Veterinary Pathology (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	84
Master's	64
Doctor's	45
Specialist	1

College of Agricultural Sciences and Natural Resources

Charles B. Browning, Ph.D., ***Dean***

Paul D. Hummer, Ph.D., ***Associate Dean for Academic Programs***

C. Wesley Holley, Ed.D., ***Assistant Dean for Academic Programs***

James E. Osbom, Ph.D., ***Assistant Dean for International Programs***

Clement R. Henderson, M.A., ***Director of Student Academic Services***

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 specialities.

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, agronomy, animal science, biochemistry and molecular biology, entomology, environmental science, forestry, horticulture and landscape architecture, 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 (Ed.D.), 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 junior 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 $300,000 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 others. 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; (or 1215 and 1225).
2. Organic chemistry (5 hours minimum): CHEM 3015 (or 3053, 3153, and 3112).
3. Biochemistry (3 hours minimum): BIOCH 3653.

Physics (8 hours minimum): PHYSC 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, 1603.
2. Microbiology: MICRO 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 Tau Alpha (agricultural education)
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
Cowboys for Christ
Dairy Science Club
Environmental Science Club
Food Industry Club
Forestry Club
Horticulture Club
National Agri-marketing Association
OSU Horseman's Association
Pre-veterinary Medicine Club
Sanborn Entomology Club
Sigma Lambda Alpha (horticulture and landscape architecture)
Society of American Foresters
Society of Range Management
Soil and Water Conservation Society
Turf Club
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 James E. Osborn, Ph.D.

The Department of Agricultural Economics provides professional training at the undergraduate and graduate level. Agricultural economics is concerned with the science and art of understanding the economic relationships that affect individuals, firms or service agencies in agriculture. Agricultural economics also examines the interrelationships between the agricultural sector and the other sectors of the economy. The courses place emphasis on the economic problems associated with producing, processing, marketing and consuming the goods and services used by agriculture.

Agricultural economics combines instruction in the technical agricultural sciences with education in the application of economic and business management principles and tools. Agricultural economists draw upon the physical and social sciences to define, understand and solve economic problems created by the changing environment in which modern agriculture operates. The Department of Agricultural Economics places emphasis upon the decision-making and problem-solving skills used in the management of agricultural production and marketing firms.

Studies in agricultural economics prepare students to excel in many challenging careers. Many agricultural economics graduates work to improve food production and processing throughout the world. Other graduates work with government policies that have an impact on the food and fiber sector. Because rural communities are directly tied to agriculture, some graduates work to help these communities thrive in the ever-changing world. Graduates also help protect and maintain our natural resources and the environment for the greatest benefit of society. Many graduates take career paths removed from the farm.

An undergraduate may elect to specialize in an option in agricultural economics. The 10 options available to the student majoring in agricultural economics are: farm and ranch management, international agricultural marketing, marketing and business, natural resources and community development, pre-law, pre-veterinary business management, quantitative studies, with three additional options offering double majors in agricultural economics and accounting, agricultural economics and agricultural education, agricultural economics and computer science. If the student chooses not to specialize, the student may elect the agricultural economics major without a special option.

Agribusiness

The Department of Agricultural Economics offers the agribusiness major in cooperation with the College of Business Administration. Students pursuing this major may obtain a B.S. in Agricultural Sciences and Natural Resources, or B.S. in Business Administration. This major prepares students for decision making in agribusiness firms. Graduates of the agribusiness program work for organizations involved in the production, processing, distribution and marketing of food, food products or input used in the production of food and food products for human or animal consumption.

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. Each student is guided in the preparation of the program of study by an advisory committee to assure 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 Ed.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. Primary emphasis is upon employment in cooperative extension or closely allied areas. 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 programs 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. Three options are offered in the Master of Agriculture program. Option A requires 32 approved semester credit hours of course work, including a two-credit-hour formal report. Option B 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 C 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 Education 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, 20 credit hours must be completed in an area of specialization like agricultural extension, technical agriculture, educational administration, or other similar area. The remaining 20 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 recommendations 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. A grant and loan program is available through the Office of Student Financial Aid.

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, agronomy, animal science, entomology, forestry, horticulture and landscape architecture, 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 or advisory committee with whom he or she will develop a plan of study in accordance with guidelines established in the department. An approved 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.

Agronomy

Professor and Head Robert L. Westerman, Ph.D.

Agronomy is the science of soil management and the production of field crops and forages. Undergraduate options include agroechosystems, biotechnology, business, crop science, plant protection, range management and soil science. Each of these options provides a thorough preparation in the sciences relating to its specialization. Areas of study are designed to permit 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 problems such as soil and water conservation, crop and range improvement and management, prevention and abatement of agricultural sources of environmental pollution, judicious use of agricultural chemicals, and land application of wastes. In the vast field of agribusiness, technical preparation in agronomy 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. Agronomists 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, which can not be ignored.

A major challenge facing agronomists is the concern for preserving environmental quality while maintaining efficient food production systems. Agronomists 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 agronomists to assist farmers in proper utilization of production input such as fertilizers and agricultural chemicals. Developments in basic science fields such as genetics and molecular biology have created a need for agronomists to work in biotechnology programs with plants and soil organisms. Land application of biosolids and animal wastes requires agronomists to ensure that proper rates and methods are used.

Careers in agronomy include farm or ranch operation or management; land appraisal for banks or loan companies; 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 breeders, molecular biologists, soil scientists, and weed control specialists with federal or state experiment stations or private industries; teaching and extension positions 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 agronomic 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 Agronomy offers programs of course work and research leading to the Master of Agriculture in the emphasis area of agronomy, the Master of Science degree in agronomy, and the Doctor of Philosophy degree in crop science, environmental science, plant science, and soil science. 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 Agronomy prepare individuals for successful careers in a variety of areas, including farming and ranching, extension education, agricultural business, and plant or soil science research, teaching, environmental sciences, and waste management, and all aspects of crop production.

Prerequisites. Admission to the graduate program requires a B.S. degree in agronomy or a closely related field. Applicants should have completed basic courses in 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 requirements for the respective degrees they are pursuing.

The Master of Science degree in agronomy may be earned by utilizing one of two plans:

Plan I-Thesis, minimum of 30 credit hours of course work, including six credit hours of AGRON 5000, master's thesis.

Plan II-Formal report (non-thesis), minimum of 32 credit hours of course work, including two 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 agronomy 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 programs in plant sciences, that include molecular, organismal, or ecological programs of study, and environmental sciences, that include a broad spectrum of science dealing with soil, water, and waste management issues, are developed for candidates in conjunction with advisory committee approval.

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, 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 protect the environment and preserve natural resources by creating and adapting engineering knowledge and technologies for the efficient and effective production, processing, storage, handling and distribution of food, feed, fiber and other biological products.

The objective of the biosystems engineering program is not only to teach the engineering, physical, mathematical and biological sciences to students, but also to teach them to apply these sciences to create and design new systems and equipment for biological production and processing. As a part of this instruction, students learn to work with computers on simulation, control and design of bioenvironmental projects. In addition, students will take social studies and humanities courses that help give them the people skills important for advancement into management level positions. This transition often occurs early in a biosystems engineer's career.

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, machine 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.

Biosystems engineering courses for juniors and seniors 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. Design experiences are developed in one or more of the following areas: environment and natural resources, food and bioprocessing, biotechnical and general agricultural engineering.

In addition to the 76 semester credit hours of common requirements for engineers, biosystems engineering students take courses in electronic applications, instrumentation, watershed hydrology, flood control, drainage and irrigation, environmental engineering, power and machinery, structural design, processing, and food engineering. The program is accredited at the basic level by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

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 of plant and animal environments, 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 propose a solution, identify a problem, define alternatives, 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 will evaluate 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 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, Agronomy, Animal Science, Entomology, Forestry, Horticulture and Landscape Architecture, and Plant Pathology. The major and its students also benefit from the resources and activities of the Center for Agriculture and the Environment on the OSU-Stillwater campus. Students 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 regulation 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 Head **Edwin** L. Miller, 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 today are problem-solvers using a blend of ecology, technology, economics and sociology to provide benefits and services desired by society. Foresters work with private landowners and city planners, teach and conduct research at universities, administer parks and recreation areas, manage the business of forest industry, and 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, and 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. 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 a nine-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 spectacular forest settings. Past summer camps have been held across the U.S. from Maine to Oregon, from Montana to Florida, and even in Brazil. Students learn field forestry skills and observe state-of-the-art operations.

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 many 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, or 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, 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 (arboretums, 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, preservation

and processing 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.

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, business, construction, ecology, engineering and horticulture 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 and design, or 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 20 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 with a 2.50 GPA or higher in all courses required as prerequisites to the last two years of the B.L.A. program.

Landscape contracting is a four-year program leading to the Bachelor of Science in Agricultural Sciences and Natural Resources degree. It emphasizes the construction and management phases of landscape development. Course work includes basic landscape architectural design, construction technology, business and horticulture. The program is certified by the Associated Landscape Contractors of America. Graduates are employed by landscape nurseries, contracting companies, design and building firms, and landscape maintenance companies.

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 flower crops, fruit and nut crops, vegetable crops, ornamental nursery crops, and turf. In addition to commodity-oriented specialities, 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 lease 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 applicants for advanced degrees must be approved by the head of the department and a faculty member who will serve as the adviser. The program of study and research will be directed by the student's graduate adviser and advisory committee.

Plant Pathology

Professor and Head Larry J. Littlefield, 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, phytobacteriology, 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.

College of Arts and Sciences

Smith L. Holt, Ph.D., *Dean*

Richard C. Rohrs, Ph.D., *Interim 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 University and Arts and Sciences Honors Programs*

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 46 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; at least three 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; and one year of arts such as music, theater, or studio art, and some 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 "Undecided" Student. The general education program in the College of Arts and Sciences, while providing the breadth necessary for a quality undergraduate education, also makes it possible for freshmen who enroll without having decided on a major to make satisfactory progress toward most degrees for up to four semesters. Students who initially enroll as undecided students may explore possible major fields of study with an academic counselor in the Office of Student Academic Services while completing required basic courses.

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.): aerospace studies, biochemistry, biological sciences, botany, cell and molecular biology, chemistry, computer science, economics, geography, geology, journalism and broadcasting, mathematics, medical

technology, microbiology, military science, physics, physiology, political science, premedical science, psychology, sociology, speech (communication consultancy), speech pathology, 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. If a student majoring in one field also completes 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 below or consult the "Graduate College" section in the *Catalog.)*

Special Academic Programs

Honors Program. The Arts and Sciences Honors Program is the oldest and largest program of its kind 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 bachelor's degree with honors (which is earned by completing both General and Departmental Honors Program requirements with a minimum of 39 honors hours). These awards are reflected on the student's transcript, and a special honors diploma is awarded to students completing the requirements for the bachelor's degree with honors.

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 (1) an ACT composite score of 27-29 with a high school grade-point average of 3.75 or higher, or (2) an ACT composite score of 30 or higher with a high school GPA of 3.50 or higher. Later entry is permitted on the basis of cumulative grade-point average. 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 Provost and Vice-President for Academic Affairs. At least 45 semester hours must be completed after the plan has been approved.

Area Studies Certificates. *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, African, Latin American, and Russian and Eastern European Studies.

The Area Studies certificate is granted upon successful completion of all requirements for a bachelor's degree in the student's major and of the following certificate requirements: (1) five credit hours of second-year level instruction in a language of the area chosen; and (2) six upper-division courses (18 credit hours) pertinent to the area chosen.

Ancient and Medieval, Native American, and Women's Studies. Certificates in Ancient and Medieval Studies, Native American Studies and Women's Studies are also available. These programs require approximately the same number of credit hours required for a minor in a specific department.

Further information on these certificate programs may be obtained from the Office of the Arts and Sciences Student Academic Services.

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 medical doctors, osteopaths, 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 athletic training, 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 senior academic 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 POLSC 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 Sciences 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. FRNCH and GRMN 3013, 3023, FRNCH and SPAN 4113, RUSS 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 4633, 4643, 4653, 4663, 4673; ECON 4643; ENGL 3173; FLL 3500, 3503; GEOG **3753,** 3763; HIST 1713, 3013, 3203, 3403, 3413, 3423, 3433, 3980, 4613; JAPAN 2115, 2123, 2223; MUSIC 3573; PHILO 3943; POLSC 3213, 3223, **3253,** 3313; REL 3403, 3413, **3533,** 3613, 4113, 4400.

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 any adviser or from the Office of the Dean of Arts and Sciences.

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 any adviser or from the Office of the Dean of Arts and Sciences.

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 50 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 (8 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)

Angel Flight

Arnold Air Society

Army Blades

Arts & Sciences Student Council

Association for Computing Machinery

Dobro Slovo (Slavic languages)

Economics Club

English Club

French Club

Friends of the Forms (philosophy)

Gamma Theta Upsilon (geography)

Geography Club

Geological Society

German Club
Japanese Club
Kappa Kappa Psi (band honor society)
Kappa Tau Alpha (mass communications)
Math Club
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 National Student Speech-Language-Hearing Association
Pershing Rifles (military science)
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
Public Relations Student Society of America
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)
Sociology Club
Spanish Club
Speech Communication Organization
Statistics Club
Tau Beta Sigma (band honor society)
Wildlife Society, Student Chapter
Women in Communications

Art

Associate Professor and Head Nancy B. Wilkinson, Ph.D.

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 education; 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, 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 Gallery 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 anatomy and ultrastructure, ecology, physiology, taxonomy, population biology, genetics and development, and biotechnology-related areas such as tissue culture and plant molecular biology.

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 morphology and anatomy, plant pathology or microbiology, plant physiology or cellular and molecular biology, genetics and ecology. Chemistry through organic and mathematics through calculus 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

Regents Professor and Chairman
Lionel M. Raff, 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 epergy 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 average 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 thesis must be presented which contains a substantial original contribution to the field of chemistry. The student must pass a final oral examination covering the thesis 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 is a preprofessional degree program. It first 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 who possess 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 level program in speech-language pathology is designed to provide students with intensive course work in the various communication disorders and exposure to a wide variety of challenging clinical activities. This includes a full time, off-campus clinical externship for at least eight weeks which serves as an excellent transition from on-campus practicum to an actual professional position after graduation. Students who graduate from this department are prepared to take positions in public schools, hospitals, community speech and hearing centers, private practices and other related settings. All graduates meet the academic and practicum requirements for the Certificate of Clinical Competence in Speech-Language Pathology of the American Speech-Language-Hearing Association and licensure by the state of Oklahoma in speech and language pathology. In addition, almost all students elect to earn the state teaching

certificate. The program is nationally accredited in speech-language pathology.

Graduate Programs

Prerequisites. Other than the general requirements of the Graduate College, no other prerequisites are required for the Master of Arts degree. 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.

Admission Requirements. Applicants should have a 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. Beyond that, the number of students admitted will depend on the number of places available in the program. 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. 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 220 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. International students are eligible to apply for graduate assistantships which also qualify them for in-state tuition. The International Student Services Office is available on campus to assist international students.

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, including extensive practical experience within the OSU clinic and in a variety of off-campus settings, including a full-time externship for at least eight weeks at the end of the program. All practicum experiences are supervised closely by faculty members or by other highly qualified and certified speech and language pathologists and audiologists. The program leads to the certificate of clinical competence of the American Speech-Language-Hearing Association, state teacher certification, and state licensure in speech-language pathology.

The degree consists of a minimum of 29 semester credit hours in courses that examine the nature, causes and treatment of communication disorders and related areas, and a minimum of nine semester credit hours in clinical practicum courses. This includes an eight-week off-campus externship for which the student may receive up to six semester credit hours.

Students holding undergraduate degrees in other fields are encouraged to apply for admission. Undergraduate prerequisites will add approximately 37 credit hours to the program.

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 has a cooperative education program. Cooperative education is the process of education that formally integrates college studies with work experiences in cooperating employer organizations. It blends classroom study with planned and supervised employment in an area relevant to the student's major. Students who are in their junior year may enter this program and alternate semesters in the classroom with semesters on the job. A student goes into the work setting at least three times.

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 Computer Center computers, an IBM 3090-200S, a VAX, and a DEC 5000-240 RISC. The department has a Sequent Symmetry S81 computer which is UNIX based. There are also several NCD X-Terminals with windowing graphics displays that are available for some classes.

Computers can be accessed through the University Computer Center Network. Computer terminals are available in various buildings on campus. Some of the residence halls also have terminals available. Both the University and departmental computers can be accessed through the network. Computers are available 24 hours a day for at least six days a week.

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 and a dissertation 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. Reading knowledge of at least one foreign language is required for a Ph.D., but not for the Ed.D. Approximately 700 students graduate each year in the United States with Ph.D.'s in computer science. 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. 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 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 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 a field of specialization. (The theory core is not considered a field of specialization.) Competence must be demonstrated in a field of specialization, either through course work or by passing a qualifying examination in the 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

Associate Professor and Head Jeffrey Walker, 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. Educated people in almost every career and lifestyle regard these skills as invaluable.

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, composition and rhetoric, technical writing, creative writing, linguistics, teaching English as a second language, and film. The number of students in any English class rarely exceeds 30; and in a writing class, including freshman-level classes, the enrollment cannot exceed 25. The maximum number of students in a graduate-level class is 10.

An undergraduate English major has three options: a traditional English major, secondary education teaching certification, 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 take creative writing from practicing, published writers and may specialize at the advanced level in fiction writing, poetry writing, and scriptwriting. 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. More students are finding 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 broad-mindedness.

The Department of English serves a great many students other than those majoring in English. It offers a variety of writing courses to fullfill 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 find English such a good complement to their first major that they choose a second major or minor in English.

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 9 of which must be upper-division. (These hours do not include Freshman Composition.)

Graduate Programs

Graduate study in English at Oklahoma State University allows students freedom of choice. Only one course, Introduction to Graduate Studies, is required of all graduate students, and only one additional course, Teaching Freshman Composition, Teaching Technical Writing, or TESL Methodology, depending on the student's career goals, is required of all graduate teaching assistants. As a result, all students, in cooperation with their advisers, design their programs in accord with career goals. In addition to American and British literature, the Department of English offers graduate work in composition and rhetoric, creative writing, film, linguistics, and literary theory. At the M.A. level, separate programs in teaching English as a second language (TESL) and in technical writing prepare teachers for the bilingual classroom and technical writers for industry. Ph.D. degree candidates have an additional interdisciplinary area that allows them to blend other disciplines with literary studies. The variety of choices and the flexibility built into the program prepare the graduate to meet the demands of a changing academic marketplace.

Application Deadlines. The deadline for spring admission is October 15. The early decision deadline for fall admission is February 28; the final deadline is April 1.

Stipends, Scholarships and Awards. All graduate assistants are charged in-state fees. Stipends for graduate assistants and associates are paid on a nine-month basis.

M.A. Examinations. During the last semester of course work-but no earlier-graduate students must take Exam A. Students in TESL and technical writing students will take the exams designed specifically for those areas.

Exam A. This five-hour exam is administered on a single day. The exam contains three essay questions in each of the 10 areas of study, from which the student will answer four questions. Exam A, therefore, presents students with 30 questions, three from each of the 10 areas. The areas of study are:

1. British literature Old English to 1660 (including Milton)
2. British literature Restoration through 19th century
3. American literature colonial through 19th century
4. Twentieth-century British and American literature
5. Literary theory and criticism
6. Linguistics
7. Composition and rhetoric
8. Film
9. Technical writing
10. Teaching English as a second language (TESL)

Questions in technical writing and TESL on Exam A are general; they are not designed for technical writing and TESL students seeking the M.A., who take different exams.

TESL Program Exam. Students in the TESL program will take two five-hour exams:

1. TESL methodology/testing
2. Applied linguistics/grammar

Technical Writing Program Exam. Students in technical writing will take one five-hour exam. They will answer four questions from the following three areas:

1. Technical writing theory
2. History of scientific and technical writing
3. Document design

Ph.D. Examinations. After the appropriate amount of course work and prior to beginning the dissertation, the student must take and pass Exam B.

Exam B. Exam B will consist of two five-hour exams. The student, in consultation with the advisory committee, will select the two areas on which he or she will be examined. These two areas will be chosen from the following:

1. Early American literature
2. Nineteenth-century American literature
3. Old and Middle English literature
4. Renaissance British literature (including Milton)
5. Restoration and eighteenth century British literature
6. Nineteenth-century British literature
7. Modern British and American literature
8. Contemporary British and American literature
9. Literary theory and criticism
10. Practical poetics and fictional rhetoric
11. Film
12. Composition and rhetoric
13. Linguistics
14. Technical writing
15. Teaching English as a second language

Details on Exam A and Exam B are found in the departmental *Guidelines.*

Teaching Opportunities. Graduate teaching assistants may enjoy a wide range of assignments, including teaching freshman composition and working individually with students in the writing laboratory. After acquiring some classroom experience and demonstrating excellence, assistants may also teach introductory courses in literary genres, creative writing, or technical and report writing.

The Master of Arts Degree. Every M.A. degree student is required to take 24 credit hours of course work and six thesis hours. Applicants must have a minimum of 24 hours of undergraduate English courses. ENGL 5013, Introduction to Graduate Studies, is required of all M.A. candidates. The remaining 21 hours of course work will be chosen by students in consultation with their advisers.

In addition to 30 hours of work in English, a reading knowledge of one foreign language is required.

Master's degree candidates in literature prepare either a scholarly or a creative work for thesis credit. A thesis committee, consisting of a thesis adviser and two other faculty members, supervises this project. Students choose the faculty members with whom they work; the project should be a valuable experience for both candidates and supervisors.

The Master's Program in TESL. *Admission to Teaching English as a Second Language.* TESL is a program within English having its own course requirements and examinations. Applicants who speak English as a second language should have had an undergraduate concentration in English or the equivalent in practical experience. After initial testing and counseling, international students may be asked to enroll in a course designed to improve their command of English. Applicants who speak English as a first language need not have majored in English, but they must have completed at least six hours of upper-division foreign language training. Native speakers who have not done so should expect to complete two semesters of foreign language courses in addition to English requirements.

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. This program, however, does not serve as a substitute for teacher certification.

Course Work. Plan I: 24 hours of course work and a thesis for a maximum of six hours are required. Plan II: **33** hours of course work and a research project or substantial paper are required.

The Master's Program In Technical Writing. *Admission to the Technical Writing Program.* Technical writing is a program within English having its own course requirements and examinations. Applicants should have a background in a technical area and in technical writing. Following a review of previous academic and work experience, students may need to enroll in courses designed to improve their mastery of a technical area or technical writing or both. Students need not, therefore, have majored in technical writing or a technical area.

Course Work. Plan I: 24 hours of course work and a thesis for a maximum of six hours are required. Plan II: 33 hours of course work and a research project or substantial paper are required.

The Doctor of Philosophy Degree. A master's degree in English from an accredited university, a graduate grade-point average of 3.50 (on a 4.00 scale), a statement of purpose, a writing sample, and three positive letters of recommendation are the usual requirements for admission to the doctoral program. If one of these factors is not clearly present, admission may be granted with qualifications. The doctoral student is expected to earn 60 hours of credit beyond the hours required for the M.A. Of these 60 hours, a maximum of 20 hours may be devoted to the dissertation.

All Ph.D. applicants are admitted provisionally. Full admission to the doctoral program is determined in the second semester of enrollment based on the student's performance on the qualifying exam, Exam A, and on performance in course work.

A reading knowledge of two foreign languages or mastery of one foreign language is required of the doctoral student. Details about the foreign language and other requirements are found in the department's *Guidelines for the M.A. and Ph.D. Programs in English.*

Doctoral candidates submit a dissertation based upon original research and prepared under the guidance of a dissertation committee composed of at least three faculty members from within the department and one faculty member from outside the department. Creative writing students may present as their dissertations original works in poetry, drama (including filmscripts), or prose fiction. The dissertation is defended orally by the candidate at a public examination in which the argument, credibility, and value of the work are challenged.

Course Requirement for Teaching Assistants. In their capacity as teachers, assistants are required to enroll in Teaching Freshman Composition, Teaching Technical Writing, or TESL Methodology. This course appears on student transcripts and may be counted for English degree credit.

Foreign Languages and Literatures

Professor and Head Kenneth J. **Dollarhide,** Ph.D.

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, 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 good 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.

Geography

Associate 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, 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 cartographic 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 geographic information system. It is directly linked to the University's computing facilities through both standard and graphics terminals.
The North American Culture Society (NACS) is centered in the department and its journal *North American Culture is* edited and published by the department.

The department specializes in four areas: cultural and historical geography, resource management, geographic techniques, and the geography of sport, recreation, and leisure. 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.

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 other fields, including retail store location analysis, banking, and university teaching and research.

The Master of Science Degree. Admis-sion 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, cartography, and other geographic concepts. If deficiencies are apparent, they will have to 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 nonthesis 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 the geography of sports, recreation and leisure.

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: hydrogeology/environmental studies in the geosciences, and sedimentary/petroleum 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 hydrogeology, environmental geology, sedimentary/petroleum 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 Ronald A. Petrin, 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 time factor in man's 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 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 one field in history with a field in a related discipline. 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

Latin America

Russia

United States to 1877

United States since 1877

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 three hours of report (HIST 5000). With the approval of the student's advisory committee, as many as 15 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:
   - United States colonial, 1600-1787
   - 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
   - Latin America
   - Russia

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. Four fields from the following, one of which must be United States history:
   - Ancient Mediterranean world
   - Medieval Europe
   - Early modern Europe to 1789
   - Europe since 1789
   - East Asia
   - England
   - Latin America
   - Russia
   - United States
2. 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 Marian D. **Nelson,** Ed.D.

At Oklahoma State University, the professional areas of mass communication are grouped in the School of Journalism and Broadcasting (S.JB). 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 practi-

tioners 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 is required for registration in all writing courses beginning with the course Mass Media Style and Structure (JB 1393). 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.

Journalism

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.

Programs offered in journalism are:

News-editorial. This 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.

Technical communication. Students may combine agriculture and journalism or home economics and journalism to prepare for specialized work in technical writing and editing. These programs are developed in cooperation with the colleges of Agricultural Sciences and Natural Resources and Human Environmental Sciences.

Community journalism. This program, for those who plan eventually to own or manage weekly or small daily newspapers, requires experience in news, advertising and management, and thus requires a wide range of courses both within and outside the School of Journalism and Broadcasting. This program is an individualized one and should be entered only with the advice and consent of the SJB director.

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 2393, 2413, 3413, 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 J. Brian Conrey, 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. Courses are available that serve as preparation for graduate work, for high school teaching and for employment in industry. Students are encouraged to acquire proficiency in computer programming and to take substantial work in related fields in which they have a special interest.

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 and also cooperates with the College of Education in supervising a program leading to the Ed.D. degree with emphasis in mathematics.

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 Master of Science degrees, 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.

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 Head Robert V. Miller, 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 grad-uate 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 microbiologists 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, 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 MICRO 5000 and one credit hour in MICRO 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 MICRO 5000 and MICRO 6000. Those entering with a master's degree must include 15 hours in courses other than MICRO 6000 which were not included in the master's study plan. Three hours of MICRO 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.

University Hospital, Oklahoma City, 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. 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.

Degree Programs

A Bachelor of Science degree in aerospace studies or military science is offered in the College of Arts and Sciences upon completion of 127 semester credit hours. It combines ROTC training with the College's general education and degree requirements and the opportunity to develop strong programs in a wide variety of other fields. The curricula for these degrees prepare the student for further professional work and for duty with the Armed Forces.

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 Joseph G. Sheridan, 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 Corps (POC); those selected will attend either a four-or six 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 two years 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 Corps. POC cadets not on three-or four-year scholarships are eligible for partial scholarships of $1000 per semester if they maintain at least a 2.35 semester GPA.

All students have the opportunity to participate in various corps-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 six- to nine-year commitment.

Military Science

Professor of Military **Science and Head** LTC William J. McLean, M.B.A., 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 8,000 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 six-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: written communication, military history, human behavior, computer literacy, and math reasoning.

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 three-year scholarships are available through the department. Prior enrollment in military science is not a prerequisite for departmental scholarship application.

Music

Associate 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. Students wishing to major in music should contact the Department of Music to arrange for an entrance audition and interview.

Philosophy

Professor and Head Neil R. Luebke, 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 behavior is directed and justified. No area of experience or behavior-aesthetic, political, religious, scientific or moral-is immune to philosophical consideration. 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 historically related to the

development of every academic discipline.

Courses offered in philosophy fall into three general groups: broad introductory courses which cover a variety of topics, historical courses which proceed chronologically through a sequence of thinkers, and special topic or field courses. Some offerings combine the latter two characteristics. No undergraduate course is intended primarily for majors. The B.A. program in philosophy has been approved for offering at the University Center at 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. Philosophy majors have an excellent educational base from which to pursue careers in teaching, the ministry, law, government service and private business of many sorts. They have available to them one of the most flexible programs offered at the University, for the minimum philosophy requirements include only two lower-division introductory courses, two upper-division historical survey courses and 21 hours of additional unspecified philosophy courses numbered 3000 or above, which permit up to 37 hours of related and elective study in other areas, in addition to General Education and other college requirements. 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 will be especially valuable to persons interested in pursuing predoctoral studies in philosophy, religious studies, or some other area of the humanities; to persons who already possess an advanced degree and who wish to expand their field of professional competence; and to college graduates who wish to broaden their own educational horizons.The M.A. program in philosophy has been approved for offering at the University Center at Tulsa.

The degree may be earned through any one of three options: with thesis (usually eight three-credit-hour courses and a six-credit-hour thesis); with report (usually 10 three-credit-hour courses and a two-credit-hour report); and with neither a thesis nor report (usually 12 three-credit-hour courses). Thus the thesis degree requires 30 hours, the report degree requires 32 hours, and the courses-only degree requires 36 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 (PHILO 3113 and 3213 or equivalents) and a course in logic (PHILO 1313 or 4303 or equivalents). 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. In every case, this examination will be arranged, administered, and supervised by the three-person advisory committee appointed for, and in consultation with, each student during the student's second semester of enrollment. This committee will also be responsible for determining the student's plan of study, thesis or report topics, if any, and any other special requirements that may need to be fulfilled.

Master of Arts in Philosophy, with thesis:

1. 24 hours of course work in classes and seminars approved by the student's advisory committee.
2. Six hours of PHILO 5000, in which a well-reasoned, substantial piece of research on a narrowly defined topic will be written as a thesis.
3. An oral examination and defense of the thesis before the graduate faculty of the department.

Master of Arts in Philosophy, with report

1. 30 hours of course work in classes and seminars approved by the student's advisory committee.
2. Two hours of PHILO 5910, in which two research papers will be prepared. These papers typically will have their origin in graduate seminars taken as part of the plan of study.
3. An oral examination and defense of these reports will be required in a formal presentation to the departmental faculty.

Master of Arts in Philosophy, without thesis or report

36 hours of course work in classes and seminars approved by the student's advisory committee.

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.

Under the auspices of the Department of Educational Administration and Higher Education (EAHED) 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.* The basic prerequisite is a significant background in philosophy (ordinarily at least 24 semester hours of upper-division and graduate-level work). Depending on the student's record, 40-60 credit hours of philosophy, excluding the dissertation, are normally required, in addition to specific EAHED courses.

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 will be 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. The requirements for the master's degree in physics include the successful completion of 30 semester credit hours beyond the B.S. and the submission of an acceptable thesis based on original and independent research. The following physics courses are required: PHYSC 5113, **5313,** 5413, 5453, 5613. In addition, nine semester credit hours of electives must be completed in physics, mathematics, or an allied field. These must be chosen in consultation with the student's adviser. For example, an advanced course in mathematics along with Solid State I and II in physics might be reasonable choices for someone interested in a materials specialization. For others, one or more courses from electrical engineering might be preferable. A maximum of six credit hours of PHYSC 5000 may be applied toward the M.S. thesis. The student must successfully defend the thesis in an oral examination.

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: PHYSC 5213, 5313, 5413, 5453, 5613, 6313. Four additional PHYSC 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 William Parle, Ph.D.

Political science is the study of politics, government and public policy at the local, state, national and international levels. It is concerned with struggles for power and the exercise of power in the form of institutions, laws and public policies.

Political science seeks to reveal the patterns of behavior associated with politics, to discern the decision-making process in government, to explain the functioning of political and governmental institutions, to appraise alternative public policies and to assess government's role in society. The principal fields of study in political science are political theory, public law, comparative politics, international relations, public administration, public policy, and American political behavior. Students may receive the Bachelor of Arts or Bachelor of Science degree in political science with a concentration in any of the fields of study.

Political science graduates enjoy a variety of career opportunities-staff positions with international, federal, state and local government agencies; teaching positions in college and high school; policy analysis and research positions with governments, businesses, civic groups and foundations; positions in journalism, public relations, political consulting or lobbying; and, via law school, the legal profession.

Graduate Programs

The Department of Political Science offers a program leading to the Master of Arts degree in political science. Candidates for the M.A. degree may choose from two plans. Plan A permits specialization in three areas of political science chosen from American politics, comparative politics, international relations, public administration, and public policy, or some other field of specialization offered under the faculty mentoring program. Plan B permits concentration in public administration and public policy. Both programs are designed to prepare men and women for future work in Ph.D. programs as well as for policy analysis, general administration and public management careers in government, the nonprofit sector, the private sector and research organizations.

Admission Requirements. Admission requirements include a 3.00 GPA, two letters of recommendation, and STAT 2013.

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:

1. A minimum of 33 credit hours in political science or closely related courses, including three hours of methods; 18 hours of political science graduate seminars (seminars numbered 5000 or above); either a thesis (six hours) or a three-hour creative research paper; and additional graduate-credit courses in POLSC or closely related fields to complete the 33-hour requirement. Students offering a field from outside political science may use up to six hours of nonpolitical science seminar courses to complete their 18-hour seminar requirement.
2. Satisfactory completion of two-hour comprehensive exams administered in the last semester of the student's program, covering three of the five fields

(American, comparative, international, policy, public administration). One field offered under the faculty mentoring program or based on courses from outside political science may be substituted for examination purposes.

3. A minimum grade-point average of 3.00.

Plan B:

1. A minimum of 36 credit hours in political science or closely related courses which includes a three-course required theory component (nine hours), a two-course required methods component (six hours), a three-credit-hour required internship, a three-credit-hour required creative component (master's research paper) and 15 hours in an area of specialization.
2. Satisfactory completion of a four-hour comprehensive exam administered in the last semester of the student's program.
3. A minimum grade-point average of 3.00.

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 David G. Thomas, 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 material 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, physiological psychology, experimental psychology, history, and systems.

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 four core courses and 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 the first-year requirements, the student may be admitted to doctoral status in clinical psychology or experimental psychology.

Religious Studies

Associate Professor Richard C. Rohrs, 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

Associate 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, social ecology and population studies, social psychology, industry and work, and rural sociology. The department also offers courses in anthropology, race and ethnicity, and gender issues. 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 community organization, 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

Associate Professor and Head Paul D. Harper, Ph.D.

The Department of Speech Communication affords a variety of opportunities for students who wish to become involved in the excitement of a changing world. Not only does the department offer academic subjects leading to both undergraduate and graduate degrees, but students are afforded an opportunity to gain practical experience in interpersonal and public communication.

In speech communication, students are prepared for positions in industry and business and are qualified to work with interpersonal communication problems. Graduate work in this area increases the student's career opportunities in the field of communication consulting. In addition, the department's concern with related areas, such as sociology, business and psychology, allows the admission of graduate students with undergraduate preparation in some of these fields.

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. Beyond that, the number of students admitted will depend on the number of places available in the program.

Program Requirements. The complexity of today's society requires an individual capable of solving a wide range of problems. In order 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 doctoral programs in communication; 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. Every student must pass a written and oral comprehensive examination. The student following Plan I or II must also pass an oral examination over his or her thesis and related materials.

Statistics

Professor and Head P. Larry Claypool, 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 COMSC 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 COMSC 2113 or to have demonstrated competence in a procedure-oriented language such as FORTRAN.

Theater

Professor and Head Jerry L. Davis, Ph.D.

The program in theater provides course work and practical experience in all areas. The degree programs are broadly based with academic, humanistic and artistic approaches to the subject matter. Training typically involves not only the most obviously theatrical disciplines such as acting, but also extensive technical skills, literary and historical knowledge, artistic expression, and self-discipline.

Study of theater can lead to many careers besides those in the performing arts. Fields where theater study can be especially helpful include business management, sales, law, politics, teaching, counseling, ministerial professions, or any career area where self-awareness and effective personal communication are essential.

Ambitious seasons of varied productions offer practical experience for both majors and nonmajors. Students with a major interest in theater choose a Bachelor of Arts degree.

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 David Duvall, 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 upper-division course work in general biology, genetics, gross and microscopic anatomy, mammalian and cellular physiology, mathematics, pharmacology, 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, or 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 conservation, (2) environmental toxicology, and (3) ecology, evolution and behavior. Specializations of faculty include animal behavior, behavioral ecology, carcinogenesis, cellular physiology, cytogenetics, developmental biology, ecology, ecotoxicology, evolution, fisheries biology, herpetology, icthyology,

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.

College of Business Administration

Gary L. Trennepohl, Ph.D., ***Dean***
Gregory C. Mosier, J.D., Ed.D., *Associate Dean*
Julie L. Weathers, M.B.A., *Director of Extension*
Craig B. Robison, Ed.D., *Director of Student Academic Services*

Today's business world is one of excitement. It offers young men and women a challenging professional future as well as the opportunity for meaningful social involvement and civic service. A steadily increasing number of young people today are choosing careers in business as they seek to shape our nation's economic structure and deal with some of its social problems. New developments in automation, economics, and innovations in management techniques and social responsibility are constantly creating new and exciting opportunities. The College of Business Administration (CBA) at Oklahoma State University assists in preparing students for these opportunities.

The College of Business Administration seeks to accomplish three major objectives: (1) to provide students with a liberal education in a program which includes study in four general areas: behavioral and social sciences, communications, humanities and fine arts, and natural science and mathematics; (2) to provide students with an understanding of the functions of business and other economic units in the American economy, which includes study in the basic areas of accounting, economics, business law, finance, management, management information systems, marketing, production and statistics; and (3) to provide students with the opportunity for specialized study in selected major areas of business.

Accreditation

The College of Business Administration at Oklahoma State University is fully accredited by the Accreditation Council of the American Assembly of Collegiate Schools of Business, 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.

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.

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 or economics. 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 3013, MSIS 3223, MKTG 3213 and FIN 3113; ENGL 1113 and 1213; ACCTG 2103 and 2203; ECON 2013 and 2023; MATH 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

Alpha Kappa Psi (professional business organization)

Beta Alpha Psi (accounting honor society)

Beta Gamma Sigma (business administration honor society)

Beta Upsilon Sigma (professional business organization)

Business Student Council

Delta Sigma Pi (professional business organization)

Economics Club

Entrepreneurship Club

Financial Management Association

Graduate Students in Business Administration

Human Resource Management Association

Marketing Club

Mu Sigma Omicron (management information systems, and management science and computer systems)

National Association of Black Accountants

Phi Beta Lambda (business leadership)

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 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.

The B.S. in accounting, including an auditing course, is acceptable in lieu of three years of required public accounting experience required before a candidate may take the Oklahoma Certified Public Accountants' Examination. 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 auditing-financial accounting, cost-managerial, or tax-is possible in the M.S. in accounting program.

Candidates for either of these degrees are encouraged to select some electives in quantitative and behavioral science areas.

Graduate Programs

The Master of Science 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 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 undegraduate 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 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, or taxation. All candidates are required to take a two-semester seminar which provides an overview of relevant academic literature. This seminar is restricted to Ph.D. candidates in accounting. 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

Interim M.B.A. Program Director Gary Frankwick, M.B.A.

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, management and marketing. Further, it provides critical analytical and research capabilities through research design and computer-based decision courses. The program is a 48-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 six credit hours. To be eligible for this waiver, students must have earned a baccalaureate degree in business administration at an AACSB-accredited institution within the past five years.

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 or marketing).

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, computer science, accounting and economics.

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 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 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 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.

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.

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 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 two fields of specialization. (The theory core is not considered a field of specialization.) Competence must be demonstrated in a third field of specialization, either through course work or by passing a qualifying examination in the 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. The Ph.D., as offered by the Department of Finance, provides intensive study in finance, preparing students for significant professional contributions in university teaching and research or staff positions in 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 skills in finance.

Students will select finance as their major area of study. One or two minor areas are also to be selected. A minor area must be taken in the College of Business Administration from accounting, economics, management, management science, or marketing. The second minor area (if any) may or may not be taken outside the College of Business Administration. As support for the major and minor 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 the modern organization. Whether the goals are to realize success in business or solve the pressing problems of civilization, organizational systems must be effectively managed in order to maximize the probability of success.

As an area of study, the field of management offers dynamic, exciting possibilities to students interested in business careers, careers with complex nonbusiness organizations, and to students who seek the challenge of working on relevant, real-world problems. The field of management is concerned with the analytical process and the application of relevant theory and research to solving business and organizational problems. Examples of such problems include designing organizational structure, systems and policies; 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 and management science. Four degree programs are available for choice based upon the student's interest in specialized work. Each program emphasizes analytical tools, the scientific method and essential theory that will be useful in a rapidly changing world.

Management

The major in management is designed to prepare 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 mainframe and microcomputer 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 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 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 L. Lee Manzer, Ph.D.

Marketing is an exciting field of study in which a wide variety of job opportunities exist. It is also an excellent foundation study for eventual movement to top management within an organization.

Marketing is concerned with the identification of wants and needs by consumers and the development of products, distribution channels, price and communication methods to best satisfy those wants and needs. Our economic system is dependent on the ability of organizations to match resources with needs. As such, firms become more marketing-oriented every year.

A marketing graduate will likely be involved in performance and management of many different traditional areas of decision-making-sales, advertising, logistics and marketing research. In addition, one will frequently assist in product planning, developing marketing information systems, and general management.

The effective marketing executive today must develop a perspective and capability that reflect a four-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; (3) a high-level competency in marketing; and (4) study in a supportive field. 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, which provides an overview of the field of marketing, the student will take courses in consumer behavior, promotion, sales management, marketing research, channels and marketing policy. While studying marketing, one typically selects courses in fields such as management, finance, statistics, advertising/public relations, international business, and other fields to support a particular career choice within the marketing field.

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 comprehensive qualifying examinations, both written and oral, that address knowledge in the major and minor fields. A separate final 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 one year (or more) 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. The program normally takes four years to complete for those without a master's degree. Applications for admission to the program are evaluated on the basis of (1) undegraduate 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 Teacher Education*

N. Jo Campbell, Ed.D., *Associate Dean* for Academic Affairs

Kenneth H. McKinley, Ph.D., *Associate Dean for Administrative Affairs and Research*

A. Kenneth Stern, Ed.D., *Director of Extension*

The College of Education includes the departments of Applied Behavioral Studies, Aviation and Space Education, Curriculum and Instruction, and Educational Administration and Higher Education, and the schools of Health, Physical Education and Leisure, and Occupational and Adult Education. 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 doctoral 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, youth sports programs, aeronautics, aviation education and space sciences. The office offers ACT preparation workshops and academic challenge competitions from across the state, as well as, the summer Reading Camp for area school children. The Department of Curriculum and Instruction offers a master's degree through education extension by compressed video.

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:

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 Specialities-Certification Areas

Elementary school certificate (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

Foreign language

Health

Physical education/health

Reading specialist

Special education (emotionally disturbed, learning disability and mental retardation)

Secondary school certificate (7-12)

Business education

English

Mathematics

Science

Social studies

Speech/Drama

Technical and industrial education

Trade and industrial education

111.

Other Specialties-Noncertification Areas

Adult and continuing education

Aviation and space education

College teaching

Community counselor

Community education coordinator

Counseling psychology

Curriculum and teaching

Curriculum supervision

Educational research and evaluation

Educational technologies

Educational/instructional psychology

Gifted and talented

Health and wellness

Higher education administration (junior college, 4-year college, and university)

Human development

Human resources development

Instructional systems

Leisure service management

Marriage and family therapy

Microcomputer applications

Occupational education administration

Student personnel

Therapeutic recreation

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 provisionally accredited by the American Psychological Association. Programs in the School of Health, Physical Education and Leisure are accredited by the National Recreation and Park Association, and the American Association for Leisure and Recreation. All teacher 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 teacher education programs, are also accredited by the Oklahoma State Department of Vocational-Technical Education.

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 Teacher Education, student teaching, and graduation. This standard is consistent with state requirements for students in the state of Oklahoma who complete teacher 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.

Total hours attempted	*Minimum GPA required*
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:

Air Traffic Control Associated Scholarship

Ray E. Brown Memorial 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

Paul Douglas Teacher Scholarship

Lacrisha Diane Stephens Earls Memorial Scholarship

Education Student Council Scholarship

Charles A. "Adam" Esslinger Outdoor Recreation Scholarship

Future Teachers Scholarship

Roger and Donna Hardesty Aviation Scholarship

Aix B. Harrison Scholarship

Frank E. and Harriet E. Hedrick Scholarship

Ora A. Henderson Memorial Scholarship

Daniel and Mary L. Herd Memorial Scholarship

J. Andrew Holley Memorial Scholarship

Helen M. Jones Scholarship

Richard and Edna Jungers Scholarship

Robert B. Kamm Distinguished Graduate Fellowship Fund

Kappa Delta Pi Scholarship

John Leslie Lehew III Scholarship

Locke, Wright, Foster, and Cross Graduate Scholarship

Mable Marietta Macy-Oaks Memorial Art Scholarship

McMaster Flying Aggies Scholarship

Leon L. Munson Memorial Scholarship

The Ninety Nines, Inc.

Percy W. Oaks, Sr. Memorial Art Scholarship

Outstanding Freshman Aviation Education Student

James L. Prince Memorial Scholarship

Wendell Sharpton Family Scholarship

Helmer and Frances Sorenson Scholarship

James Vandegrift Scholarship

Amy Louise Wagner Memorial Scholarship

Hoyt E. Walkup 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 nontraditional students may be met by working with academic advisers in selecting a specially-tailored program which 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 such departments as Applied Behavioral Studies, Aviation and Space Education, Curriculum and linstruction, Educational Administration and Higher Education, the School of Health, Physical Education, and Leisure, or the School of Occupational and Adult Education.

Students interested in such an interdisciplinary degree should contact a department within the college for information on degree requirements and the application process.

Tutoring Program. The Reading and Math Learning Center within the Department of Curriculum and Instruction 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 teacher 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. Teacher education students and alumni are encouraged to attend the annual Oklahoma Teacher of the Year (OKTOY) organization conference held on the OSU campus. The College of Education is the official home of the Oklahoma Teacher of the Year organization. The membership of the OKTOY organization is made up of winners of the annual Oklahoma Teacher of the Year cornpetition. The goals of the organization are to attract academically talented high school youth to the teaching profession; to retain undergraduate students currently enrolled in education programs; to feature the skills, talents, and expertise of Oklahoma's finest educators; to create student/teacher mentor relationships; and to establish a cadre of educators as a resource for research on improved instruction and academic excellence.

Graduation Check. The College of Education Office of Student Academic Services prepares a graduation check which indicates the undergraduate's status for graduation. For those undergraduates pursuing teacher education programs, the academic status for 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 provided for College of Education students and coordinated through the University Placement Office was initiated in the 1960s for teacher placement services and has broadened its service to the campus. University Placement assists students in signing up for interviews with in-state and out-of-state school districts. Lists of employment opportunities with school districts 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 the University Placement Office affords students the opportunity to participate in the annual teacher placement days held on campus in April and to access the office's referral service to school districts.

Alumni Association. The College of Education Alumni Association compliments the cooperative efforts of the University Placement service to assist a student during college preparation for a career in education. The organization provides the student a professional support organization and an immediate network of professional contacts. Four scholarships are provided by the Alumni Association for students in the College of Education. Graduates attending the college convocation receive an invitation for a one year complimentary membership to the College of Education Alumni Association.

General Education Requirements

All undergraduate degrees in the College of Education require a minimum of 40 semester hours in general education which includes 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

HPEL Club (health, physical education and leisure)

Kappa Delta Pi (education honor society)

Minority Educators of Tomorrow

Phi Epsilon Kappa (health, physical education, leisure honor society)

Student Art Education Association

Student Council for Exceptional Children

Student Education Association

Applied Behavioral Studies

Professor and Head Dale R. Fuqua, Ph.D.

The Department of Applied Behavioral Studies in the College of Education serves the University Teacher Education program and offers degree programs at the graduate level. Areas included in the department are special education, counseling and student personnel, educational psychology, school psychology, and educational research and evaluation. A primary mission of the department is to apply knowledge derived from psychological and related behavioral studies to the provision of educational and social services.

Graduate Programs

Special Education Programs. *M.S. Programs.* Master's level emphasis is available through the M.S. in applied behavioral studies. The academic preparation program in the special education area includes special techniques and arrangements to facilitate the education of exceptional individuals. At the master's level, students may pursue sub-area emphases in learning disabilities, emotionally disturbed, mental retardation, gifted/talented, and general special education.

Ph.D. Programs. Doctoral level emphasis in special education is available through the Ph.D. in applied behavioral studies. Graduates of this program pursue careers in university teaching and in the administration of special education programs in public and private settings.

Counseling and Student Personnel Programs. *M.S. Programs.* The counseling and student personnel area includes the following comprehensive specializations leading to master's degrees: community counseling, school counseling (elementary and secondary), and student personnel. 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 specialization such as youth counseling, substance abuse counseling and mental health counseling.

The M.S. programs in elementary/middle school and secondary school counseling are intended for individuals who wish to provide counseling services to children, youth, and consulting services to their teachers and parents in the school setting. The programs meet academic requirements for state certification as a school counselor.

The M.S. programs are designed to meet academic and practica requirements for licensure as licensed professional counselors in Oklahoma.

The M.S. 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. Applications for all M.S. programs are due and will be reviewed April 15 and October 15.

Ph.D. Programs. The Ph.D. degree offers specializations in counseling psychology and student personnel administration. These Ph.D. programs are designed to meet the needs of practicing professionals who have a strong interest in research. The counseling psychology program leads to the Ph.D. degree in applied behavioral studies and provides professional preparation in psychology as a behavioral science and in counseling as a specialty. The program is accredited by the American Psychological Association. The program is designed to prepare students for counseling, consulting, training and research roles in various settings such as university counseling services and academic departments, child guidance centers, youth services, community mental health clinics, rehabilitation centers, and family services. Students are required to follow a specified sequence of study in which academic course work and practicum experiences are integrated. Students must complete a one-year full-time internship (or a two-year half-time internship).

Students in the Ph.D. in student personnel administration are prepared 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 computer applications. A minimum of a 36-week student personnel administration internship is required.

Applications for all doctoral programs are due by February 1 for the following fall enrollment.

Educational Psychology Programs. *M.S. Programs.* A master's degree in educational psychology is available as an area of specialization within the M.S. in applied behavioral studies. Educational psychology emphasizes the application of psychological theory and research to 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 educational/instructional psychology or human development.

Ph.D. Programs. A doctorate in educational psychology is available as an area of specialization within the Ph.D. in applied behavioral studies. The educational psychology Ph.D. includes emphases in teaching and research, and instructional systems design. The teaching and research emphasis includes content in instructional psychology, education of the gifted and talented, and/or human development.

The teaching and research emphasis prepares students for the role of teacher and researcher in higher education, or researcher in non-educational settings. The instructional systems design specialization focuses on the development of systems for training and instructional support in business, government and educational settings. 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. There are no specifically required courses. Students, in consultation with the faculty, choose subject matter domains around which they structure their programs. Each domain is to be mastered through formal course work, independent study and practicum experiences. For each domain, the student specifies a "qualifying examination experience," the completion of which will be taken as evidence of mastery of the domain.

Applications for the Ph.D. program in educational psychology are due by February 1 for the following fall enrollment.

School Psychology Programs. *M.S. Programs.* 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 school psychometry program may include state certification requirements.

Ph.D. Programs. The doctorate in school psychology is available through the Ph.D. in applied behavioral studies. Doctoral level study in school psychology is designed to prepare individuals who can apply their knowledge of the behavioral sciences and their professional skills in ways that enhance learning and adjustment and facilitate child success. To achieve this purpose, the emphasis in the school psychology program is on the study and integration of principles of psychology and education. In addition to foundation knowledge in these areas, training is provided in the major areas of functioning within the profession: consultation/organizational development, psychological assessment, intervention procedures, and research/evaluation. The Ph.D. program includes the requirements for state licensure as a psychologist. Applications for the Ph.D. program in school psychology are due February 1 for the following fall semester.

Research and Evaluation Programs. *M.S. Program.* The M.S. degree in applied behavioral studies provides master's level study in educational research and evaluation. The academic preparation program in the educational research and evaluation area includes courses focusing on research and evaluation and courses selected to facilitate the development of a collateral area of expertise in another graduate area of education such as special education, curriculum and instruction, occupational education, or school administration. This M.S. program prepares students for entry level positions in research and evaluation units in school districts, government agencies, and private corporations and foundations.

Ph.D. Program. Doctoral level study in research and evaluation is available through the Ph.D. in applied behavioral studies and provides advanced graduate level preparation in applied educational research and evaluation. This program is designed to include advanced graduate training in two collateral areas, one of which must be in an area of education. The student may select the second collateral area in an adjunct field that pro-

vides course work conducive to the development of skills in educational research and evaluation. The second collateral area might be focused in an area such as curriculum evaluation, mathematical statistics, computer science, or program administration. A required practicum/internship provides an opportunity for practical applications of skills developed during the doctoral program. Graduates of this program will be prepared for positions such as college or university faculty members or directors of education, government agencies, private test corporations, or education foundations.

Aviation and Space Education

Professor and Head Kenneth E. Wiggins, Ed.D.

Aviation Education

The aviation education program prepares students for careers in the aviation industry. A bachelor's degree in aviation sciences offers three options: professional pilot, aviation management, and technical services management. Each of these options is tailored to meet specific needs for skilled personnel in the air carrier, aircraft manufacturing and sales, and general aviation segments of the industry. The degree program is a fusion of liberal arts, management, business, and aviation courses. Academic credit is awarded for flight training and associated ground school courses. The aviation sciences program is also offered in Tulsa through the University Center at Tulsa (UCT).

Students in the professional pilot option will complete all flight training through the Commercial Pilot with Instrument, Multi-engine, and Certified Flight Instructor ratings. Flight Instructor-Instrument and Multi-engine instructor ratings are available as electives. Students in this option must complete a minimum of two flight ratings in residence at OSU. This option prepares individuals for careers as corporate, commuter or airline pilots.

Flight training is conducted at Stillwater Municipal Airport located 2.5 miles from the main campus. Flight training for the University Center at Tulsa is administered by Oklahoma State University at the OSU Aviation Center at the Tulsa Downtown Airpark. Both flight training and ground school courses are conducted under Federal Air Regulation Part 141. OSU is one of two universities in the nation to operate its own high altitude chamber. The chamber is used to supplement aviation safety education.

The aviation management option is designed for students who are interested in a management position in some component of the aerospace industry. Employment opportunities include management positions with fixed-based operators, air carriers, corporate flight departments, commuter and air taxi flight operators, and a variety of functions associated with airport operations.

The technical services management option builds on an individual's technical experience to prepare the student for management positions in all segments of the aviation industry.

The Federal Aviation Administration (FAA) Airway Science program is available for those individuals seeking careers with the federal government.

Interested parties may contact the department head concerning graduate programs at the master's and doctoral level with an emphasis in aviation, management and related areas.

Oklahoma State University is a member of the University Aviation Association and the National Intercollegiate Flying Association (NIFA). The university aviation club, the OSU Flying Aggies, has been recognized 20 times by NIFA as the nation's outstanding collegiate aviation club.

Space Science Education

The space science education program presents and supports courses primarily designed for pre- and in-service teachers. The department serves as a 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 department 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 Programs

The Department of Aviation and Space Education (AVSED) offers graduate degree programs at the master's and doctoral levels.

The Master of Science Degree. 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 will be determined, in part, by the student's educational experiences.

Admission Requirements. A student seeking admission to the program must submit the following material to the Graduate College:

1. An official Graduate College application for admission;
2. Original transcripts for all college-level courses;

The student must submit the following data to the AVSED department:

3. A written statement of personal goals and professional objectives to be obtained from the program;
4. Two letters of recommendation describing the student's abilities, interest and motivation;

An international student must also submit:

a. A TOEFL score of 550 or greater;

b. A financial statement for the amount required by OSU.

To enter the program, an undergraduate grade-point average of 3.00 is required. Students with a grade-point average below 3.00 but 2.50 or better may be admitted on a probationary basis. A student admitted on a probationary basis must receive a GPA of 3.00 or better in the last 10 semester hours of course work at the 4000 or 5000 level in the first semester as a graduate student. Any request for exceptions to the stated criteria should be addressed to the graduate coordinator.

Degree Requirements. All students select core courses from the following: research, organizational theory, administration and management. The remaining courses, to total a minimum of 32 semester hours, are selected from the suggested AVSED list of courses. Courses may be substituted only upon approval of the advisory committee. Up to nine semester hours from other accredited institutions of higher education may be included in the student's plan of study if recommended by the advisory committee and if not used in a previous degree. At least 21 credit hours must be at the graduate level (5000 or above). No

course may be taken pass-no pass. Course work older than 10 years can not be applied to a plan of study.

The Doctor of Education Degree. The interdisciplinary nature of the applied educational studies Ed.D. degree 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. A minimum of 60 semester credit hours must be taken beyond the master's degree. Given the nature of an interdisciplinary degree, the advisory committee may require additional hours to ensure a solid research core. Courses at the 5000 and 6000 level should make up at least 48 hours of the plan of study. Ten doctoral dissertation hours must also be included within the 60 hours.

Admission Requirements. In order to be considered for admission to the program of study, a student must submit the following material to the Graduate College:

1. An official Graduate College application for admission;
2. Original transcripts for all college-level courses. The grade-point average of all graduate course work should be a 3.00 minimum on a 4.00 scale.

The student must submit the following data to the department's graduate coordinator:

1. A written statement of goals and objectives to be obtained from the program;
2. Three letters of recommendation reflecting the individual's abilities and potential to complete the degree program;
3. Test scores from the Miller Analogies Test and/or the aptitude portion of the Graduate Record Examination.

An international student must also submit:

a. A TOEFL score of 550 or greater;

b. A financial statement for the amount required by OSU.

An evaluation of an application for admission only occurs when the application is complete. Failure to provide any of the material requested in the list above will prevent the application from being considered. Applications will be reviewed at least once each semester. Upon recommendation of the AVSED graduate review committee, the Graduate College will inform the student by letter of the admission status.

Graduate Advisory Committee. A minimum of four graduate faculty members serve on the Ed.D. advisory committee. Given the interdisciplinary nature of the program, committee members should be cross-departmental to complement the student's career goals. A committee is formed upon admission to the program to determine a student's plan of study and research topics. A plan of study should be submitted prior to the enrollment period during the second full semester. Course work older than 10 years can not be applied to a plan of study.

Time Limit. A seven-year time limit has been established in which the degree must be completed. The time is calculated from the beginning of course work.

The student, with approval of the advisory committee, will determine how the research skill component will be completed. The committee may opt for a two-course sequence in statistics, a research design course, a course in a quantitative or qualitative research area, and/or competence in computer application for manipulation of data.

Before taking the qualifying examinations, the student must have completed the main areas in a plan of study, have an approved outline for the dissertation on file in the Graduate College and the AVSED department.

Residence Requirement. A minimum of 30 semester credit hours must be taken in residence at OSU. One academic year of the last two, as determined by the department, must be spent in continuous residence at OSU.

The residence requirement can be met by two consecutive 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 OSU are considered residence credit. Courses taken from the other three cooperating universities of UCT are considered to be transfer credit.

From the initial enrollment the student must maintain continuous enrollment. At least two hours per semester including summer has been defined as continuous enrollment. After one year of no enrollment, a student is dropped from the program. If the student desires to resume the program, the student must re-apply for admission and meet all current requirements for the degree.

Curriculum and Instruction

Associate **Professor** and **Interim Head** **Bruce** A. Petty, Ph.D.

The Department of Curriculum and Instruction (CIED) offers bachelor's, master's and doctoral degrees. Through its programs, it is directly involved in the education and certification of teachers and specialists in several instructional/ professional areas. Specific areas of emphasis include preparation of elementary and secondary teachers, reading specialists, instructional media and technology specialists, and supervisors/ curriculum coordinators.

Completion of the Bachelor of Science in Elementary Education degree qualifies the student for an elementary Oklahoma 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 one of these areas qualifies the student for a secondary (7-12) Oklahoma license. Students emphasizing art, or foreign language, also receive a degree in secondary education and qualify for an elementary/secondary (K-12) Oklahoma license. 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.

Programs leading to an Oklahoma license as a curriculum administrator and reading specialist are also available through the department.

In addition to these degree/certification offerings, the department sponsors the Reading and Mathematics Learning Center jointly with the Education Extension office. This clinic provides opportunities for research and practicum experiences for graduate students and faculty members as well as providing a valuable service to the community.

The department also sponsors the Natural Resources and Environmental Education Center.

Graduate Programs

The Department of Curriculum and Instruction offers graduate degree pro-

grams at the master's and doctoral levels. While specialization is required, maximum program flexibility enables students to meet their individual goals. These degree programs are designed to prepare persons to enter public or private elementary and secondary schools as teachers, curriculum directors, department heads, reading coordinators, team leaders, and research specialists. In addition, they prepare persons to assume teaching positions in colleges and universities where they become methods instructors and researchers in the discipline-related areas of education.

The Master of Science Degree. A student may earn the degree of Master of Science (M.S.) in curriculum and instruction with emphasis in curriculum/supervision, elementary education, information/communication technology, reading, and secondary education. Within these degree emphases, a student can further specialize in such areas as art, curriculum/instruction, early childhood education, foreign language, language arts, mathematics, science, and social studies. Students planning an emphasis in secondary education must incorporate graduate course work from an academic discipline.

The master's degree program is also frequently designed to qualify persons for an OSU recommendation for state licensure in a specific area.

Course work leading to the Master of Science degree in curriculum and instruction with emphasis in curriculum/supervision, elementary education, or reading is available through the University Center at Tulsa (UCT). OSU course work taken through UCT qualifies as residence credit course work.

In completing the master's degree, students elect one of three plans:

Plan I (30 hours)-The student completes a minimum of 24 credit hours of approved course work and writes a master's thesis for which six semester hours of credit are granted.

Plan II (32 hours)-The student completes a minimum of 30 credit hours of approved course work and writes a master's report for which two semester hours of credit are granted.

Plan III (36 hours)-The student completes a minimum of 36 credit hours of approved course work which includes a creative component. The creative component must be explicitly identified on the plan of study.

Unqualified admission to the master's degree program is granted to a graduate of an accredited college or university who has made application to the Graduate College (described under "General Regulations" in the "Graduate College" section) and who has achieved an acceptable grade-point average, i.e., a grade-point average of at least (1) 3.00 for all undergraduate course work; or, (2) 3.25 for all undergraduate upper-division and graduate course work; or, (3) 3.50 for OSU graduate course work included in the initial nine hours of study.

Provisional admission to the master's degree program is granted to a graduate of an accredited college or university who has been admitted to the Graduate College and who has achieved a grade-point average less than the minimum required for unqualified admission but at least (1) 2.60 for all undergraduate course work; and, (2) 2.80 for all undergraduate upper-division and graduate course work, or 3.00 for OSU graduate course work included in the initial nine hours of study.

Provisional admission is granted for a minimum enrollment in six credit hours of CIED course work (5000 or 6000 level) to be determined through advisement and taken during one calendar year. A student admitted provisionally must earn a grade-point average of at least 3.50 in these six hours to be admitted (unqualified). Dismissal from the program at the end of this probationary period is automatic if the student fails to satisfy this stipulation.

Further information about this degree may be found in the departmental publication *Master's Degree Policies and Regulations* available in 245 Willard and under "Master's Degree" of the "Graduate College" section of the *Catalog.*

The Doctor of Education Degree. A student may earn the degree of Doctor of Education (Ed.D.) in curriculum and instruction with emphasis in curriculum/supervision, elementary education, information/communication technology, reading and secondary education. Within these degree emphases, a student can further specialize in such areas as curriculum/instruction, early childhood education, language arts, mathematics, science and social studies. Students planning to emphasize secondary education must incorporate graduate course work from an academic discipline.

The Doctor of Education degree requires a minimum of 60 semester hours beyond the master's degree.

Unqualified admission to the doctoral degree program is granted to a graduate of an accredited college or university who has made application to the Graduate College and who has (1) submitted the completed departmental folder which includes a score on the Miller Analogies Test and other pertinent information, (2) provided evidence of at least one year of experience in a professional position in an education institution if not the holder of a master's degree, (3) received favorable recommendations from area faculty members who have evaluated the personnel folder, and (4) identified qualified faculty members who have agreed to serve on the advisory committee and in the chairpersonship role.

Further information about this degree may be found under "Doctor of Education" in the "Graduate College" section of the *Catalog.*

Educational Administration and Higher Education

Professor and Head Martin Burlingame, Ph.D.

Graduate Programs

Advanced graduate work is offered at the master's, specialist, and doctoral degree levels. Higher education degree programs prepare persons for careers as faculty members and administrators in colleges, universities, and other educational agencies. Public school educational administration degree programs and educational administration non-degree certificate programs prepare persons for positions in federal and state education agencies, for leadership careers as elementary or secondary principals and as school superintendents, and for staff positions in central offices and attendance centers.

The educational administration program at Oklahoma State University focuses on developing professional educational leaders at both the public school and the higher education levels and stresses: (1) a thorough foundation in administrative theory; (2) a multidisciplinary approach to understanding the administrative process, including contributions from industrial management, political science, economics and organizational sociology; and (3) extensive consideration of administrative functions and problems unique to particular educational levels.

The college teaching program focuses on developing skilled college and university instructors and stresses the combination of high-level competence in the appropriate subject area with the study of those facets of higher education which are important to functioning effectively in contemporary college and university settings. Persons interested in the

college teaching program should contact the head of the department for further information about specific cooperative arrangements with teaching fields. The higher education component includes the study of (1) the development of American higher education; (2) the roles, functions, and problems associated with various types of institutions of higher learning; (3) the essentials of curriculum development; and (4) the principles and procedures underlying effective college and university instruction.

Prerequisites. Educational administration majors are expected to have a minimum of 16 semester credit hours of undergraduate study in education. Higher education college teaching majors are expected to have an undergraduate major in the discipline they plan to teach at the college level.

Admission Requirements. Persons interested in degree or certificate programs should apply through the Graduate College. All applicants must submit transcripts of prior academic work. In addition, those persons seeking admission to a graduate degree program must submit a Graduate Record Examination or a Miller Analogies Test score at the time of application. Within the first four weeks of the initial term of study, all degree program applicants are expected to provide the department with specific information that is used by the faculty to reach a decision regarding admission to a degree program. When a person is admitted to the program, a permanent adviser and an advisory committee are appointed. The committee, working closely with the student, develops an individual plan of study.

The Master of Science Degree. A student may earn the degree of Master of Science (M.S.) under one of three plans:

Plan I (30 hours)-the student completes a minimum of 24 credit hours of approved course work and writes a thesis for which six hours of credit are granted;

Plan II (32 hours)-the student completes a minimum of 30 credit hours of approved course work and writes a master's report for two hours of credit;

Plan III (32 hours)-the student completes a minimum of 32 credit hours of approved course work, which includes a creative component (e.g., a special report, an annotated bibliography, a project in research or design). The creative component must be explicitly identified on the plan of study.

After completing the plan of study, master's students in all departmental programs write a comprehensive examination.

Further information about this degree may be found under "Master's Degree" in the "Graduate College" section of the *Catalog.*

The Specialist in Education Degree. The student may earn the degree of Specialist in Education (Ed.S.) with an emphasis in educational administration. The degree is designed for teachers and administrators in public schools who seek certification as elementary and/or secondary school administration, elementary superintendent or school district superintendent. The Specialist in Education program requires a minimum of 39 post-masters hours. Beginning December 31, 1995, prerequisites for education specialist course work (EAHED 6243, 6263, 6323, 6393, 6453 and 6573) include OSU graduate program admission and/or consent of the instructor. Beginning December 31, 1996, enrollment in the same course work will be limited to students admitted into OSU post-masters degree programs. Further information about this degree may be found under "Specialist in Education" in the "Graduate College" section of the *Catalog;* advisement materials are available in the department.

The Doctor of Education Degree. The program in educational administration focuses on the development of education leaders for the public schools. It employs a multidisciplinary approach to administrative processes, incorporating knowledge from industrial management, political science, economics, organizational sociology, and other fields as well as from education.

Programs in higher education focus on the preparation of administrators and faculty. The administrator preparation program utilizes knowledge from many fields of administration and allows the student to make appropriate application to higher education. The college teaching program for two- and four-year college teachers stresses an interdisciplinary approach and allows the student to develop a strong competence in an academic area. The professional education component emphasizes the philosophies, roles, functions, and problems of various types of institutions of higher learning and incorporates the latest findings in curriculum development and effective college teaching. Cooperative programs for the college teaching degree have been developed in conjunction with many departments on campus. The Doctor of Education programs require a minimum of 90 credit hours beyond the bachelor's degree.

Applicants entering the doctoral program after completing a master's degree may apply up to nine hours of post-master's credit toward the doctorate, with the approval of the doctoral committee. Applicants entering the doctoral program after completing a specialist degree must earn a minimum of 40 credit hours, including dissertation hours, from Oklahoma State University.

Further information about this degree may be found under "Doctor of Education" in the "Graduate College" section of the *Catalog.*

School of Health, Physical Education and Leisure

Professor and Director Lowell M. Caneday, Ph.D.

The School of Health, Physical Education and Leisure (HPEL) is a multi-faceted organizational unit encompassing undergraduate and graduate academic programs in health, physical education and leisure studies, and outreach programs. The School of HPEL seeks to fulfill the traditional functions of teaching, research, extension and public service which are consistent with Oklahoma State University. The mission of the School of HPEL is to promote excellence in human development and environmental consciousness to enhance the knowledge, attitudes and behaviors of individuals through increased responsibility for social, physical, mental, emotional and environmental health. This mission is accomplished through programs and services via teaching, research and scholarly activity, university and professional services and extension programs.

Health

Associate Professor and Coordinator Bert H. Jacobson, Ed.D.

The program in health provides students with the scientific knowledge and professional skills in preparation for careers in corporate, community, and hospital health promotion and other health-affiliated settings.

The community wellness track provides a curriculum that yields expertise in developing health and wellness programs consisting of fitness, weight control, stress management, substance abuse, gerontology, and related health promotion dimensions focusing on behavior modification and problem prevention. Students culminate their expeiences with on-site internships in the last semester. The community wellness curriculum consists of preparing graduates for em-

ployment in hospital-based wellness centers, community settings, corporate wellness and private enterprise.

The school health track, leads to a bachelor's degree in the health major, and prepares the student to teach health in a public or private school setting. After successfully completing all course work, including a student teaching internship and the health curriculum examination, the student would be qualified for state licensure to teach in grades K-12.

The bachelor's degree in health also provides an essential foundation for the master's and doctoral degrees in related areas. As a part of a comprehensive university, students in the health programs gain valuable insight from faculty who are extensively involved in health-related professions, on the state, regional and national levels, and in research and professional publications.

Leisure Studies

Associate Professor and Coordinator Jerry Jordan, Ed.D.

The program in leisure studies at Oklahoma State University prepares students at the undergraduate level for careers in leisure service management and therapeutic recreation. Both 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 which include hospitals, rehabilitation centers, day programs, institutions and within the community.

Beyond the baccalaureate level, the program in leisure provides preparation at the master's and doctoral level. Thus, the undergraduate program serves as a foundation for the graduate programs and receives the benefit of faculty involved in research, publication and professional service.

Physical Education

Professor and Coordinator Steven W. Edwards, Ph.D.

The program in physical education 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 grades kindergarten through 12.

The curriculum has two emphasis areas, namely, exercise science kinesiology, and specific course work in pedagogy. Core courses for all physical education students include an introductory course for the discipline, eight hours of methodology in sport activities, courses in applied anatomy and kinesiology, biomechanics, motor learning, exercise physiology, and motor development.

Students engage in two formal field-based experiences designed to better prepare them to become certified teachers. First, each student must complete a 45-hour practicum consisting of on-site observational experiences in one or more public school settings. Second, during the last semester of enrollment, each student completes a student teaching experience that includes on-site experience as both an elementary and a secondary physical educator.

Preparation to become a public school athletic coach is available via selected courses in the physical education and health education curricula. A 2.50 cumulative grade-point average is required for admission into the teacher education program and for graduation in all School of HPEL programs.

Graduate Programs

Professor and Director Lowell M. Caneday, Ph.D.

OSU's School of Health, Physical Education, and Leisure offers graduate programs at both the master's and the doctoral level. The Master of Science degree has three major emphasis areas: health, physical education, and leisure with a specialization in each area. The School of HPEL offers a Doctor of Education (Ed.D.) degree through the applied educational studies major, with a specialization in health, physical education, or leisure studies. Based on the student's previous experience, an individual program consisting of course work, practical experience and research is designed to meet the student's future needs and interests.

The Master of Science Degree. Emphases are available in health, physical education or leisure.

Admission Requirements. Depending upon the area of emphasis, a bachelor's degree in physical education, health, leisure or a related area is required. Applicants without an approved undergraduate program will be required to make up deficiencies by taking the specified prerequisites. Students are required to meet the following for full admission: (1) 3.00 GPA in an accredited undergraduate program; (2) MAT score of 40 or GRE score of 1450; and (3) three letters of recommendation. Applicants not meeting these requirements are subject to review by the School's Graduate Screening Committee.

Degree Requirements. A non-thesis minimum of 32 hours or 30 hours with six hours for a thesis must be taken, including 21 hours of courses at the 5000 level and 15 hours in the School.

The Master of Science degree is not a teacher certification program. Undergraduate requirements for certification must be satisfied before the student is eligible for certification from the Oklahoma State Department of Education.

The health program offers a master's degree with specialization in health promotion, while the physical education program offers a master's degree with specialization in administration or exercise science. The program in leisure has two areas of specialization: leisure services management, and therapeutic recreation.

The Doctor of Education Degree. *Admission Review Process.* Faculty in the School of HPEL render decisions on admission based on appropriate academic, scholarly and research alliances between the student, the faculty, and focus of the doctoral program in applied educational studies with an emphasis in health, physical education or leisure studies.

Admission Requirements. The student must submit an application for admission to the Graduate College, transcripts of all academic records, required standardized test scores, reference letters, written documentation of immediate and professional goals, and a written statement of academic focus within the School of HPEL. Requirements for full admission to the doctoral program are: (1) Minimum graduate grade-point average of 3.50 on a 4.00 scale; (2) a Graduate Record Examination (GRE) composite score of 1400. The preferred subscale minimums are 500 on the verbal scale, 450 on the quantitative scale and 450 on the analytical scale; **(3)** three professional recommendations, including references from the major adviser and faculty for any graduate work completed; and (4) a written document stating immediate and future professional accomplishments, and academic focus within the doctoral program.

Program Requirements. During the admission process, a faculty member must agree to serve as mentor and dissertation adviser based upon the research interests of the applicant's goals and academic focus.

General Requirements. A minimum of 60 hours beyond the master's degree or a minimum of 90 hours beyond the bachelor's degree is required. In addition, the degree requires 10 hours of dissertation enrollment, 15 hours of research design, computer application and statistics, and 12 hours for development of interdisciplinary connections and appropriate knowledge of curricular designs, higher education and education administration, learning and teaching styles, and other topics for focus in applied educational studies.

Comprehensive examinations are administered toward the end of the student's course work, followed by a research proposal, research writing and dissertation defense.

Graduate teaching and research assistantships are available. For further information and application forms, write to the coordinator of graduate studies, School of HPEL, 103 Colvin Center, OSU, Stillwater, OK 74078.

School of Occupational and Adult Education

Professor and Director Melvin D. Miller, Ed.D.

The School of Occupational and Adult Education (OAED) is an administrative unit within the College of Education at Oklahoma State University. The School of OAED consists of faculty in the areas of business professions, technical and industrial education, and graduate programs related to human resource development, adult and continuing education, and vocational-technical and industrial education. In addition, the School of OAED provides programs for prospective and practicing administrators, other workplace education leaders, together with workplace personnel development that is internationally based.

The School of OAED's mission is closely aligned with the statutory purposes of U.S. land-grant universities, long established as teaching, research and service. Increasingly complex and new problems necessitate Oklahoma and Oklahomans to be sensitive and responsible to multicultural, social, political, and economic conditions as a global society and economy approach. Furthermore, these facts demand the continuing evolution of strategies for fulfilling the mission and goals of the School of OAED.

The faculty envision the School of Occupational and Adult Education as having strategic alliances with business, industry, government, and education, developing knowledge and leadership for work-place related education. Faculty see the School as a dynamic organization fostering collaborative relationships among faculty and students. At the same time, the faculty's efforts reflect a sensitivity to and support for equity and increasing human diversity in the classroom and workplace.

The mission of the School of Occupational and Adult Education is to prepare individuals for careers as instructional, administrative or support personnel in the broad field of workplace education in business, industry, government, and education at the state, national, and international levels. The School conducts research to generate new knowledge and disseminate findings for informed decision making and policy development, and provide services to the educational and human resource development community. The School's instructional, research and outreach activities reflect a sensitivity to and support for equity and cultural diversity. These efforts are designed to develop leaders and influence practice and policy in order to achieve national and international prominence in occupational and adult education.

The goals of the School are:

1. To strengthen research activities for improving practice in workplace education.
2. To provide graduate programs that reflect transformative roles in education and the workplace.
3. To provide undergraduate programs designed to prepare individuals for transformative roles in workplace education.
4. To strengthen leadership and outreach services to the discipline.
5. To expand activities in international professional development.
6. To strengthen the cultural diversity of OAED.

Occupational and Adult Education

Graduate Programs

The M.S. and Ed.D. programs in occupational and adult education are intended for individuals who wish to prepare for broader educational roles relating to all vocational education disciplines, adult and continuing education, and employee development and training. Major program concentrations are available in adult and continuing education, human resource development, and votech education. 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 emphasis in adult and continuing education prepares teachers and administrators in public schools, vocational-technical schools, community/junior colleges, universities, medical, correctional, and religious organizations as well as volunteers to facilitate effective learning for continuing education and returning adult students.

These degree programs are a cooperative, interdisciplinary effort among all faculty of the School of Occupational and Adult Education with substantial contribution from faculty members in other departments on campus.

Prerequisites. An undergraduate degree in an appropriate field, together with academic qualification indicative of potential success at the graduate level, are necessary. Experience related to the degree sought is desirable, but not necessary, except in the vocational-technical education emphasis.

Technical and Industrial Education

The technical and industrial education curriculum is designed with two distinct options: for students interested in adult technical education, the noncertification option, and the certification option for students interested in secondary vocational education.

The 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.

The Certification Option. Students select-

ing 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.

Business Education

This program is designed to prepare prospective educators as instructional specialists in traditional business education as well as vocational workplace education. Business professions (BUSPR) provides training for a variety of employment opportunities requiring specialized knowledge and skill development for occupations in secondary schools, area vocational schools, and post secondary schools.

Persons seeking certification in the field of business education complete the teacher certification and bachelor's degree programs in the College of Education with specialized education courses being taken in the School of OAED under the BUSPR (Business Professions) and OAED prefixes. Additionally, the student completes course work in the College of Business Administration related to specific subject areas to be taught.

Graduate Programs

Graduate program opportunities for the business educator are available as an area of emphasis under OAED's Master of Science and Doctor of Education degrees. Specialized work in BUSPR is available to be included in the candidate's degree plan.

Technical Education

Graduate Programs

The technical education curriculum for the M.S. degree is offered for persons who are preparing for employment in junior/community college or technical institute technician education programs and for those who aspire to positions in training programs for employee development. The overriding goal of this graduate curriculum is to help individuals improve their instructional and occupational skills for greater effectiveness in the educational setting.

Prerequisites. An adequate background in a major field of technology with an undergraduate program which included specialized technical course work at the junior or senior level at an accredited college or university, and approval of an adviser are necessary.

Trade and Industrial Education

The trade and industrial curriculum is designed to prepare teachers, supervisors and coordinators for vocational trade and industrial education programs. Plans of study leading to the master's degree are offered for those who wish to qualify for teaching under the approved state plan for vocational education as well as industrial training opportunities.

Graduate Programs

The trade and industrial education curriculum for the M.S. degree is designed to develop leadership and expertise in a wide variety of trade areas and industrial program design, implementation and evaluation. The curriculum helps students build and increase competence in instructional, occupational, and supervisory skills for advanced leadership opportunities in trade and industrial instructional situations whether in the public or private sector of trade and industrial education.

Prerequisites. Educational preparation in a specialized trade area and adequate occupational experience to meet minimum provisions of the State Plan for Vocational Education, and approval by an adviser are necessary.

Teacher Education Programs

Officers of the Teacher Education Council

Ann C. Candler-Lotven, *Director of Teacher Education*

Leah Engelhardt, ***Associate*** *Director of Teacher Education*

Robert E. Knaub, ***Coordinator of*** *Reid* ***Experiences***

John Steinbrink, *Chair of Teacher Education Faculty*

Faculty Group Chairs

Carolyn Bauer, *Early Childhood/ Elementary Education*

Nadine Olsen, ***Secondary*** *Education*

Diane Montgomery, ***Elementary/ Secondary Education***

All Teacher Education programs are administered through the OSU Teacher Education unit and are coordinated through the Office of Teacher Education, 223 Willard. Upon completion of an approved program or degree, passing the appropriate Oklahoma Teacher Certification Test(s), 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 Teacher 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 which lead to certification but which may or may not lead to graduate degrees. Teacher Education programs at Oklahoma State University have the approval of the Oklahoma State Department of Education.

Undergraduate Teacher 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 Teacher Education unit as well as the degree requirements of the particular college. Each student who desires to enter a Teacher 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 Teacher Education program. Information regarding admission requirements may be obtained from the Office of Teacher Education, 223 Willard.

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 many times 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 Teacher Education programs at Oklahoma State University should be addressed to the head of the administrative unit offering the program or the Office of Teacher Education, 223 Willard.

Undergraduate Certification Programs

Undergraduate programs are offered in the following areas: agriculture; art; business education; early childhood; elementary education; English; foreign language (French, German, Spanish); health education; mathematics; music-instrumental; music-vocal; occupational agriculture; physical education/health; science; social studies; speech and drama; technical education; and trade and industrial education. There are also numerous teaching endorsements available.

Graduate Programs

Basic certification programs offered at the graduate level are school psychologist, school psychometrist, special education-emotionally disturbed, learning disabilities, and mental retardation; and speech-language pathology. Advanced certification programs offered at the graduate level include reading specialist, school counselor, school principal-elementary, school principal-secondary, 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 Teacher Education

The criteria for admission to undergraduate Teacher Education programs are based on University-wide policies recommended by the director of Teacher Education through the Council on Teacher Education. Requirements are applicable to all Teacher Education administrative units of the colleges preparing teachers. The student is not considered a fully eligible participant in a Teacher Education program until formally admitted to Teacher 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 Teacher Education program has been earned and retained. Certain vocational programs may vary from this requirement due to state guidelines. Students should apply for admission to Teacher Education as early as possible in their programs.

Criteria for Admission to Undergraduate Teacher Education Programs

During the first semester of the academic program, the student must complete the Declaration of Intention to Pursue a Program in Teacher Education. This form can be obtained in the Office of Student Academic Services, 106 Willard, for College of Education students. Students wishing to enter teacher 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 Teacher 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 Declaration of Intention to Pursue a Program in Teacher Education form, the student should schedule the Teacher Education interview and register for the Prepro-fessional Skills Test (PPST) or meet the current OSRHE alternative criteria. Teacher 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, 111 North Murray and the Office of Teacher Education, 223 Willard.

After declaring an intention to pursue a program in Teacher 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 Teacher Education must be achieved before the student can enroll in the remaining professional education sequence of learning theory, evaluation and methods. The student must meet all the following criteria:

1. *The Preprofessional Skills Test.* This test is offered to all Teacher Education students and is composed of mathematics, reading, English grammar and essay 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 scoring at the 50th percentile on the ACT earned prior to the completion of the first 12 college credit hours, or earning a 3.00 GPA in all hours of liberal arts and sciences courses (minimum of 20 hours). Contact the Office of Teacher Education, 223 Willard for specific information relative to alternative criteria. Information and registration for the Prepro-fessional Skills Test can be obtained from the University Testing and Evaluation Service, 111 North Murray and in the Office of Teacher Education, 223 Willard, A study guide for the test is available in the Reserve Room in the Library.
2. *Interview for Admission to Teacher Education.* All candidates for full admission to undergraduate Teacher Education must be formally interviewed by selected OSU Teacher Education faculty.
3. *Orientation to Teacher Education Course and Laboratory and Clinical Experiences.* An appropriate orientation to Teacher Education course must be completed with a grade of "C" or better. One semester credit hour of early laboratory and clinical experi-

ences 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) Teacher Education Programs

Graduate (post-baccalaureate) students must file the form Declaration of Intention to Pursue a Teacher Education Program-Post-baccalaureate and meet one of the following criteria for full admission to Teacher Education.

1. The student must have completed an approved Teacher 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 Teacher 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 Teacher 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 Teacher Education; and (c) complete one semester credit hour of early laboratory and clinical experiences and an orientation to Teacher 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 Teacher 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 Teacher Education purposes will be calculated based on the University graduation and retention GPA policy. Grades of 'I," "NP," "P," "X," "W" or the mark of "AU" or "N" will not affect the overall GPA.

Retention in Teacher Education

For continued acceptability and recommendation for a license or certification, the student must have met and maintained all specified requirements for admission to the Teacher Education program. In addition, the student must maintain an overall GPA of at least 2.50; a major requirement GPA of at least 2.50 with no grade below "C" or "P"; a professional core GPA of at least 2.50 with no grade below a "C" or "P"; and a college/departmental requirement of at least a 2.50 GPA with no grade below "C" or "P."

Student Teaching Profile Application

The Student Teaching Profile Application form must be completed by the student the semester prior to the student teaching semester. The application forms are distributed at a meeting called by the coordinator of field relations and through the Office of Teacher 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 teacher education classes. Students must submit their Student Teaching Profiles to the Office of Teacher Education prior to specified dates in October 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. Students are encouraged to take all appropriate teacher certification tests after the completion of at least 90 semester hours of course work. (See "Oklahoma Teacher Certification Testing Program.")

Criteria for student teaching placement for all Teacher Education students are:

1. Must have achieved and maintained full admission to a Teacher Education program;
2. Must have a current overall grade-point average of at least 2.50;
3. Must have 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" will be accepted in either of these areas;
4. It is recommended that the applicant have completed all preprofessional education course work which 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" accepted 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. Upon recommendation of the Residency Committee the student is eligible for recommendation for a standard certificate. 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 will be 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 Teacher 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 may be responsible for reimbursing OSU for at least one visit by an OSU supervisor in addition to the visitations performed by the cooperating institution. All other criteria pertaining to in-state student teaching placements will apply as previously stated.

Appeals

As a comprehensive land-grant university, OSU is committed to serving a diverse audience. As Teacher Education is a professional program, standards have been established which will allow only students who have been admitted to the program to continue in good standing. If a student believes that the established policies and procedures of the Teacher Education program were not consistently

and accurately followed, the student will have the right to pursue an appeal through the Admission and Retention Committee. Information pertaining to the appeals process is available through the Office of Teacher Education, 223 Willard.

Oklahoma Certification Testing Program

All students who graduate or are seeking endorsements from a Teacher Education program are required to complete the Oklahoma Teacher Certification Test(s) in their teaching field(s) with a score of 70 or above before a license or endorsement can be issued. The examinations are administered by the Oklahoma State Department of Education five times each year. Registration booklets are available in the Office of Teacher Education, 223 Willard. To qualify to take the examination(s) the student must:

1. be fully admitted to Teacher 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 as required by the Oklahoma State Department of Education.

An Oklahoma State University student must pass the Oklahoma Teacher Certification Test(s) in his or her major teaching area(s) before taking any tests in endorsement areas outside the major.

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 Teacher Education will process and deliver the registration form and required fees to 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."

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 Teacher 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 Teacher Education. Students seeking advisement concerning teacher licenses or certificates can be assisted by the coordinator of teacher certification in the Office of Teacher Education in 223 Willard.

Entry-year Assistance 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, 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., *Interim Associate Dean for Research*
Bill L. Cooper, Ed.D., *Director of Extension*
Larry D. Zirkle, Ph.D., P.E., *Director* *of Student Academic Services*
Carl R. Gull, B.S., M.B.A., *Manager* *of Support 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 year 2000 and beyond 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 and the physical sciences. 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 (an option of the B.S. 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 option; General Engineering; 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, electrical engineering, environmental engineering, general engineering, industrial engineering and management, and mechanical engineering.

Doctor of Philosophy in biosystems engineering, chemical engineering, civil engineering, electrical engineering, general 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), electronics technology (option in computer), fire protection and safety technology, general technology, manufacturing technology, mechanical design technology, and mechanical power technology.

Accreditation

The undergraduate engineering programs are each separately accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (EAC-ABET). 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.

The undergraduate engineering technology programs are separately accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC of ABET). 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 three 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.

Women in Engineering. 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 Women in Engineering (WIE) 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 WIE programs provide support to this program.

Multicultural Programs. 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. The Housing for Multicultural Engineering Students (HOMES) program provides a special living arrangement for freshman CEAT students of diverse cultures, with special programming provided, including collaborative learning workshops, speakers, faculty associates, clustering of students in classes, live-in staff, computers and other facilities on the floor, tutoring, and dinners with faculty. The purpose of this program is to build a sense of community and a support base of peers during the first year at OSU. A minority study lounge has been provided where students can study between classes, with access to computers and other resource materials. 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 service assists students with obtaining 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, tutoring and monitoring of the program. 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 peer 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 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

Fluid Power Society

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

Tau Alpha Pi (technology honor society)

Tau Beta Pi (engineering students honor society)

CEAT Honors Program

The Honors Program provides opportunities for challenging and individual study 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 with 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.

Calculators and Computers

An engineering, architecture or technology student is expected to be equipped with an appropriate calculator or computer. Necessary functions include exponential functions, the logarithm and inverse logarithm functions in both natural base and base 10, and the trigonometric and inverse trigonometric functions.

While students may find their own personal computers to be a convenience, computer labs are available to meet student needs. Those wishing to purchase their own computer should consider a 486/66 with math co-processor and 40 or more megabyte hard drive, or the Apple/Mac equivalent, as compatible with class requirements.

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 and one unit of general physics, and students will benefit from taking 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 or architecture.

General chemistry, college algebra and trigonometry credits may count toward B.S. degrees in engineering technology.

General Education Requirements

For students in Engineering, Architecture and Technology, general education courses provide both a broadening of the education and essential background for addressing the critical issues in society. Students are encouraged to select courses that meet both of these objectives by following guidance specified in the sections devoted to each school. General education course lists are available in the Office of Engineering Student Academic Services to help students select appropriate courses.

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 curricular objectives in each engineering program 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.

Pre-engineering Program. The pre-engineering program covers the freshman and sophomore years. The content of the pre-engineering program is similar for all engineering specialities (except architectural engineering), and includes course work devoted to mathematics through calculus and differential equations, communication skills, general chemistry, general physics, the engineering sciences commonly referred to as mechanics, thermodynamics and electrical science, and the social sciences and humanities.

Bachelor of Science. 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 the *Catalog.*

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 government. 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 are first admitted to the pre-engineering program. Transfer students will not be admitted if performance in the most recent semester of transfer credit, would have placed the student on probation if enrolled in pre-engineering at Oklahoma State University.

Nonresident transfer students will be admitted directly to pre-engineering 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.

Nonresident transfer students not directly admissible to pre-engineering 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.

Students transferring to pre-engineering 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.

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 qualifying the student for admission to the 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 Pre-engineering 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 admis-

sion. 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 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 his or her score on placement tests administered at enrollment, 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, which exceeds the minimum requirements stipulated by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology. 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 from the CEAT approved list in order to assure compliance with accreditation requirements for both breadth and depth.

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 Engineering, Architecture and Technology and the College of Agricultural Sciences and Natural Resources.

Biosystems engineers are professionals who protect the environment and preserve natural resources by creating and adapting engineering knowledge and technologies for the efficient and effective production, processing, storage, handling and distribution of food, feed, fiber and other biological products.

The objective of the biosystems engineering program is not only to teach the engineering, physical, mathematical and biological sciences to students, but also to teach them to apply these sciences to create and design new systems and equipment for biological production and processing. As a part of the instruction, students learn to work with computers on simulation, control and design of bioenvironmental projects. In addition, students take social studies and humanities courses that help give them the people skills important for advancement into management level positions This transition often occurs early in a biosystems engineer's career.

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, machine 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.

Biosystems engineering courses for juniors and seniors 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 that hire biosystems engineers. Design experiences are developed in one or more of the following areas: environment and natural resources, food and bioprocessing, biomechanical and general agricultural engineering.

In addition to the 76 semester credit hours of common requirements for engineers, biosystems engineering students take courses in electronic applications, instrumentation, watershed hydrology, flood control, drainage and irrigation, environmental engineering, power and machinery, structural design, processing and food engineering. The program is accredited at the basic level by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology. Each student in consultation with his or her adviser must carefully select elective courses to assure that all accreditation criteria including those for engineering design are satisfied.

The program is accredited at the basic level by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology under the program criteria for agricultural and similarly named engineering programs.

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 of plant and animal environments, 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.

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 will evaluate 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 degrees listed above follows an approved plan of study which must satisfy at least the minimum University requirements for that particular degree.

Chemical Engineering

Amoco Chair and Head Robert L. **Robinson,** Jr., Ph.D., P.E.

Chemical engineers apply chemical, physical, and engineering principles to solve important problems and to supply vital materials for our technology-based civilization. Their work includes pharmaceuticals, fuels, industrial chemicals, bioengineering and much more. It includes energy conservation and pollution control. The emphasis on chemistry and the chemical nature of everything people use is what makes chemical engineers different from other kinds of engineers.

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 will commonly manage operations, oversee equipment maintenance, and supervise control of product quality. They troubleshoot 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 it, 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 School of Chemical Engineering is to provide the best possible education to students so that they are competitive in employment, in advanced studies and are prepared for a life-time of self-study and continued improvement. More specifically, the goals are:

1. To develop to the maximum extent the capability of the student to solve in a realistic, professional way the problems of society that are of public interest and concern;
2. To provide for the student both a sufficiently broad background and enough depth of specialization that he or she will be well-prepared to excel in any of the many fields of chemical engineering endeavor-marketing, manufacturing, design, research, development, management;
3. To provide the graduate with a level of technical competence such that he or she can compete favorably in employment and academic programs with graduates from other quality professional schools of engineering;
4. To prepare the student to maintain technical competence in his or her chosen area of chemical engineering by self-study of the current literature, new books and by study in continuing education courses; and
5. To encourage the student to maintain an open-minded attitude such that over the years, he or she will be flexible in outlook for opportunities to apply chemical engineering knowledge to new and unique fields.

The academic preparation of chemical engineers for such a broad variety of careers must be based on a strong foundation in the basic sciences and mathematics. Computer competency is a must. Fundamental professional courses follow to provide the student an opportunity to apply the basic sciences to chemical engineering problems. Engineering design and laboratory courses integrate the more fundamental studies and demonstrate that engineering is a process of assembling knowledge from many fields and sources into a practical answer to a real problem. At the bachelor's (B.S.) level, three emphasis areas are offered: (1) the regular course emphasis 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 employ-

ment in medically-related professions; and (3) the environmental emphasis is for those who wish to emphasize environmentally-related studies. Each area prepares a student for success in M.S. or Ph.D. study at OSU or at other universities. More complete descriptions of exact degree requirements for the bachelor's degrees are given in the document *Undergraduate Programs and Requirements.* All of these emphasis areas are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology under the program criteria for chemical and similarly named engineering programs.

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 beyond the B.S. degree of course work and an acceptable thesis (a minimum of six hours of credit required for thesis research). The chemical engineering courses taken must include CHENG 5123, 5213, 5743, 5843, and either 5423 or 5633.

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 30 hours of credit for research. The chemical engineering courses must include 18 hours of credit in 5000- and 6000-level CHENG courses. (At least six hours must be 6000 level.) 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.* These programs are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology under the criteria for civil and similarly named engineering programs.

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. 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 Rajnikant V. Patel, 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 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.The design experience is integrated throughout the program, leading to two major design courses at the senior level.

Computer Engineering

A special program option in computer engineering is offered by the School of Electrical and Computer Engineering. This option 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 engineering 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.

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.

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, electromag-netics, 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 any of the three 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. In certain cases, remedial work in undergraduate electrical and computer engineering will 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 Timothy **J. Greene,** Ph.D.

Industrial engineering and management is one of the five major engineering disciplines and is 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 which is 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."

Productivity and effective utilization of resources, including energy and hazardous materials management, are principal concerns of practicing industrial engineers. The industrial engineer may follow a career in almost any type of enterprise; manufacturing companies, service organizations such as consulting firms, insurance companies, banks and hospitals, and government agencies, including city, state and federal government functions. 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 his or her background, the industrial engineer is especially well qualified to rise to positions of leadership and authority within the organization.

The curriculum blends a basic group of common engineering science courses with specialized courses 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.

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.

Prospective students are encouraged to write directly to the School of Industrial Engineering and Management for career guidance information.

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 all engineering graduates, including non-industrial engineers, and to 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. 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." A student may enter the program at a point for which he or she is qualified provided the minimum admissions criteria are met and the student is accepted by the School of Industrial Engineering and Management.

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 six 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, including normally about 20 semester credit hours for a 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.

Mechanical and Aerospace Engineering

Professor and Head Lawrence L. Hoberock, Ph.D., P.E.

Mechanical engineering is a professional discipline which involves 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 which is not identified with or restricted to any particular vehicle, device or system. 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 are included.

This program, including the premedical emphasis area, 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.

The aerospace option within 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-oriented mechanical 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.

The aerospace option in mechanical engineering is separately accredited as an aerospace group program by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology. Program criteria developed by the American Institute of Aeronautics and Astronautics as well as by the Society of Mechanical Engineers have been applied in the accreditation process.

The goals of the mechanical engineering B.S. degree programs, including the aerospace and premedical option, 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 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, such that a minimum of 16 credit hours of design, integrated throughout the last two years of study, must be taken by each student. In fact, with the exception of only a few courses, 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. The objective is to provide a total design experience, beginning with ENGR 1322, integrated throughout the upper level course work; the design experiences grow with the students' development. The objective is to develop graduates who are competent in the essential aspects of engineering design. Dominant meaningful design experiences include a three credit course at the 3000 level dedicated entirely to engineering design, a three credit course at the 4000 level (selected from a group of three courses) with two credit hours devoted to design, and a four-credit major engineering design experience at the 4000 level. The major design experience focuses each student's attention upon professional practice, and draws upon previous course work. This course provides each student with an experience in the process of devising a system, component, or process to meet a need. 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.

The broad background and problem-solving ability of mechanical engineers make them suited to engage in one or more of the following activities: research, development, design, production, operation, management, technical sales, patent law and private consulting. *Versatility* is their trademark. A bachelor's degree in mechanical engineering is also an excellent background for entering other professional schools such as medicine, dentistry, law or business (M.B.A.). A formal premedical option is available for students wishing to follow this avenue of approach to medical school.

In the professional school, mechanical 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 virtually every course 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, General Dynamics, Schlumberger, Seagate, Hilti, Mercury Marine, Purolator, Moore Business Forms, and Mobil. Students may also help aggressive, smaller firms that may need assistance with the development of new products. These industrial firms also are representative of those hundreds of firms that employ mechanical engineers with the aerospace option.

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 Mechanical Engineering degree, Master of Science degree, and the Doctor of Philosophy degree.

The Master of Science degree and the Doctor of Philosophy degree prepare the graduate for research/development positions in industry and government, or for the teaching profession in engineering. These degrees are distinguished by the incorporation of a research component.

The Master of Mechanical Engineering degree prepares the graduate for engineering practice and is distinguished by its incorporation of an off-campus internship in industry to give the student engineering design experience before graduation.

Students may select course work and participate in research or design projects in the following areas: fluid mechanics and aerodynamics, thermal and environmental sciences, engineering acoustics and vibrations, manufacturing, systems design, energy conversion and utilization, solid and experimental mechanics, tribology, materials behavior, system dynamics, automatic control, and fluid control 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.Mech.E., 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.

Admission to the Master of Mechanical Engineering degree program is for students who meet the prerequisites stated under "Master of Engineering." A student may enter the program at any level for which the individual is qualified provided he or she meets the minimum admission criteria and is accepted by the School of Mechanical and Aerospace Engineering.

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 Mechanical Engineering degree requires 24 semester hours of approved graduate-level course work and a prescribed internship. As a result of the internship, a written report acceptable to the faculty must be submitted for completion of the degree requirement.

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 32 semester credit hours of which three to five must be for an acceptable, individually directed creative activity which 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 James F. Knight, 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 professional 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 EAC/ABET. 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. Over the last 40 years, the School has the second highest number of winners and finalists of any program in the United States in these prestigious competitions.

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.

Most states require that an individual intending to become an architect hold an accredited degree. There are two types of degrees that are accredited by the National Architectural Accrediting Board: (1) the Bachelor of Architecture, which requires a minimum of five years of study, and (2) the Master of Architecture, which requires a minimum of three years of study following an unrelated bachelor's degree or two years following a related preprofessional bachelor's degree. These professional degrees are structured to educate those who aspire to registration/licensure as architects.

The four-year, preprofessional degree, where offered, is not accredited by NAAB. The preprofessional degree is useful for those wishing a foundation in the field of architecture, as preparation for either continued education in a professional degree program or for employment options in architecturally related areas.

Architectural Engineering

The architectural engineering program focuses on the creative and analytical solutions to the technological aspects of building design.

Architectural engineering at OSU concentrates on the design of building structural systems to resist the various forces of nature, such as gravity, winds and earthquakes, as well as the forces of man. It involves the detailed study and use of materials such as steel, concrete and wood in applications as diverse as earth-sheltered structures, high-rise and long-span structures.

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 program's educational goal, as in architecture, is to provide the education necessary for leadership in the architectural engineering profession.

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, which are required for professional licensure.

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. As a minimum, a student must have completed 60 semester credit hours, all required architecture courses specified for the first two years with grades of "C" or better, and maintained an overall GPA of 2.30 or higher. Furthermore, first preference will be given to students who have completed ARCH 2024 prior to admission.

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 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 each 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, containing 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 22 percent are women, and 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, expediter 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

General

Manufacturing

Mechanical Design

Mechanical Power

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 specially-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 with rapidly changing 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 application in construction estimating.

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.

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, labor management and construction managers.

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).

Electronics and Computer Technology

Professor and **Head** Thomas G. **Bertenshaw,** Ed.D.

The electronics 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 electronics 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 electronics 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

Assistant Professor and Interim **Head James** D. **Brown, M.S., P.E.,** C.S.P.

The fire protection and safety curriculum is designed to prepare graduates to assess and reduce the loss potential existing in an operation with respect to fire, safety, industrial hygiene, and hazardous material accidents. The following are some of the applications that graduates are prepared to address. With respect to fire, reducing the loss potential might involve designing facilities with 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, and possibly 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. The redesign of ventilation systems may be needed or 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 in 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 also places emphasis upon industrial fire protection, safety, and occupational health in addition to fire services. The program is fully 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.

General Technology

Professor and Head James E. Bose, Ph.D., P.E.

The general technology curriculum is designed to provide a bachelor's degree program that will prepare men and women for employment as engineering technologists in more than one specific area. Normally, there are two groups of students who enroll in this program: those who have an associate degree in one of the traditional technology specialties, but desire more diversification than continuing in the same specialty; and those who have an associate degree from another institution in a technical specialty not offered at Oklahoma State University.

Each student who completes the program must show proficiency in the following areas by completing appropriate courses: engineering design graphics with CAD, machine tool processes, hydraulics, computer programming, electronics, controls, dynamics, supervision and instrumentation.

Manufacturing Technology

Professor and Interim Head James **E. Bose,** Ph.D., P.E.

The flow of affordable goods and products from producer to consumer is a major cornerstone of the free enterprise system that is enjoyed in the United States. Essential to this system are the manufacturing industries which comprise that segment of our economic society directly responsible for the conversion of raw materials into usable products. Today these industries face numerous and complex challenges, which if met, offer promising careers to men and women who have interests in manufacturing. These career positions include such areas as tool design, cost evaluation and control, plant operations, production planning, and manufacturing methods. Emerging career fields include robotics, computer-integrated manufacturing and automated assembly.

The manufacturing technology option provides educational experiences in the core areas of manufacturing processes, industrial materials, drafting/CAD and technical science, as well as an opportunity to develop an area of specialization. This curriculum provides the Bachelor of Science in Engineering Technology with a major in manufacturing technology. Manufacturing courses are concentrated in the last two years allowing for efficient transfer from other OSU programs or from other colleges or universities.

The bachelor's program in manufacturing technology is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC/ABET).

Mechanical Design Technology

Professor and Interim Head James **E. Bose,** Ph.D., P.E.

Mechanical design is an activity necessary for existence of the modern world. All the conveniences of today's world have passed through the designers on their way to being useful products. Mechanical design is applied in robotics, automotive manufacturing, computer-aided drafting and design, computer-aided manufacturing, agricultural machines, petroleum industry, mining, shipbuilding, spacecrafts, electronics manufacturing, food processing, aircraft, metals and plastics production-nearly the entire spectrum of industry. Every industry requires some type of mechanical design, either directly to produce the product or indirectly to produce the tools, equipment and materials used to manufacture the product.

The computer has had an impact on few areas of technology more than mechanical design. The phrase "computer-aided design" or "CAD" means many things from computer-aided drafting and design to sophisticated solids modeling and analysis. The mechanical design student is exposed to a range of applications from designing with a computer to manufacturing with a computer. It is the objective of the department that all of its graduates be proficient in using the computer as a problem-solving tool both graphically and analytically.

Transfer students with an associate degree in drafting and design may transfer into the program with ease. The junior and senior years provide additional education in design principles, manufacturing processes, computer graphics, and other related areas necessary for more complex aspects of mechanical design. The mechanical design technologist with in-depth analysis and technical knowledge makes a computer-aided drafting and design work station a design tool rather than just a drafting tool. Bachelor of science graduates usually find employment in areas related to new product design and redesign, tool design, or manufacturing equipment design.

The curriculum has been carefully constructed to provide a realistic progression from the basic, or elementary principles, to advanced or more sophisticated techniques. The curriculum has two emphases available. The graphics or CAD emphasis requires courses that prepare a graduate to work as a mechanical designer, tool designer, or product designer. The broad emphasis requires greater breadth and allows more flexibility to prepare for the broader fields of mechanical technology, such as, test, evaluation, operation, fluid power or sales. Companies utilizing the talents of designers 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. The bachelor's program in mechanical design is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC/ABET).

Mechanical Power Technology

Professor and Interim Head James **E. Bose,** Ph.D., P.E.

Mechanical power involves a broad spectrum of the world and its utilization is of great benefit to society. This program includes the application of vapor power cycles, gas power cycles, fluid power and power transmissions. The usage of mechanical power is related closely to the manufacturing of merchandise, diverse forms of transportation, the generation of electrical power, the exploration for and production of gas and oil, and the production of agricultural products. Since many forms of mechanical power are required for existence in the world today, graduates of this program are essential to the diverse industrial, governmental and educational institutions.

The study of mechanical power is concerned with the utilization of energy, the development and transfer of power, and the measurement and control of fluid

and mechanical devices. It is a unique program which offers depth in the theoretical knowledge and a broad range in laboratory and equipment experiences. Within the major course work, the emphasis is on the solution of practical problems with supplemental laboratory experiences. It resembles a mechanical engineering program with a power option, combined with the added advantage of a strong laboratory background. The laboratory exposure enhances the theoretical portion of the program and provides extended experience with the associated hardware. This combination provides the graduates with immediate employment knowledge and skills.

The bachelor's program in mechanical power technology at Oklahoma State University is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC/ABET). In addition to the required mechanical power courses, students are provided a solid foundation in algebra, trigonometry and calculus, physics, chemistry, statics, dynamics, instrumentation, thermodynamics and computer science. Students are also offered a variety of courses required by the general education portion of the curriculum, including 12 hours of written and oral communication. The curriculum is designed to allow immediate entry into the technical course work in mechanical power, thus enabling students to determine their interest and satisfaction with the discipline early in their academic careers.

Preparation for specification of industry can be accomplished by selecting courses which emphasize a given area, such as power generation, fluid power, air conditioning and heating.

Because the program focuses on the application of engineering principles to the solution of pragmatic problems, graduates are immediately employable with minimal on-the-job training, thus increasing their value to industry. Mechanical power graduates are prepared to function in the areas of product design, testing and evaluation, product application and maintenance, and technical sales and liaison. Employment includes a variety of manufacturing companies (aircraft, automobile, compressor and turbine, fluid power manufacturers), energy companies (natural gas, electrical power generation, oil and gas industries), and service companies (transportation industry, architecture and professional engineering firms, and those supporting the oil and gas industry). This partial list of employment opportunities indicates the diversity of career options for graduates of the mechanical power program. The starting salary exceeds the average for most bachelor's degree programs.

College of Human Environmental Sciences

Patricia K. Knaub, Ph.D., *Dean*

Margaret J. Weber, Ph.D., ***Associate*** *Dean for Research and Graduate* ***Studies***

Lynn Sisler, Ed.D., *Associate Dean for Undergraduate Programs*

Debra C. Engle, M.S., *Director of University Extension and Development*

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.

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.

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 Undergraduate Programs and 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.

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, 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 human nutrition and dietetics.

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, 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 extension programs in design, housing and merchandising that focus on the individual-environment interaction, that are globally oriented, scientifically based and that enhance the quality of life in a socially responsible manner. Three undergraduate options are available: interior design, apparel merchandising and apparel design.

Students in *interior design* are preparing for careers as professionals who assist families and businesses 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.

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, and international sourcing. Career opportunities include merchandise manager, merchandise sourcing specialist, visual merchandiser, fashion coordinator, mall manager, and manufacturer's representative.

Students in *apparel design* are preparing for careers in the apparel and textiles 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 or accessory items. Course work includes principles of design, apparel production, functional apparel design, properties and performance evaluation of textiles, pattern making, CAD and entrepreneurship. Career opportunities include fashion and functional designer, apparel engineer, product development specialist, accessory designer, pattern maker, pattern company or manufacturer's representative, and textile designer.

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.

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

Associate Professor and Interim **Head** **Carolyn** S. Henry, 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 five options (1) child development-preprofessional, (2) early childhood education (teacher certification), (3) gerontology-preprofessional, (4) individual, family and community services, and (5) youth and adult-preprofessional. All options emphasize integration of theory and research with practice.

The *child development-preprofessional* option is 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, in addition to gaining knowledge in child development. It provides a basis for a career as a child development specialist, pediatrician, or family law attorney. This option provides flexibility to accommodate the student's particular area of interest or to meet prerequisites for a professional school.

The *early childhood education-teacher certification* option provides professional preparation for individuals to teach in public school programs for prekindergarten through third grade. The option prepares students to design developmentally appropriate curricula for young children. An Early Childhood Education certificate is required to teach prekindergarten through kindergarten in Oklahoma public schools.

The *gerontology-preprofessional* option provides 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, in addition to gaining knowledge in gerontology. It prepares a student for a career as a medical field specialist with emphasis in working with the elderly and provides flexibility to accommodate the student's particular area of interest, or to meet prerequisites for a professional school.

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 social service agencies, and in business and industry.

The *youth and adult-preprofessional* option provides 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, in addition to gaining knowledge in youth and adult development. It prepares a student for a career as a family counselor, or marriage and family therapist, family law attorney, or medical field specialist with an emphasis in working with families. 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.

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. 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 fultillment 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 has restrictive admission requirements and 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 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 at Oklahoma State University by designing a plan of study that meets the requirements for one of the FRCD specializations and the OSU Graduate Certificate in gerontology requirements. 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 relations or child development. The program is designed to prepare competent researchers and educators who will make contributions to the scientific literature in child development and family sciences. 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* 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.

Two degree options and a minor are offered through the department.

The *dietetics* option meets the Didactic Program in Dietetics (DPD) academic requirements and is approved by the American Dietetic Association. With appropriate electives, minors may be obtained in restaurant administration, business administration or wellness. 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 in April and October each year by the American Dietetic Association. Individuals who are successful on the examination become registered dietitians and are entitled to use the initials "RD." 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, food service design consultant, dietary products or equipment representative, 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.

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. 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 Raphael R. Kavanaugh, Ed.D., CHA

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: hotel lobby with front desk and reservation system, 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; laboratory for computer management information systems; basic food preparation laboratory; classroom and demonstration area; and project room.

Career opportunities include tourism, food service 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 additional possibilities. Airline catering, vending and individual restaurant entrepreneurship are excellent 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, economics, marketing and personnel management. Courses in service management, food and beverage purchasing and control, layout and design, sales and promotion, front office management, tourism, and advanced hotel and restaurant management are also included in the specialized area. General requirements are met through courses in English, the natural and social sciences, humanities, political science, history and government, mathematics and computer application. The B.S. degree with an option in hotel administration or restaurant management may be earned by completing a minimum of 125 semester hours and maintaining a 2.50 grade-point average for courses required in the major area.

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.

A well-balanced academic high school program is recommended for students interested in hotel or restaurant management as a career. Mathematics, accounting, computer science, English and speech are excellent background courses.

Graduate Programs

The Master of Science Degree. Admis-sion 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 and a minimum of two years of relevant work experience. Prerequisite courses may be required for students with other degrees. The master's degree requires a minimum of 30 semester hours, including six credit hours in HRAD core courses, six credit hours in HRAD specialization courses and six credit hours in guided electives. A six credit hour research thesis is also required.

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.

Areas of specialization include lodging administration, restaurant management and hospitality education. Competitive graduate teaching and research assistantships, graduate fellowships and tuition fee waivers are available to qualified applicants.

College of Osteopathic Medicine

Thomas Wesley Allen, D.O., *Provost and Dean*

David T. John, Ph.D., *Associate Dean* for Basic Sciences

Larry D. Cherry, D.O., *Associate* Dean for Clinical Education

Daniel E. Overack, Ph.D., *Assistant Dean for Students/Admission and Advisement*

Wennette 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 and includes a modern three-building complex. The Center for Advanced Medical Education is expected to be completed in 1996 and will house an expanded library, Telemedicine Center, and extensive conference facilities. On the south campus, a half-mile away, is an

office building and medical bookstore, and the 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. 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, spiral-

ing systems approach in which subject matter is continuously re-introduced in greater depth and complexity.

The first year of study concentrates on the basic sciences and preliminary clinical concepts. Preparation of the student for early patient contact requires a foundation in anatomy, physiology, behavioral science, techniques of physical examination, diagnosis and patient interview, and recognition of normal and abnormal patterns of physical conditions and disease. The next year of study emphasizes the interdisciplinary study of the structure and function of body systems. In addition, students are introduced to specialized clinical care and medical procedures related to each body system.

The final two years of the program are devoted exclusively to clinical rotations, where students work with patients under physician-faculty supervision. The student rotates through basic hospital services, including general medicine, surgery, obstetrics/gynecology, pediatrics, internal medicine, and emergency medicine. Other clinical training occurs at a small rural hospital, primary care clinic, psychiatric facility, community health facility, and offices of private physicians.

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.

Selection Factors

The College considers applications for admission from all qualified candidates without regard to age, sex, 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 1995-96 school year) totals $7552 per year for Oklahoma residents and $18,662 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***

Billy E. Hooper, D.V.M., Ph.D., ***Associate Dean for Academic Affairs***

Richard W. Eberle, Ph.D., ***Associate Dean for Research***

Thomas R. Thedford, D.V.M., ***Assistant Dean for Outreach***

James E. Creed, D.V.M., M.S., ***Assistant Dean for Service and Director of the Boren Veterinary Medical Teaching Hospital***

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-eight semester credit hours. Physics courses must include laboratory work and the following topics: mechanics, heat, sound, electricity, magnetism, light and modern 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.

Humanities and social science-six semester credit hours.

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 November 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 coordinator 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 aca-

demic performance in preparatory studies, standard achievement tests, and references to determine personal characteristics and career motivation.

The Oklahoma State Regents for Higher Education (OSRHE) permit the College of Veterinary Medicine (CVM) to accept a limited number of students who do not meet the usual admission requirements. The College will consider applications from persons who are educationally or economically disadvantaged and/or who show promise of being able to succeed in the professional curriculum. Special consideration will be given to the diversity of students admitted to the CVM program in an attempt to fulfill OSRHE goals in the realm of social justice.

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.

Departmental Clubs and Honor Societies

American Veterinary Medical Association, Student Chapter

Society of Phi Zeta Nu Chapter (academics and research)

Physiological Sciences

Regents Professor and Head
Charlotte L. Ownby, Ph.D.

Graduate Programs

The Department of Physiological Sciences offers programs of study leading to the degrees of Master of Science and Doctor of Philosophy. The programs are designed to prepare students for teaching and research positions in universities or colleges; research positions in governmental laboratories, foundations or industry and related positions. Areas of concentration offered are morphology, pharmacology, physiology and toxicology.

Application Procedure. Applications are accepted at any time; however, to be considered for assistantships, applications for enrollment in the summer session or fall semester should be received by February 15, and applications for enrollment in the spring semester should be received by September 15.

Review and formal acceptance or rejection of applications for admission to the graduate program is delegated to the departmental Graduate Education Committee. For admission to the graduate program, the candidate must possess a bachelor's degree or higher in a science-related field with course work in mathematics, chemistry and physics.

Criteria for recommending admission are:

1. For candidates whose highest earned degree is the baccalaureate, the sum of verbal and quantitative scores on the Graduate Record Examination will be multiplied by the grade-point average on a four point scale, for the last 60 hours of undergraduate course work. The product score must be 3000 or greater for M.S. degree candidates or 3150 or greater for Ph.D. degree candidates for admission without qualification. Students who fail to meet these criteria may be considered for admission on a provisional basis.
2. For candidates with advanced degrees, medical degrees or degrees earned outside the United States, admission status will be evaluated on an individual basis.

Applicants are required to select a major professor prior to admission to the departmental program. The department head, in consultation with the adviser and the Graduate Education Committee, will appoint a graduate advisory committee. Two of the committee members must be members of the graduate faculty of the Department of Physiological Sciences. This committee will consist of not fewer than three graduate faculty members for students pursuing the master's degree. For students pursuing the doctoral degree, a graduate advisory committee of not less than four graduate faculty members, one of whom must be from outside the departmental graduate faculty, will be appointed by the dean of the Graduate College upon recommendation of the Graduate Education Committee. Functions of the advisory committee are described in the "Graduate College" section.

The Master of Science Degree. This degree may be earned in one of two ways: (1) completion of a total of 30 semester credit hours including six credit hours related to a thesis; the thesis must be formally submitted to the Graduate College for partial fulfillment of the requirements for the degree; (2) completion of a total of 32 semester credit hours including two credit hours in research and thesis. A report must be submitted to the Graduate College in partial fulfillment of the requirements for the degree. For both pathways, two credits of seminar are required and PHSI 5224 is recommended. The student must present the thesis or report in a seminar to the department and pass a final oral examination at that time. The courses forming the student's program are determined by the student's graduate advisory committee in conference with the student.

The Doctor of Philosophy Degree. Students may enter the doctoral program without first acquiring a master's degree. The course requirement for the Ph.D. is 90 semester credit hours including a minimum of 30 credits for research and dissertation. The courses required are determined by the graduate advisory committee in conference with the student but must include four credits of seminar. The 90 semester credit hours may include all or a part of the work completed for a master's degree. The student must pass written and oral qualifying examinations. A doctoral dissertation based on original research must be accepted by the graduate advisory committee and submitted to the Graduate College. The student must present the dissertation in a seminar to the department and pass a final oral examination at that time.

Minor in Physiological Science. A graduate student working toward a Ph.D. who wishes to declare a minor is expected to have a member of the department on his or her graduate advisory committee, must meet the Graduate College requirements for a minor, and have a minimum of 14 credit hours in physiological sciences course work.

Veterinary Medicine and Surgery

Professor and Head **Grant** H. Turnwald, **B.V.Sc.,** 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 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. Graduate

academic programs in other departments are offered in association with some residencies.

Application Procedure. Applications are accepted at any time and will be considered as positions become available.Most open positions are listed in the Veterinary Internship/Residency Matching Program directory published each October.

Veterinary Parasitology, Microbiology and Public Health

Professor and Head Robert W. Fulton, D.V.M., Ph.D.

Graduate Programs

The Department of Veterinary Parasitology, Microbiology and Public Health offers a program of research and study leading to the degrees of Master of Science and Doctor of Philosophy with specialization in the areas of veterinary helminthology, protozoology, bacteriology, virology, immunology, epidemiology and public health. The program is designed to prepare individuals for careers in teaching and research, and is flexible to meet the needs of the student within the capabilities of the department and the University.

Application Procedure. Applications are accepted at any time; however, all documents must 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 suggested.) International applicants are required to take the English Proficiency Exam (TOEFL: a passing score is 550 or above), as well as the Test of Spoken English (TSE: a passing score is 220 or above), before they can be considered for graduate teaching assistantships unless they are from a country where English is a first language.

Applicants generally select a major professor before they are admitted to the departmental program. They are urged to correspond with a member of the department's graduate faculty whose interests reflect their own before making application. Information about the faculty's research interests is available upon written request to the department. After acceptance to the graduate program, the department head recommends an advisory committee to the dean of the Graduate College to develop a plan of study.

Prerequisites. Candidates for admission must possess a bachelor's degree or equivalent, including 30 semester credit hours in biological and physical sciences. Unqualified admission will be granted only to those applicants with combined verbal and quantitative GRE total scores multiplied by their GPAs (last 60 hours) totaling 3000 or greater. Provisionary status may be awarded to those not having these credentials with specific requirements dependent on recommendations of the departmental graduate faculty.

The Master of Science Degree. The M.S. must be earned by either Plan I, with thesis, 30 credit hours, including not more than six credit hours for the thesis, or Plan II, with report, 32 credit hours, including not more than two credit hours for the report. The plan of study will be tailored to meet the student's needs and interests; however, all students must enroll in the course Current Topics in Veterinary and Biomedical Science (VPARA 5120) and in Seminar (VPARA 6110) for one credit hour each, and must pass three credit hours of biochemistry acceptable for graduate credit, and a course in statistical methods. The student must also pass a final oral examination covering the thesis or report and related course work.

The Doctor of Philosophy Degree. The Ph.D. requires a total of 90 credit hours beyond the B.S. degree. All Ph.D. students must enroll in the course Current Topics in Veterinary and Biomedical Science (VPARA 5120) for one hour of graduate credit and in Seminar (VPARA 6110) for two hours of graduate credit and, if not already complete, must fulfill the requirements for biochemistry and statistical methods detailed above under "Master of Science Degree." A written and oral qualifying examination is required. Students must prepare a research proposal and complete a dissertation based on original research. The final examination is oral and is based primarily on the dissertation problem, although not limited to this subject.

Veterinary Pathology

Professor and Head Anthony W. Confer, D.V.M., Ph.D.

Graduate Coordinator Charles W. Qualls, Jr., D.V.M., Ph.D.

Graduate and Residency Programs

The Department of Veterinary Pathology offers graduate programs with options of basic research in pathobiology or veterinary pathology. Pathobiology is available to persons with a minimum of a bachelor's degree in a science-related field and is designed to prepare individuals for careers in teaching and research. The research program in the Department of Veterinary Pathology is focused on elucidation of mechanisms of disease, utilizing the disciplines of microbiology, immunology, toxicology, histology, immunocytochemistry, electron microscopy and molecular biology. Persons who undertake a program in the area of veterinary pathology must have a professional degree in veterinary medicine. It is designed to prepare individuals for careers in teaching, research and service pathology as required to fulfill the requirements of academics, animal diagnostic facilities, and industries.

The Master of Science Degree. The M.S. may be earned by 30 credit hours beyond a bachelor's degree including not more than six credit hours for the thesis. The plan of study will be designed to meet the student's needs and interests. Requirements include one credit 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. degree requires a total of 90 credits beyond the bachelor's degree. The plan of study will be designed to meet the student's needs and interests. Requirements include courses in biochemistry, biochemistry techniques, statistics and two credits of seminar. A written and oral qualifying examination is required. Students must prepare a research proposal and complete a dissertation based on original research. The final examination is oral and is based primarily on the dissertation problem.

Application Procedure. Applications are accepted at any time. Applicants should submit college transcripts and Graduate Record Examination scores.

Faculty

College of Agricultural Sciences and Natural Resources

Agricultural Economics

Professor and Head
James E. Osborn, Ph.D.

Regents Professor and Pat and Jean Neustadt Chair in Agricultural **Economics**
Harry P. Mapp, Ph.D.

Regents Professors
Gerald A. Doeksen, Ph.D.; James N. Trapp, Ph.D.

Professors
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Assistant Professor
Notie H. Lansford, Ph.D.

Agricultural Education, Communications and 4-H Youth Development

Professor and Head
James G. Leising , Ph.D.

Professors
Kevin G. Hayes, Ed.D.; C. Wesley Holley, Ed.D.; James P. Key, Ed.D.; Jack W. Pritchard, Ed.D.; H. Robert Terry, Ph.D.; James D. White, Ed.D.

Associate Professors
Sheila Forbes, Ph.D.; Robert F. Reisbeck, Ed.D.; William G. Weeks, Ph.D.

Assistant Professors
Billie Chambers, Ed.D.; Charles Cox, Ed.D.; Fred Rayfield, Ed.D.

Instructor
Shelly R. Sitton, M.S.

Agriculture (General)

Professor and Assistant Dean
C. Wesley Holley, Ed.D.

Agronomy

Professor and Head
Robert L. Westerman, Ph.D.

Regents Professor and Warth Distinguished Professor of Agronomy
Charles M. Taliaferro, Ph.D.

Regents Professor and Wheat Genetics Chair
Edward L. Smith, Ph.D.

P.E. Harrill Distinguished Professor of Crop **Science**
Donald S. Murray, Ph.D.

SantelmanniWarth Distinguished Professor of **Crop Science**
David L. Nofziger, Ph.D.

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Assistant Professors
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Animal Science

Professor and **Head**
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Professor and President Emeritus
John R. Campbell, Ph.D.

Professor, Dean and Director, **College** of Agricultural **Sciences** and Natural **Resources**
Charles B. Browning, Ph.D.

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Assistant Researchers
Michael W. Mather, Ph.D.; Margaret Pierce, Ph.D.; Steven P. White, Ph.D.

Teaching Associate
Sharon T. Ford, Ph.D.

Instructor
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Biosystems and Agricultural Engineering

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Lecturer
Gary R. Sands, Ph.D.

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Instructor
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Counselor
Catherine Ware, M.S.

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Regents Professor
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School of Geology

Brown Monnett Professor, Regents Professor and Head
Zuhair F. Al-Shaieb, Ph.D.

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Assistant Professors
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Professor
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Grayce B. Kerr **Professor**
William H. Jaco, Ph.D.

Noble Professor
James R. Choike, Ph.D.

Southwestern Bell Professor
Benny D. Evans, Ph.D.

Vaughn Professor of Number Theory
Bernard Dwork, Ph.D.
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Assistant Professors
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Smith L. Holt, Ph.D.

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Staff
SSgt Leoel L. Gonzales; SrA Bruce T. Hammond

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Staff
SFC Walter Haralson; MSG Grover Watters

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Professors
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Instructor
Thora duBois, D.M.A.
Adjunct Instructors
Susan Anderson, M.M.; Ted Cox, M.M.; Lisa lottini-Wagner, M.M.; Brenda Johnson, M.M.; Rick Wagner, M.M.

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Richard W. Eggerman, Ph.D.; Edward G. Lawry, Ph.D.
Associate Professors
Doren A. Recker, Ph.D.; Walter G. Scott, Ph.D.; Mui-Hwa (May) Sim, Ph.D.; Michael R. Taylor, Ph.D.
Assistant Professors
Michael Rhodes, Ph.D.; Qingjie (James) Wang, Ph.D.

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Regents Professor and Head
Steven W.S. McKeever, Ph.D.
Regents Professors
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Susan K. Redwood, Ph.D.

Professor
Michael H. Pollak, Ph.D.

Associate Professors
Richard H. Bost, Ph.D.; Vivian M. Stevens, Ph.D.

Assistant Professor
Nancy Van Winkle, Ph.D.

Radiology

Clinical Professor and Chairman
Dean R. Fullingim, D.O.

Surgery

Clinical Associate Professor and Chairman
Walter L. Wilson, D.O.

Professor
William E. Moore, D.O.

Clinical Associate Professor
Thad Taylor, D.D.S.

Clinical Assistant Professors
Ronnie L. Keith, D.O.; James E.Magnusson, D.O.; Jimmy G. Melton, D.O.; David R. Rittenhouse, D.O.

College of Veterinary Medicine

Physiological Sciences

Regents Professor and Head
Charlotte L. Ownby, Ph.D.

Professors
James E. Breazile, D.V.M., Ph.D.; *George E. Burrows, D.V.M., Ph.D.; Subbiah Sangiah, B.V.Sc., Ph.D.

Associate Professors
*Cyril R. Clark, B.V.Sc., Ph.D.; Nicholas L. Cross, Ph.D.; Joseph P. McCann, Ph.D.; Larry E. Stein, Ph.D.; Alastair G. Watson, B.V.Sc., Ph.D.

Assistant Professor
Jerry R. Malayer, Ph.D.

Teaching Associates
Danette Goodyear, B.S.; Laura Kellum, M.S.; Joey Maier, B.S.; Deepa B. Rao, D.V.M., M.S.; Tonya Tromblee, B.S.; Sha Zhu, M.S.

Veterinary Medicine and Surgery

Professor and Head
*Grant H. Turnwald, B.V.Sc., 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.; *James E. Creed, D.V.M., M.S.; *William C. Edwards, D.V.M., M.S.; *Charles G. MacAllister, D.V.M.; Thomas Monin, D.V.M.; *Lawrence E. Rice, D.V.M., M.S.; *Richard V. Shawley, D.V.M., M.S.; *Steven H. Slusher, D.V.M., M.S.; Thomas R. Thedford, D.V.M.

Associate Professors
*Robert J. Bahr, D.V.M.; *Lionel J. Dawson, B.V.Sc., M.S.; *George A. Henry, D.V.M,; *John P. Hoover, D.V.M., M.S.; *Henry W. Jann, D.V.M., M.S.; John G. Kirkpatrick, D.V.M.; *Gregor L. Morgan, M.V.Sc., Ph.D.; *Sandra E. Morgan, D.V.M., M.S.; *Robert A. Smith, D.V.M., M.S.; *Ronald D. Welsh, D.V.M., M.S.

Assistant Professors
Mary H. Bowles, D.V.M.; Mitchell A. Crystal, D.V.M.; W. Tod Drost, D.V.M.; Carolynn T. MacAllister, D.V.M.; Ronald E. Mandsager, D.V.M., M.S.; Mark C. Rochat, D.V.M., M.S.; Virginia Schultz, D.V.M.; Robert N. Streeter, D.V.M., M.S.; J. Paul Woods, D.V.M.; Philip R. Woods, D.V.M., Ph.D.

Administrative and Professional
Barbara Buxton, D.V.M.; Petrina A. York, D.V.M.

Adjunct Faculty
*Lloyd M. Reedy, D.V.M.

Residents
Tanya Ciaceiarelli, D.V.M.; Karen J. Copedge, D.V.M.; Gary J. Nie, D.V.M., M.S.; Maria Prado, D.V.M.; Tulio Prado, D.V.M.; Mark Soderstrom, D.V.M.

Veterinary Parasitology, Microbiology and Public Health

Professor and Head
*Robert W. Fulton, D.V.M., Ph.D.

Professors
Sidney A. Ewing, D.V.M., Ph.D.; J. Carl Fox, Ph.D.; A. Alan Kocan, M.S.P.H., Ph.D.

Associate Professors
*Jean M. d'Offay, D.T.V.M., Ph.D.; Richard W. Eberle, Ph.D.; *Rebecca J. Morton, D.V.M., Ph.D.; John H. Wyckoff III, Ph.D.

Assistant Professors
Terry W. Lehenbauer, D.V.M., M.P.V.M., Ph.D.; Jeremiah T. Saliki, D.V.M., Ph.D.

Teaching Associate
Jean M. Clarke, D.V.M.

Veterinary Pathology

Professor and Head
*Anthony W. Confer, D.V.M., Ph.D.

Professors
Kenneth Clinkenbeard, D.V.M., Ph.D.; *Rick L. Cowell, D.V.M., M.S.; *Billy E. Hooper, D.V.M., Ph.D.; Katherine M. Kocan, M.S.P.H., Ph.D.; *Roger J. Panciera, D.V.M., Ph.D.; *Charles W. Qualls, Jr., D.V.M., Ph.D.; *E.L. Stair, D.V.M., Ph.D.

Associate Professors
*Ray Ely, D.V.M., Ph.D. (adjunct); *R. Gayman Heiman, D.V.M., Ph.D.; George L. Murphy, Ph.D.; Stanley L. Vanhooser, D.V.M., M.S.

Assistant Professors
*Gregory A. Campbell, D.V.M., Ph.D.; *R. Jay Hoffman, D.V.M., Ph.D.; *James H. Meinkoth, D.V.M., Ph.D.

Assistant Researcher
Edmour Blouin, Ph.D.

Residents
Connie Cummings, D.V.M.; Nick Gatto, D.V.M.; Matt Starost, D.V.M.; Amy Thiessen, D.V.M.

Oklahoma Animal Disease Diagnostic Laboratory

Professor and Director
*William C. Edwards, D.V.M., M.S. (toxicologist)

Professor
*E.L. Stair, D.V.M., Ph.D. (chief pathologist)

Associate Professors
*Ray W. Ely, D.V.M., Ph.D. (pathologist); *R. Gayman Heiman, D.V.M., Ph.D. (pathologist); Stanley L. Vanhooser, D.V.M., M.S. (pathologist); *Ronald D. Welsh, D.V.M., M.S. (bacteriologist)

Assistant Professor
Jeremiah T. Saliki, D.V.M., Ph.D. (virologist)

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 1996-97, Fall 1996

August 19, Monday
Class work begins

August 30, Friday
Last day to file a diploma application

August 30, Friday
Applications for graduate credit for graduating seniors due

November 1, Friday
FINAL DRAFT copy of dissertations, theses and reports due

November 1, Friday
Application for admission to spring candidacy due for doctoral and Ed.S. candidates

November 15, Friday
RESULTS of doctoral, Ed.S., and Plan I, Plan II or Plan III master's FINAL EXAMINATIONS due

November 29, Friday
FINAL COPIES of dissertations, theses and reports due by fall candidates

December 8, Sunday
Graduate College Hooding Convocation

December 13, Friday
Class work ends

Second Semester 1996-97, Spring 1997

January 13, Monday
Class work begins

January 24, Friday
Last day to file a diploma application

January 24, Friday
Applications for graduate credit for graduating seniors due

March 28, Friday
FINAL DRAFT copy of dissertations, theses and reports due

April 11, Friday
RESULTS of doctoral, Ed.S., and Plan I, Plan II or Plan III master's FINAL EXAMINATIONS due

April 25, Friday
FINAL COPIES of dissertations, theses and reports due by spring candidates

April 25, Friday
Application for admission to fall candidacy due for doctoral and Ed.S. candidates

May 9, Friday
Class work ends

May 9, Friday
Graduate College Hooding Convocation

May 10, Saturday
University Commencement

Summer 1997 Regular 8-Week Sumner Session

June 9, Monday
Class work begins

June 13, Friday
Last day to file a diploma application

June 13, Friday
FINAL DRAFT copy of dissertations, theses and reports due

June 13, Friday
Applications for graduate credit for graduating seniors due

June 27, Friday
RESULTS of doctoral, Ed.S., and Plan I, Plan II or Plan III master's FINAL EXAMINATIONS due

July 11, Friday
FINAL COPIES of dissertations, theses and reports due by summer candidates

August 1, Friday
Graduate College Hooding Convocation

August 1, Friday
Class work ends

First Semester 1997-98, Fall 1997

August 25, Monday
Class work begins

September 5, Friday
Last day to file a diploma application

September 5, Friday
Applications for graduate credit for graduating seniors due

November 7, Friday
FINAL DRAFT copy of dissertations, theses and reports due

November 7, Friday
Application for admission to spring candidacy due for doctoral and Ed.S. candidates

November 21, Friday
RESULTS of doctoral, Ed.S., and Plan I, Plan II or Plan III master's FINAL EXAMINATIONS due

December 5, Friday
FINAL COPIES of dissertations, theses and reports due by fall candidates

December 14, Sunday
Graduate College Hooding Convocation

December 19, Friday
Class work ends

Second Semester 1997-98, Spring 1998

January 12, Monday
Class work begins

January 23, Friday
Last day to file a diploma application

January 23, Friday
Applications for graduate credit for graduating seniors due

March 27, Friday
FINAL DRAFT copy of dissertations, theses and reports due

April 10, Friday
RESULTS of doctoral, Ed.S., and Plan I, Plan II or Plan III master's FINAL EXAMINATIONS due

April 24, Friday
FINAL COPIES of dissertations, theses and reports due by spring candidates

April 24, Friday
Application for admission to fall candidacy due for doctoral and Ed.S. candidates

May 8, Friday
Class work ends

May 8, Friday
Graduate College Hooding Convocation

May 9, Saturday
University Commencement

Sununer 1998 Regular 8-Week Sununer Session

June 8, Monday
Class work begins

June 12, Friday
Last day to file a diploma application

June 12, Friday
FINAL DRAFT copy of dissertations, theses and reports due

June 12, Friday
Applications for graduate credit for graduating seniors due

June 26, Friday
RESULTS of doctoral, Ed.S., and Plan I, Plan II or Plan III master's FINAL EXAMINATIONS due

July 10, Friday
FINAL COPIES of dissertations, theses and reports due by summer candidates

July 31, Friday
Graduate College Hooding Convocation

July 31, Friday
Class work ends

Thomas C. Collins, Ph.D., *Dean and Vice-President for Research*

Wayne Powell, Ph.D., *Associate Dean*

Gary K. Ostrander, Ph.D., *Associate Dean*

Stephen P. Robinson, Ph.D., *Director of Student Academic Services*

Carol V. Olson, Ed.D., *Director of Strategic Research Development*

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/index.htm

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 executive committee of the Graduate Faculty. It formulates and reviews policies concerned 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 and then to the Graduate Faculty with the Graduate Council's recommendations.

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

Thomas C. Collins, Chair
Robert Wettemann, Vice-Chair

Group 1--Biological Sciences
1997--James Motes
1999--Robert Hunger
1997--James Webster

Group II--Humanities
1996--Carol Moder
1998--Jeffrey McQuillen
1996--Perry Gethner

Group Ill--Physical Sciences and Technology
1997--Richard Essenberg
1999--Eric Price
1997--William Warde

Group IV--Social Sciences
1996--David Fournier
1998--Don R. Hansen
1996--Daryl Nord

Group V--Teacher Education
1997--James P. Key
1999--Al Carlozzi
1997--Robert Nolan

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 home page on the World Wide Web (http://www.seic.okstate.edu/envi nst/).

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 an on-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 OSU Center for Laser Research is a national leader in the basic research

areas of laser interaction with condensed matter. Researchers are engaged in optical studies of semiconductor quantum wells and superlattices, rare-earth doped glasses, colloids, and sol-gel systems. Femtosecond THz generation and detection, femtosecond ring laser operations, femtosecond pulse propagation and mixing in nonlinear crystals and semiconductors are being actively investigated. Through this basic research, scientists are then able to focus on applied research using lasers in industrial, medical and technological applications. Future research initiatives involve photonic materials and devices, new laser technologies and biomedical laser research.

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.

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 and dean of the Graduate College, 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 of Colleges and Secondary Schools. Programs within the colleges are also accredited by other agencies.

In the *College of Agricultural Sciences and Natural Resources,* the mechanized agriculture program receives approval from the American Society of Agriculture Engineers and 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. 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 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; 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 speech and language pathology 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, the only nationally-recognized accrediting body for programs in business and management. The School of Accounting has separate accreditation by this body.

In the *College of Education,* programs in the School of Health, Physical Education, and Leisure are accredited by the National Recreation and Park Association as well as the American Association for Leisure and Recreation, 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 that received this designation. The counseling psychology program is provisionally accredited by the American Psychological Association. All teacher education programs are accredited by the Oklahoma State Board of Education and the North Central Association of Colleges and Secondary Schools. Vocational education programs in business education, technical education, and trade and industrial education are also accredited by the Oklahoma State Department of Vocational-Technical Education.

In the *College of Engineering, Architecture and Technology,* engineering and technology programs are reviewed for accreditation by separate commissions of the Accreditation Board for Engineering and Technology as measured against general and program-specific criteria. Consult the program descriptions in the *Catalog* for details of current accreditation status. The National Architecture Accrediting Board has accredited the bachelor's program in architecture.

Professional programs in the *College of Human Environmental Sciences* are recognized by separate prestigious accreditations and approvals. The Foundation of Interior Design Education Research has accredited the undergraduate interior design program. The Child Development Laboratory that serves as a model teaching laboratory for students in early childhood education is licensed by the state of Oklahoma Department of Human Services. The Oklahoma State Department of Education and the Oklahoma State Department of Vocational-Technical Education has accredited the programs in family relations and child development. The American Association of Marriage and Family Therapists has accredited the master's program in marriage and family therapy. The American Dietetic Association has approved the Dietetic Internship and the Didactic Program in Dietetics (DPD). The School of Hotel and Restaurant Administration is accredited by the Accreditation Commission for Programs in Hospitality Administration (ACPHA). The early childhood education program is accredited as a part of the OSU Teacher Education unit. 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.

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 has been accredited by the American Animal Hospital Association.

Programs at OSU's branch campuses have also received accreditation from national agencies. The College of Osteopathic Medicine-OSU is accredited by the Bureau of Professional Education of the American Osteopathic Association. The nursing program at OSU-Oklahoma City is accredited by the National League for Nursing and approved by the Oklahoma Board of Nurse Registration and Nursing Education. OSU-Okmulgee is accredited by the Commission on Institutions of Higher Education of the North Central Association of Colleges and

Research Centers

Agricultural Experiment Station	139 Agricultural Hall	744-5398
Agronomy Research Station	101 Agricultural Hall	744-7036
Caddo Research Station	R.R. Box 42 Fort Cobb, OK 73738	643-2501
Eastern Research Station	Rt. 1, Box 65A Haskell, OK 74436	918-482-3822
Irrigation Research Station	Route 1 Altus, OK 73521	482-3459
Kiamichi Field Station	Rt. 1, Box 228 Idabel, OK 74745	286-5175
North Central Research Station	Box 141 Lahoma, OK 73754	796-2447
Pecan Research Station	Sparks, OK 74869	918-866-2263
Sandyland Research Station	Mangum, OK 73554	787-2046
Southeast Center	Lane, OK 74555	889-7890
South Central Research Station	Rt. 3, Box 9 Chickasha, OK 73018	224-4476
Southwest Agronomy Research Station	Tipton, OK 73570	667-4273
Vegetable Research Station	13711 S. Mingo Rd, Bixby, OK 74008	918-369-2441
Noble Research Center for Agriculture and Renewable Natural Resources	139 Agricultural Hall	744-5398
Center for Aerospace Education Services Project	300 North Cordell	744-7015
Center for Applications of Remote Sensing	314 Geography	744-5178
Center for Consumer Services	016 Human Environmental Sciences	744-7084
Center for Environmental Education	325 Willard Hall	744-7122
Center for International Trade Development	204 Center for Intl Trade Development	744-7693
Center for Laser Research	413 Noble Research Center	744-6575
Center for Local Government Technology	308 Center for Intl Trade Development	744-6049
Crystal Growth Laboratory	546 Physical Science	744-5796
Ecotoxicology Research Laboratory	426 Life Science West	744-5551
Educational Technology Center	002 Willard Hall	744-7124
Electronics Laboratory	348 Cordell South	144-5716
Electron Microscopy Laboratory	020 Veterinary Medicine	744-6765
Engineering Energy Laboratory	216 Engineering South	744-5157
Human Nutrition Center	425 Human Environmental Sciences	744-5040
Human Resources Development Center	406 Classroom Building	744-6275
Industrial Assessment Center	322 Engineering North	744-6055
Manufacturing Processes and Materials Center	1724 W. Tyler	744-7375
Mass Spectrometry Laboratory	025 Physical Science	744-5937
Micro Raman Facility	145 Physical Science	744-5807
NMR Solids Laboratory	005 Physical Science	744-5946
NMR Solutions Laboratory	012 Physical Science	744-5950
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	111 Engineering North	744-7375

Secondary 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 Edmon Low 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 30 day check-out period for books, and can utilize the interlibrary loan facilities.

Computer Center

The University Computer Center (UCC) provides computing services to all areas of the University including research, instruction, extension and administration. The Center operates three host computers: an IBM 3090-200S with a Vector Facility, operating MVS/XA under VM/XA; a DEC VAX VMS cluster including an 11/780, a 6320, and several VAX station 3100S; and a VAX Ultrix cluster including an 8350 and VAX station 3100S. These computers are accessible via a number of public terminal clusters which are connected to the Asynchronous Communications Network. This network also allows access using microcomputers on or off campus. A large number of computers maintained by various academic departments are also accessible using this network.

The UCC offers a number of computer-related services to the University community. Noncredit short courses are offered each semester. Topics include various mainframe and microcomputer subjects. Registration is required. There is a small charge for some microcomputer courses. Mainframe and microcomputer diagnostic services staff will provide quick answers to computer-related questions.

The Computer Center offers discounts on computer purchases, provides consultation for software and hardware, and has a computer demonstration lab in which the latest products can be observed.

Programming service, systems analysis, design and development are also available. There is a charge for these services.

UCC is part of the BITNET network. Users should contact the UCC to get a BITNET number. For more information, contact the University Computer Center, located in 113 Math Science.

Living Accommodations

From high-rise residence halls to single-dwelling apartments, OSU has all types of housing to meet many preferences. The Iba Graduate House is a residence hall designated for single graduate students. This five story air-conditioned building offers single and double year-round occupancy, and an optional meal plan in neighboring cafeterias. Vending machines and microwave ovens are conveniently placed for limited food preparation. Other amenities include an open visitation policy, extensive study space with computer terminals and printers, and parking adjacent to the hall.

Family housing is available on a limited basis. The apartment complex features two-bedroom units. To be eligible, one spouse 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, Anne Benes, *Coordinator*

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

Adult Student Organization-030E 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.

Special Services

The Special Services program of the University Counseling Center provides assistance to the students enrolled in Oklahoma State University who are unique because of their social, economic, cultural or academic background. The program is designed to coordinate and provide services that will assist students so that they may reach their full potential.

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 tuition for graduate assistants who are employed at least one-fourth time in instruction, research or extension and are enrolled in at least six hours (three hours in the summer).

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 out-of-state 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:
   Sponsored Programs Information Network (SPIN), a data base that provides access to funding programs from all types of entities-federal, foundations, professional societies, etc.-and access to the current requests for proposals from those entities. The SPIN data base is located in 001 Life Science East and is available 8-12 and 1-5 Monday through Friday.
   Federal Information Exchange, Inc. (FEDIX), an on-line data base of government information for colleges, universities and other organizations. It serves to link higher education and the federal government to facilitate research, education and services. 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/nsf/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.
4. 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.
5. 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

1. Fulbright-Contact Office of International Programs, 307 Center for International Trade Development, 405-744-6535.
2. 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 Graduate College 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

University Center at Tulsa

Oklahoma State University offers graduate courses at the University Center at Tulsa (UCT). All courses offered by OSU faculty are considered resident credit for degrees granted by Oklahoma State University. Courses offered by the other universities participating in UCT can be applied to OSU degree requirements as transfer credit.

The graduate and certification programs approved by the Oklahoma State Regents for Higher Education for Oklahoma State University to offer through the University Center at Tulsa 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

College of Education
M.S. in Applied Behavioral Studies
Community Counseling
Emotionally Disturbed
Gifted and Talented
Learning Disabilities

Certification Program in School Psychology

M.S. in Curriculum and Instruction
Curriculum/Supervision
Elementary Education
Reading

Certification Program in Educational Administration

Certification Program for School Superintendent

M.S. in Higher Education

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 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

At present, OSU does not offer any doctoral programs at UCT. Courses offered by OSU at UCT may apply as residence credit to doctoral degree programs that are available in Stillwater. Prior to enrollment in UCT courses, students should secure approval from their advisers concerning the appropriateness of any courses relative to the degree objective. Students should also be aware that substantial portions of doctoral degree programs require attendance in courses and participation in departmental programs in Stillwater.

Graduate Centers

Students may take one-half of the requirements for the master's degree at a Graduate Center provided they comply with the following conditions:

1. Each student working for a degree must comply with requirements for admission given in the *Catalog.*
2. At least 22 semester credit hours must be completed after the degree plan has been approved by the student's advisory committee and the dean of the Graduate College, and filed in the Graduate College.
3. The thesis or report must be supervised and approved by resident members of the faculty teaching on the Stillwater campus.
4. Final examinations covering the entire graduate program are to be given by a committee selected by the major department and the dean of the Graduate College.
5. 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 some other place is approved by the head of the major department and the dean of the Graduate College.

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

Any student registering in a graduate course to be taken by extension must make application for admission to the Graduate College.

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

Environmental Science

Program Coordinator Gary K. Ostrander, 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, a doctoral seminar (three credit hours), 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 24 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 (http://seic.lse.okstate.edu/envsci).

Food Science

Animal Science
Professor and Head Donald G. Wagner, Ph.D.

Biochemistry and Molecular Biology
Professor and Head James **B.** Blair, Ph.D.

Microbiology and Molecular Genetics
Professor and Head Robert **V.** Miller, Ph.D.

Nutritional Sciences
Professor and Head **Barbara** Stoecker, Ph.D.

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.

Natural and Applied Sciences

Program Coordinator Wayne Powell, **Ph.D.**

The Master of Science degree in natural and applied *sciences is a* unique

program designed to address the needs of the student who desires a strong interdisciplinary perspective and who has personal and professional goals which may not be addressed in traditional departmental degree programs.

The natural and applied sciences program has four areas: natural sciences, aviation and space sciences, gerontology, and interdisciplinary sciences. A bulletin describing each and the corresponding curriculum is available from the Graduate College.

Application to the Program. A faculty advisory committee, in conjunction with the program coordinator, will evaluate applications for admission. A student seeking admission to the program must submit the following material to the program director:

1. An official Graduate College application for admission;
2. Official transcripts for all college-level courses;
3. A written statement of personal goals and professional objectives to be obtained from the program;
4. Three letters of recommendation describing abilities, interest and motivation of the applicant;
5. All international students must also submit:
   a. A TOEFL score of 550 or greater;
   b. A financial statement of available funds as currently required by OSU.

The student should indicate in the written statement the area in which he or she is interested. However, a formal declaration is not mandatory until the course plan of study is filed at a later date. Additional criteria may be required. Any request for exceptions to the stated criteria should be addressed to the program director.

Graduate Student Committee. Each area has an interdisciplinary faculty advisory committee whose members will assist the student in selecting courses for the plan of study and who will supervise the research component of the degree program. Faculty outside the advisory committee may be selected to assist the student with the research component.

Plan of Study. The minimum number of hours required to earn the master's degree in natural and applied sciences varies by the area selected and varies from 30 to 36 credit hours. The format for each is delineated below. At least 21 credit hours must be at the graduate level (courses numbered 5000 or above). Up to nine graduate credit hours can be transferred from a regionally-accredited graduate program with consent of the advisory committee.

Time Limit. Students are expected to complete the requirements for the degree within five years from first enrollment after admission to the master's degree program.

Research Component. For the thesis plan, the student must present a proposal to the advisory committee for approval prior to completing 22 hours in the program. The thesis should be investigative research. The written proposal should contain an introduction, literature review, and the methodology and research questions or hypotheses proposed to develop the thesis. A copy of the approved thesis proposal must be filed with the program director. A grade of "B" or better must be earned in thesis hours.

In the areas allowing a creative component, the topic must be approved by the advisory committee. Students must earn a grade of "B" or above in the course designated as the creative component.

In the areas allowing a report, students are expected to apply the theory and research methodology that they have acquired in the program to a topic approved by the advisory committee. In most cases, this topic will relate to the individual's professional interests. Students do not enroll in report hours until a topic is approved. A student must earn a grade of "B" or better for the report.

Programs of Study. *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.

Three degree plans are available in this program. The student must complete either a 30-credit-hour plan with a six-credit-hour research thesis, a 32-credit-hour plan with a two-credit-hour report, or a 36-credit-hour plan with a creative component.

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.

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.

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.

This program offers three choices in obtaining the master's degree: (1) a 30-credit-hour program, including six hours for a thesis; (2) a 32-credit-hour program including a creative component, which may be a special research report, an annotated bibliography, a project in research or design, or other creative activity; and (3) a 32-credit-hour program, including two credit hours for a report. The advisory committee must approve the plan under which the student will pursue the degree.

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.

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.

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 John L. Sherwood, 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 Pa**thology.** The multidisciplinary nature of this **program** allows students to experi**ence 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

Aaron C. Guenzi, Agronomy

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 Coordinator **Ramesh Sharda, 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 not only through traditional means to on-campus students but also via distance learning technologies to students at remote locations.

The telecommunications management program draws on the combined exper**tise of three** OSiJ 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 employable 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 I I 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.

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 tc **provide 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 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.

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.

Manufacturing Systems Engineering

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.

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. Succeeding 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 credentials become the property of the 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.* Should a student's composite score on the TELP indicate a need for further work in English, the student is required to enroll in a nongraduate-credit English course until the deficiency is removed. This enrollment is concurrent with courses enrolled in for the advanced degree.

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 demon-

strated 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 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 Vice President for Research and Dean of the Graduate College, 203 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 a 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 candidates cannot transfer more than nine hours from a non-doctoral degree-granting institution.

Departmental or Program Requirements

Departmental or program requirements are in addition to the general requirements. The decision is made within the department or major field regarding the substitution for OSU requirements of similar work taken at another institution.

A student who desires further information about departmental and admission and curricular requirements should write to the department in which he or she desires to major.

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 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.

Students who desire to enroll concurrently in another institution or by extension at OSU must secure approval in advance from the dean of the Graduate College. Forms are available in 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

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, (l.o.r. = letter of recommendation).

Major	Degree	GRE Gan Cub	GMAT	Miller Analogy (MAT)	Additional Requirements
AGRICULTURAL SCIENCES AND NATURAL RESOURCES					
Agricultural Economics	MS, PhD				No entrance exam.
Agricultural Education	MS, EdD				GRE or Miller.
Agriculture	MAg				See specific departmental section.
(Agricultural Economics, Agricultural Education, Agronomy, Animal Science, Entomology, Forest Resources, Horticulture & Landscape Architecture, & Plant Pathology)					
Agronomy	MS				No entrance exam.
Crop Science	PhD				No entrance exam; 3 l.o.r.; stmt of interest area.
Soil Science	PhD				No entrance exam.
Animal Science	MS				No entrance exam.
Animal Breeding	PhD				No entrance exam.
Animal Nutrition	PhD				No entrance exam.
Biochemistry and Molecular Biology	MS, PhD	1 2			
Entomology	MS, PhD	1 2			
Forest Resources	MS	2			
Horticulture	MS	1			3 l.o.r.; stmt of Interest area.
Plant Pathology	MS, PhD	1 2			No minimum score.
ARTS AND SCIENCES					
Botany	MS	1 2			3 l.o.r.; stmt of intent.
Chemistry	MS, PhD	2 2		2	Placement exams.
Computer Science	MS				
	PhD	1 1			PhD: 75 percentile quantitative section; 50 percentile advanced.
English	MA, PhD	1 1			MA: 3.00 GPA; BA in English or equivalent for TESL or Technical Writing; 2 l.o.r.; writing sample. PhD: 3.50 GPA; MA in English; 3 l.o.r.; writing sample.
Geography	MS	1			3.00 GPA; 3 l.o.r.
Geology	MS	2 2			
History	MA	1 1			3.00 GPA; 3l.o.r.
	PhD	1 1			3.50 GPA; 3 l.o.r.
Mass Communications	MS	1			3.00 GPA; 3 l.o.r.; stmt of goals & purpose.
Mathematics	MS, PhD	2			
Applied Mathematics	MS	2			
Microbiology, Cell and Molecular Biology	MS, PhD	1 2			3 l.o.r. & stmt of intent.
Philosophy	MA	2			
Physics	MS, PhD	2 2			
Political Science	MA	1			See department admission requirements.
Psychology	PhD	1 1			Dept. application; 3 l.o.r.
Sociology	MS, PhD	1 2			See departmental admission requirements.
Speech	MA				
(Speech Communication)		2			3.00 GPA minimum & 3 l.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; 3l.o.r.; interview.
(Theater)					No entrance exam.
Statistics	MS, PhD				No entrance exam.
Wildlife and Fisheries Ecology	MS, PhD	1			Aptitude: MS-1000, PhD-1150. Advanced: MS-600, PhD-650.
Zoology	MS, PhD	1 1			Same as Wildlife and Fisheries Ecology.

Major	Degree	GRE Gen	GRE Sub	GMAT	Miller Analogy (MAT)	Additional Requirements
BUSINESS ADMINISTRATION						
Accounting	**MS**					**3.25** GPA; GMAT 500.
Business Administration	MBA					3 Los. & an **essay.**
Business Administration	PhD					
emphasis in:						
(Accounting)						GMAT **required,** high GPA, & 3 Los.
(Finance)						31.o.r.
(Management)						3 Los.
(Marketing)						**3** Los.
Economics	MS, PhD					**3 l.o.r..**
EDUCATION						
Applied Behavioral Studies	MS	3			3	**3 l.o.r.; career aspirations** & goals stmt.
	PhD	1				**4 l.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 l.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 l.o.r. EdD: MAT or GRE, **complete folder** of info.
Technical **Education**	MS					No **entrance** exam; no Los.
Trade & Industrial Education	MS					No entrance exam; no l.o.r.
ENGINEERING, ARCHITECTURE AND TECHNOLOGY						
Architectural Engineering	MArchE					
Architecture	MArch					**See** specific school admission **requirements.**
Biosystems Engineering	**MBioE,** MS, PhD	2				
Chemical Engineering	MChemE, MS, PhD	1				3 Los.
Civil Engineering	MCivilE, MS, PhD	2				**3** Los.
Environmental Engineering	MEnvirE, MS	2				**3** l.o.r.
Electrical Engineering	MElecE, MS, PhD					No entrance exam.
General Engineering	MGenE, MS, PhD	2				
Industrial Engineering **and Management**	MIE&Mgmt, MS, PhD	2				
Mechanical Engineering	MMechE, MS, PhD	2	2			Class rank **required.**
HUMAN ENVIRONMENTAL SCIENCES						
Design, Housing **and Merchandising**	MS	1				3.00 GPA; **3 l.o.r.; goal** stmt; writing **competency** assessment first semester.
Family Relations and Child **Development**	**MS**					3.00 GPA, 31.o.r., 2 pp goals stmt, TOEFL 575.
Hospitality Administration	MS	**4**	4			3.00 GPA; **GRE 525** or GMAT 900; **2 years relevant experience.**
Human Environmental Sciences (Design, Housing **and** Merchandising; Family **Relations and** Child **Development, Nutritional Sciences)**	PhD	1			3	
Nutritional Sciences	MS					
INTERDISCIPLINARY						
Environmental Science	MS, PhD	1				No entrance exam; 3.00 GPA; 3 i.o.r.; TOEFL 575.
Food Science	MS, PhD					No entrance exam.
Manufacturing Systems Engineering	MMSE	2				TOEFL 600; technical undergraduate degree.
Natural and Applied Sciences	**MS**	**3**				**Gerontology only** GRE 900; MAT **35.**
Plant **Science**	PhD		**2**			3 I.o.r.; resume; stmt of interests.
Telec)onanunicationsManagement	**MS**	**4**	**4**			3 l.o.r.; 1 **page** essay.
VETERINARYMEDICINE						
Physiological Science	MS, PhD		1			GPA last 60 hrs. B.S. X GRE must **equal** 3000 or **above** for MS or 3150 **or above** for PhD.
Veterinary Parasitology	MS, PhD	1	1			GPA last 60 hrs. x **General** score on **GRE** must **equal** 3000 or **above** for **unqual'fied** admission.
Veterinary Pathology	MS, PhD	1				

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.

Phone-in Enrollment

Individuals residing outside Stillwater may use the phone-in enrollment procedure. Graduate students may enroll by phone if they have been accepted into the Graduate College, are continuing students, or have taken courses at OSU. 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 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 the academic year (fall, spring and summer) until the degree is awarded. Students may satisfy this requirement by enrolling for the required hours during any one term or by continuous enrollment during the three terms.

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. Students in the Graduate College who are not taking any courses for graduate credit may register for the number of credit hours recommended by their advisers and approved by the dean of the Graduate College.

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 4 hours	more than 2 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, and 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. A student must have a "B" grade average in all courses on the plan of study, and also, a "B" grade average in thesis, report, and courses designated as the creative component. After a student has completed a course, it cannot be dropped from the plan because of a low grade, unless the change in the plan of study is first approved in writing by the student's adviser, and then by 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) ahd 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" and

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 Provost and Vice-President for Academic Affairs 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 degrees 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)

Agronomy, MS

Animal Science, MS

Applied Behavioral Studies, MS

Applied Mathematics, 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

Counseling and Student Personnel, MS

Curriculum and Instruction, MS

Design, Housing and Merchandising, MS

Economics, MS

Educational Administration, MS

Electrical Engineering, MElecE, 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

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

Philosophy, MA

Physics, MS

Physiological Science, MS

Plant Pathology, 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 Parasitology, MS
Veterinary Pathology, 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
MCivilE	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
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 which is explicitly identified on the plan of study. For example, the creative element may be a special report, an annotated bibliography, a project in research or design, or other creative activity.

The number of credits specified for each plan are minimums set by the Graduate College. Departmental requirements may exceed these.

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 8, 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 *Graduate College Style Manual* 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 three 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.
12. Pay binding fee in the Office of the Bursar and return form to the Graduate College.		Form to be obtained from the Graduate College after the thesis has been formally accepted by that office.
13. Arrange for cap, gown and hood at Student Union Bookstore and attend Commencement.		

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 in residence if they follow Plan I , or 23 semester credit hours if they follow Plan I I or III.

Nine semester credit hours of the 30 or 32 required for the degree may be completed: (1) by residence courses taken at an accredited college or university, (2) by extension or in-service courses from Oklahoma State University or from another accredited institution, or (3) by a combination of these methods. Students may petition the dean for exceptions and deviations. Courses taken in Stillwater through the OSU extension program are not considered as residence credit.

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 filed in 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 file three copies in the Graduate College. All copies must be signed by the adviser and by two other members of the graduate faculty in the major department, and approved by the dean of 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 used to obtain one master's degree cannot be counted toward 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 purchase a copy of the *Graduate College Style Manual,* published by and available *from* the Graduate College. 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").

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 examining 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.

Thesis. The student *must* submit *to the* Graduate College three 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 one copy is 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 Style Manual.* The final copy *of the* report, *must* be submitted to the Graduate College rto 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, 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.

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.

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 per year or two credit hours in each of the fall, spring and summer semesters.

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 Architecture, 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
Animal Breeding and Reproduction
Animal Nutrition
Applied Behavioral Studies
Biochemistry and Molecular Biology
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
Physiological Science
Plant Pathology
Plant Science
i **llology**
Sociology
Soil Science
Statistics
Veterinary Parasitology
Veterinary Pathology
Wildlife and Fisheries Ecology
Zoology

The Doctor of Philosophy degree is granted in recognition of high achievement 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.

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 appointed 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 final examination.

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, file three copies in 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 pre-enrollment date during the second full semester of enrollment (beyond the master's degree).

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 final examination, and (5) comply with other requirements of the major department.

Residence Requirements. A minimum of 30 semester credit hours must be taken in residence 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 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 required that will contribute to the needs of the individual program.

Qualifying Examination. The qualifying examination is comprehensive, covering

Summary of Procedure for Doctoral Degree

Dean-Dean of Graduate College; DH-Department Head; TA-Temporary Adviser; Comm-Committee; Ch-Chair of Committee

	Procedure	Innate through Approved by	Time
1.	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 three approved copies 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 Gradiate 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 format must follow the *Graduate College Style Manual* 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 three 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.		

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 Style Manual,* available from the Graduate College. 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 ORB) 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 IRS, 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 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 reexamination decision will be made by the examining 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.

Three 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 one copy is 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.

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 per year or two credit hours in each of the fall, spring and summer semesters.

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.)

Agricultural Education

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.

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 department 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. 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, and have four copies approved and signed by the advisory committee. 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. 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 pre-enrollment date during the second full semester of enrollment (beyond the master's degree).

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.

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 final examination, and (5) comply with other requirements of the major field or department.

Residence Requirements. A minimum of 30 semester credit hours must be taken in residence 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.

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 per year or two credit hours in each of the fall, spring and summer semesters.

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 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.

Programs leading to the Specialist in Education degree are offered at present only with the Teacher Education Group.

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 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 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.

Plan of Study. As soon as practicable after the appointment of the committee, the student will arrange with the chairperson 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. It will be filed, in triplicate, in 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.

Credit-hour Requirements. A minimum of two academic years of full-time graduate study, or equivalent (a minimum of 60 semester credit hours beyond the baccalaureate degree), is 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 in residence study 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.

Qualifying Examination. A qualifying examination is required of all candidates for the Specialist in Education degree. Conditions governing it are similar to those required for candidates for the Ed.D. (see "Doctor of Education" section).

Other Regulations. Other requirements for the Specialist in Education degree are similar to those for the Ed.D. (see "Doctor of Education section").

Time Limit. The time limits applicable to candidates for the Specialist in Education degree are the same as those which apply to the Ed.D. candidate.

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

BRUCE J. ACKERSON, B.S. (Univ. of Nebraska), M.S. (Univ. of Colorado), Ph.D. (ibid); *Regents Professor of Physics;* 1991, 1977.

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.

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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 orB orC 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, orC 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
ABSED	Applied Behavioral Studies in Education
ACCTG	Accounting
AEROS	Aerospace Studies
AG	Agriculture
AGCOM	Agricultural Communications
AGEC	Agricultural Economics
AGED	Agricultural Education
AGRON	Agronomy
ANSI	Animal Science
ANTH	Anthropology
ARCH	Architecture
ART	Art
ASTRO	Astronomy
AVSED	Aviation and Space Education
BCOMM	Business Communications
BIOCH	Biochemistry
BIOEN	Biosystems Engineering
BIOL	Biological Science
BOT	Botany
BUHON	Business Honors
BUSAD	Business Administration
BUSED	Business Education
BUSL	Business Law
BUSPR	Business Professions
CDIS	Communication Sciences and Disorders
CHEM	Chemistry
CHENG	Chemical Engineering
CIED	Curriculum and Instruction Education
CIVEN	Civil Engineering
CLMOL	Cell and Molecular Biology
COMSC	Computer Science
CONST	Construction Management Technology
DHM	Design, Housing and Merchandising
EAHED	Educational Administration and Higher Education
ECEN	Electrical and Computer Engineering
ECON	Economics
ECT	Electronics and Computer Technology
EDUC	Education
ENGL	English
ENGR	Engineering
ENGSC	Engineering Science
ENTO	Entomology
ENVIR	Environmental Science
FIN	Finance
FIRET	Fire Protection and Safety Technology
ELL	Foreign Languages and Literatures
FOR	Forestry
FRCD	Family Relations and Child Development
FR OH	French
GENAD	General Administration
Cilif4E	Genetics
GENEN	General Engineering
GENT	General Technology
GEOG	Geography
GEOL	Geology
GRAD	Graduate
GREEK	Greek
GRMN	German
HES	Human Environmental Sciences
HIST	History
HLTH	Health
HONOR	Honors
HORT	Horticulture
HPEL	Health, Physical Education and Leisure
HRAD	Hotel and Restaurant Administration
INDEN	Industrial Engineering and Management
JAPAN	Japanese
JB	Journalism and Broadcasting
LA	Landscape Architecture
LATIN	Latin
LEIS	Leisure
LIBSC	Library Science
MAE	Mechanical and Aerospace Engineering
MATH	Mathematics
MBA	Master of Business Administration
MC	Mass Communications
MECAG	Mechanized Agriculture
MECDT	Mechanical Design Technology
MFGT	Manufacturing Technology
MGMT	Management
MICRO	Microbiology
MILSC	Military Science
MKTG	Marketing
MPT	Mechanical Power Technology
MSIS	Management Science and Information Systems
MTCL	Medical Technology
MUSIC	Music
NATSC	Natural Science
NSCI	Nutritional Sciences
OAED	Occupational and Adult Education
PE	Physical Education
PET	Petroleum Technology
PHILO	Philosophy
PHSI	Physiological Sciences
PHYSC	Physics
PLP	Plant Pathology
POLSC	Political Science
PSYCH	Psychology
REL	Religious Studies
RUSS	Russian
SOC	Sociology
SPAN	Spanish
SPCH	Speech
STAT	Statistics
TCOM	Telecommunications Management
TE	Technology Education
TECED	Technical Education
TH	Theater
TIED	Technical and Industrial Education
UNIV	University
VMED	Veterinary Medicine
VMS	Veterinary Medicine and Surgery
VPARA	Veterinary Parasitology, Microbiology and Public Health
VPATH	Veterinary Pathology
ZOOL	Zoology

Accounting (ACCTG)

2103
Principles of Accounting. Prerequisite: 24 semester credit hours, including ENGL 1113 and MATH 1513 or equivalent. Financial accounting covering the accounting process and principles of accrual accounting.

2203
Principles of 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.

3103
Survey of Accounting Principles. Elementary financial and cost accounting with special emphasis on statement interpretation and industrial problems. No credit for students with credit in 2103 or 2203.

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.

4713*
International Accounting. Prerequisite: senior level standing. Present-day multinational accounting problems, including world-wide differences in financial reporting, efforts at harmonizing these differences, and planning and control in multinational enterprises.

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*
Seminar in Oil and Gas Accounting. Financial accounting and reporting rules and practices in the petroleum industry.

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.

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.

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.

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 theeretical literature and research methodology in accounting.

Aerospace Studies-Air Force (AEROS)

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.

410$
(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 off icership.

4203
(S)National Security Forces in Contemporary American Society II. Lab 1. Strategy and man**agement** 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 (AGCOM)

3103
Communications and Public Issues in Agriculture and the Environmental Sciences. Lab 2. Prerequisite: junior standing in the College of Agricultural Sciences and Natural Resources or consent of the instructor. Understanding and application of communications principles and theories relevant to the science of agriculture and natural resources. Practice in the preparation of communications for a variety of media to address public issues. Development of communications strategies designed to reach diverse audiences in achieving public accountability and reducing adversarial and crisis communications.

4453
Communications in Agriculture. Lab 2. Funda**mentals** of newswriting and other communication methods; the role of the news media in agriculture and related fields. Same course as JB 4453.

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: 2103 and 3303. 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*
(S)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. The philosophical bases for research methods used in agricultural economics. Alternative research methods compared. Alternative approaches to planning, managing and performing research.

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.

5313*
Food Distribution Systems. Analysis of market structure; operational and pricing efficiency; organizational and operational decision making in food distribution firms.

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 followed by applications of nonlinear programming. Nonparametric production functions, neutral networks, and discrete stochastic programming. Required use of the 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. Prerequisite: 5213 and MATH 3013. General presentation of large sample theory followed by applications to general linear models, general nonlinear models, simultaneous equation models, time series models, and probability models.

6300*
Agricultural Marketing Seminar. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Current developments in theory, techniques far 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)

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.

3510
Laboratory and Clinical Experiences In Agricultural Education. 1-2 credits, maximum 2. Planned experiences in agricultural education career areas to acquaint students with the diversity of responsibilities and audiences served. Course planning to satisfy requirements for admission to teacher education and student teaching and to develop technical competence.

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.

4300
Agricultural Education Internship. 3-10 credits, maximum 10. Prerequisites: professional course sequence and consent of adviser/internship coordinator. Supervised full-time internships in approved county extension offices, businesses or governmental agencies, or students preparing for agricultural education. Not intended for teacher certification. Maximum credit requires a 12-week internship in addition to a report.

4713
(1)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, max. 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.

5300*
Extension Teaching Methods. 1-3 credits, maximum 6. Teaching methods applicable to extension work, their interrelationships and relative effectiveness. Result demonstration, method demonstration, meetings, tours, field days and exhibits.

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*
Guidance and Leadership Development of Agricultural Youth. Providing for guidance of youth into farming and agricultural occupations. Sponsoring and advising youth groups; developing leadership through the local FFA chapter, 4-H Club and other youth organizations and groups.

5820*
History, Functions and Objectives of the Extension Service. 1-3 credits, maximum 6. History, legal status, objectives, educational philosophy, aims and objectives and functional responsibilities.

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.

5862*
Curriculum Design and Methodology for Alternative Approaches in Agriculture. The methodology, development and utilization of curriculum for instructional programs focusing upon alternatives in agriculture and agricultural enterprises. Resources and components of curriculum for teaching about new and emerging occupations and careers in agriculture.

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.

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.

6220*
Assessment and Evaluation of Educational Programs in Agriculture. 1-3 credits, maximum 6. Application of the accountability concept to educational programs. Instructional, extension and other educational programs are assessed and the systems approach used to revise current programs and re-direct effort.

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)Agroecosystems: A Basis for Life. A study of natural plant and animal processes, for the non-agriculture major. Issues such as factory farming, animal welfare, forest clear cutting, water quality and global warming, as the basis for applying the understanding of the principles.

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.

4010
Honors Seminar. 1-6 credits, maximum 6. Role of agriculture in society and adjustments to change in the economy.

Agronomy (AGRON)

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
Agronomic Orientation. Prerequisite: sophomore standing in agronomy. Development and improvement of written and oral communicative skills; orientation to agronomic research and extension activities; academic requirements and procedures. Graded on pass-fail basis.

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.

3111
Weed Control Laboratory. Lab 2. Prerequisite: 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.

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.

3554*
(N)Plant Genetics. Lab 2. Prerequisites: 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.

3893*
(N) Soil Chemistry. Prerequisite: 2124. Soil chemical properties and processes that affect plant nutrition, nutrient cycling, and fate of environmental pollutants. Soil chemistry of agronomic and environmental topics that affect water quality and sustainable agriculture. Soil acidity, pesticide residues, irrigation water quality, and heavy metal bioavailability in soils treated with waste materials.

3913*
(N)Principles of Range Management. Prerequisites: 1213 or BIOL 1304, and AGRON 2124. Characteristics of rangelands; range regions of the U.S.; range plant response to the environment; the range ecosystem; ecological basis of range management; manipulating range vegetation; grazing management; managing rangelands for wildlife and other values. Two Saturday field trips required.

4080
Agronomy 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.

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.

4234*
Soil Fertility and 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.

4353*
Plant Breeding. Prerequisites: **3554** or equivalent. Basic principles dealing with the improvement of plants through application of genetic principles.

4363*
Environmental Soil Science. Prerequisite: 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. 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 crop and soil science including range and turf, plant breeding and genetics, crop management and physiology, weed control, 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 Range Soils. Prerequisites: 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 range soil systems.

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.

4683*
(N)Physical Properties of Soils. Prerequisites; 2124 and PHYSC 1114. Soil physical properties and processes, and their influence on plant growth.

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.

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.

4934*
Range Ecology. Prerequisite: 3914. Ecological principles pertaining to rangelands with emphasis on soil, plant and animal relationships. Characteristics of major range ecosystems and range plants.

4954*
Range Vegetation Management. Lab 3. Prerequisites: 3914, AG 2112. Methods of managing rangeland vegetation for optimum sustained production. Integrated application of grazing management, prescribed burning, herbicides, and mechanical, treatments. Field trips and reports in laboratory.

4961
Range Techniques. Lab 3. 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
Range and Ranch Planning. Lab 4. Prerequisite: **4954,** ANSI 3612. Inventory of ranch resources, survey and evaluation of ranch practices, and economic analysis. Development of a comprehensive ranch management plan. Managing range 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 in agronomy. 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 in agronomy.

5110*
Problems in Agronomy. 1-4 credits, maximum 6. Prerequisite: consent of instructor. Supervised study of special problems and topics in crop and soil science not covered in other graduate courses in agronomy.

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.

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. 1-6 credits, maximum 8 (not to exceed 4 credit hours of either crops or soils). Prerequisite: consent of a faculty member who will supervise the research.

5293*
Plant Response to Water Stress. Prerequisites: BIOCH **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.

5353*
Advanced Soil Genesis and Classification. Lab 2. Prerequisite: 3433. Processes and factors of soil formation. Comparison of world soil morphology and classification systems.

5403*
Physiological Action of Herbicides and Plant Growth Regulators. Prerequisite: BOT 3463. The mode of action, breakdown and movement of herbicides and plant growth regulators in plants and soils.

5414*
Plant Breeding Theory, Methods and Strategies. Prerequisite: 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; BIOCH 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.

5583*
Soil Physics. Prerequisites: MATH 2265 or 2365, PHYSC 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, M, UV-VIS, XRF), chromatographic (GC, GC-MS, HPLC, IC), and potentiometric methods. Laboratory component hands-on experience of chemical methods.

5760*
Special Topics in Range Science. 2-4 credits, maximum 4. Prerequisite: consent of instructor. Selected topics in range research methods, range ecophysiology, grazing management, and range analysis.

5813*
Soil-Plant Relationships. Prerequisite: 4234 or equivalent. Essential nutrient reactions in soil theories, concepts, and approximations used to describe the relationship between soil nutrient supply and plant responses that minimize the potential for groundwater pollution.

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.

5954*
Rance Vegetation Management. Lab 3. Prerequisites: 3914, AG 2112. Methods of improving or maintaining range condition and production. Grazing management; chemical, mechanical and burning treatments; and physical developments. Field trips and reports in laboratory. No credit for students with credit in 4954.

5973*
Range and Ranch Planning. Lab 4. Prerequisites: 4954, ANSI 3612. Detailed analysis of case studies of range 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.

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. 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 in Agronomy. 1-6 credits, maximum 12. Prerequisite: M.S. degree. Supervised study of advanced topics in areas of agronomic interest. A reading and conference course designed to acquaint the advanced student with fields not covered in other courses in agronomy.

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.

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.

3002
Dairy Production. Lab 2. Prerequisites: 1124 and 2123. Basic requisites of nutrition as related to composition of milk produced: requirements of replacement animals; herd health problems peculiar to stresses of production; milking management and mammary health; and dairy breed programs related to herd management.

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
(N) Food Chemistry. Lab 2. Prerequisites: 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.

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*
Range and Pasture Utilization. Lab 2. Prerequisite: AGRON 3213 or 3913. Integration of livestock production with range 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.

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: ZOOL 3204. 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
Range and Ranch Planning. Lab 4. Prerequisites: 3612 and AGRON 4954. Inventory of ranch resources, survey and evaluation of ranch practices, and economic analysis. Development of a comprehensive ranch management plan. Managing range 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. Prerequisites: 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 PHSI 5113.

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 ZOOL 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 Animal Nutrition. Lab 2. Prerequisite: 3653. Physiological aspects of digestion and absorption; nutrient content of livestock feeds and methods of analysis; methods of determining nutrient value of feeds, nutritional energetics; nutrient requirements of different animals; and the application of current concepts in nutrition to formulation of rations and feeding program.

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.

5762*
Carbohydrate and Lipid Nutrition. Prerequisite: BIOCH 5753. An in-depth study of the digestion, absorption and metabolism of carbohydrates and lipids as related to energy requirements, productive function, health and disease.

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.

5923*
Livestock Systems. Lab 2. Prerequisites: AG 2112 or consent of instructor. Application of computer, linear programming and simulation techniques in animal research and livestock production.

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. Precontact 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.

4643*
Women: A Cross-cultural Perspective. Compares the roles of women in different types of societies (hunting and gathering, horticultural, peasant and agricultural). Social, familial, economic and legal status of women in American society. Same course as SOC 4643.

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.

4953*
Anthropological Theory. Significant theoretical formulations in cultural anthropology. Relationship between theoretical developments and research emphasis.

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 (ABSED)

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.

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.

3113
Psychological Foundations of Childhood. Prerequisite: PSYCH 1113. The child from conception to puberty with focus on educational implications of development in cognitive, affective and psychomotor domains.

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.

3213
Psychology of Adolescence. Prerequisite: PSYCH 1113. The adolescent from pubescence to adulthood with focus on educational implications of development in cognitive, affective and psychomotor domain.

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.

3413
Child and Adolescent Development. Prerequisite: PSYCH 1113. The person from conception through adolescence with focus on education implications of development in cognitive, affective, social, and physical domains.

3633
Assessment and Intervention for Exceptional Infants and Children-Birth to Age 6. Prerequisite: 3202. 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.

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.

4063*
Exploration of the Creative Experience. Prerequisite: senior standing. 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. Prerequisites: 3113, 3213 or **3413;** an approved observation or field experience course, and for students pursuing teacher certification, full admission to Teacher Education required. 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.

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. Prerequisite: 3202 or 5633. 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. Prerequisite: 3633. Nature, causes, and social consequences of mental retardation and physical handicaps.

4640
Student Teaching in Special Education. 1-12 credits, maximum 12. Prerequisites: 3202 and full admission to Teacher Education. 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. Prerequisites: 3202, 3633, 4653. 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. Prerequisites: 3202 and PSYCH 4613. Education program needs and social-cultural environment of mentally retarded children, adolescents and adults.

4713*
Individualizing Education Programs for Exceptional Individuals. Prerequisite: 3202. Techniques for teaching individuals with handicapping conditions.

4723*
Curriculum and Methods for Teaching Mentally Retarded Adolescents and Adults. Prerequisite: 3202. Techniques for teaching the mentally retarded individual from adolescence through adulthood.

4743*
Student Evaluation and Guidance Services. For secondary school majors with emphasis on test design, use and grading practices and on the teacher role in testing, evaluation and guidance services.

4753*
Techniques of Behavior Management and Counseling with Exceptional Individuals. Prerequisite: 3202. 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. Prerequisite: consent of instructor.

5013*
Research Design and Methodology. Prerequisite: admission to a graduate program in education or consent of instructor. 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.

5015*
Foundations of Educational Research. Introductory concepts in methodology, statistics and measurement necessary to research in education. Calculation and interpretation of descriptive statistics, introduction to inferential statistics, rudiments of educational research design and appropriate uses and characteristics of tests and measurements. Emphasis on the scientific method in educational problem solving. No credit for students with credit in 5013 and 5953.

5023*
Introduction to School Psychological Service. Prerequisite: admission to school psychometry or school psychology program. History, role and function, and issues and problems of the school psychological service worker.

5042*
Interviewing Techniques. Prerequisite: graduate standing or consent of instructor. 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.

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. Prerequisite: three hours in developmental psychology or consent of instructor. Introduction to basic research and theories of cognitive, emotional and social development. Applications to educational and family settings.

5123*
Medical Information in Counseling. Prerequisite: graduate standing or consent of instructor. 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.

5163*
Counseling Techniques for Teachers of Gifted and Talented Students. Prerequisites: **5063** and admission to the graduate program in applied behavioral studies. 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.

5173*
Gerontological Counseling. Prerequisites: graduate standing or consent of instructor. 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.

5213*
Advanced Educational Psychology. Prerequisite: three hours of educational psychology or consent of instructor. Learning and its effect upon coping and adjustment. How learning, environmental and personality factors interact to change human behavior.

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 Applied Behavioral Studies. 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.

5363*
Differentiated Curr**iculum Techniques and Materials for Gifted and Talented.** Prerequisite: **5063.** 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.

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.

5382*
Family-School Involvement Processes. For teachers, administrators, counselors, school psychologists and other school personnel concerned with improving communication between the home and school in an attempt to better meet the needs of children and youth.

5453*
Vocational and Career Information. Prerequisites: **5553** or 5572. Local, state and national sources of occupational information about jobs and sociological factors related to career planning and worker effectiveness.

5483*
Psychology of Learning. Application to education of the principles and theories of the psychology of learning.

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. Prerequisite: **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.

5510*
Practicum in School Psychology. 2-6 credits, maximum 6. Prerequisite: admission to school psychometry or school psychology program. Supervised application of the principles and procedures of school psychology in institutional settings appropriate for the preparation of students in the areas of their specializations.

5512*
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.

5520*
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. Provides a comprehensive foundation for counseling practice and emphasizes the application of contemporary theories to further knowledge of counseling as a communication process.

5572*
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.

5590*
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.

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.

5623*
Introduction to Learning Disabilities. Prerequisite: survey course in special education. Problems that students experience during their preschool, school and adult years; historical and contemporary perspectives; the cultural, environmental and psychophysiological contributions to earning style differences; and issues related to individualized educational planning and instruction. Practical experience with individuals having earning problems.

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.

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.

5670*
Rehabilitation Counseling Practicum. 1-12 credits, maximum 12. Prerequisites: graduate standing and consent of instructor. Applied experience for graduate students in counseling.

5673*
Developmental Language for the Exceptional Individual. Prerequisites: 3202 or 5633; and SPATH 3213. Normal language development and variations from norms demonstrated by handicapped learners. Theoretical approaches to language training, formal and informal assessment techniques, and instructional methods.

5680*
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.

5683*
Methods of Teaching Students with Learning Disabilities. Prerequisites: 3202 or equivalent, 5623. Current techniques and approaches used to teach students with learning disabilities and the theoretical bases for these techniques and approaches. Adapting curriculum for use with learning disabled students. Professional roles of the teacher of learning disabled students including communications with other teachers.

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*
Workshop. 1-8 credits, maximum 15. Professional workshops of various topics and lengths. Each workshop designed to meet unique or special needs of individuals concerned with education, helping professions, and behavioral studies.

5732*
Seminar in Education. Prerequisite: consent of instructor. Preparation of seminar study.

5733*
Teaching Strategies for the Physically Handicapped. Prerequisite: 4613. 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.

5753*
Psychoeducational Assessment of Preschoolers. Prerequisite: graduate standing. 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. Prerequisite: 5363. Subject and skill-related learning facilitation that is process-oriented and doing-centered. The role of the teacher as facilitator, counselor and nondirective change agent. Individualized educational plans, involving independent study, tutoring, correspondence, clustering, mentors, learning centers, resource centers.

5783*
Psycho-educational Testing of Exceptional Individuals. Prerequisite: consent of instructor. Intensive practice in the selection, administration and interpretation of individual tests, appropriate for exceptional individuals.

5823*
Characteristics and Identification of the Emotionally Disturbed Learner. Prerequisites: 4513 and PSYCH 3443. 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. Prerequisite: 4653. A review of research and methodological developments related to the instruction of mentally retarded children, adolescents and adults.

5863*
Developing Programs for the Gifted and Talented. Prerequisites: 5063 and 5363. 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.

5873*
Instructional Strategies and Resources for the Emotionally Disturbed Learner. Prerequisite: 5823. 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. Prerequisite: 4753. The utilization of various approaches to the management of individual and group behavior; affective education in a wide range of instructional settings.

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.

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.

5962*
Developing Support Resources for Gifted and Talented Programs. Prerequisite: 5863. 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. Prerequisites: 5373 and 5863. 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 Thesis. 1-25 credits, maximum 25. Prerequisite: permission of advisory committee chairperson. Required of all candidates for doctorate in applied behavioral studies. Credit given upon completion and acceptance of thesis.

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.

6030*
Doctoral Seminar in School Psychology. 3-6 credits, maximum 6. Prerequisites: 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.

6053*
Professionalism and Ethics In Counseling Psychology. Principles and issues of professionalism and ethics. Legal and ethical implications derived from statutes and case law for the practice of counseling psychology in case studies.

6063*
Research Topics in Special Education. Prerequisites: 6003 and 6013, admission to doctoral program or consent of instructor. Classic and current significant research topics; review and reinforcement of professional inquiry skills in reading, utilizing, planning, conducting and reporting research in special education.

6083*
Principles of Counseling Psychology. Prerequisite: admission to the doctoral program in couseling psychology. Development, theoretical foundations and applications of therapeutic models of counseling and psychology.

6110*
Seminar in School Psychology. 1-3 credits, maximum 6. Prerequisite: concurrent enrollment in 6210. 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.

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.

6163*
Emotion and Cognition. Prerequisite: consent of instructor. 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.

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.

6183*
Legal Aspects in Special Education. Prerequisite: admission to doctoral program or consent of instructor. 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.

6210*
Internship In School Psychology. 3-6 credits, maximum 12. Prerequisite: 5510 or equivalent and admission to the school psychology program. Supervised field experience in the duties of a school psychologist consisting of one semester participation under the direction of a certified school psychologist or other qualified field personnel approved by the supervising faculty member.

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.

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.

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.

6373*
Program Evaluation. Prerequisite: admission to a doctoral level program or consent of instructor. 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.

6443*
Theories and Problems in Educational Psychology. Prerequisite: admission to doctoral program in educational, school psychology or consent of instructor. Theoretical foundations and nature of the problems studied in educational psychology; current issues and historical overview.

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.

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 PSYCH **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.

6563*
Program Development in Special Education. Prerequisite: 6373 and admission to doctoral program or consent of instructor. Physical, social and psychological factors in communities such as power structure, economics, prejudice, religion, as well as national activities that are influential in establishing programs for the exceptional.

6603*
Current Trends and Issues in Special Education. Current research and literature regarding the education of exceptional children.

6613*
Instructional Systems Design. Prerequisites: 5213 and consent of instructor. 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.

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.

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.

Architecture (ARCH)

1111
Introduction to Architecture. 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. Lab 2. Prerequisite: grade of "C' or better in 2024. Structural theory for applications in architecture.

3323
Structures: Steel I. Lab 2. Prerequisite: grade of 'C" or better in 2024. 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.

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: grade of "C" or better in 3323. 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: grade of 'C' or better in 3243. 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.

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. Prerequisite: grade of 'C" or better in 3246 and 4123. 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: grade of "C" or better in 4123. 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: graduate standing or consent of instructor. Data gathering, analysis and program formulation related to creative component.

6117*
Architectural Design Studio VIII. Lab 20. Prerequisite: 5217. Problems in architectural design.

6183*
Architecture Seminar I. Seminar for graduate students only. Must be taken concurrently with 6117.

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 supporting 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
Design I. Lab 6. An introduction to visual problem solving. Organization of the two-dimensional plane using the elements and principles of design: line, shape, value, texture and color. Use of black and white and color media.

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. Prerequisite: 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
Design 11. Lab 6. Prerequisites: 1103, 1203. Color theories and their application to visual problem solving, distinctions between pigment and light and between additive and subtractive color mixing. The nature and properties of color, its expressive qualities, symbolic potential, and psychological impact.

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: 1103, 1113, 1203, 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: 2413. 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.

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.

3330
Sculpture. 3 credits, maximum 9. Lab 6. Prerequisites: 1333 and 3303. Sculpture in any material.

3333
Sculpture II. Lab 6. Prerequisite: 3323. Nonferrous 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, 3123 or 3133. 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. Prerequisite: 2423, 3643. 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. A survey of European art and architecture from the fall of Rome to the end of the Gothic period, approximately 400-1400. Includes a study of the late Middle Ages as emerging from the blending of earlier traditions: classic, Byzantine, barbaric, Christian, and Moslem.

3623
(H) History of Renaissance Art. A survey of Italian painting, sculpture and architecture from the thirteenth through the sixteenth century. Includes painting in northern Renaissance Europe, Jan van Eyck to Pieter Brugel.

3633
(H) History of Baroque Art. Painting, sculpture, and architecture in Counter-Reformation Italy, Spain, and Flanders. The second half of the course focuses on seventeenth-century Protestant Holland, analyzing the popularization of non-religious themes in painting including portraits, landscape, still life, and genre.

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.

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.

3710
Printmaking: Screenprinting. 3 credits, maximum 9. Lab 6. Prerequisites: 1103, 1113, 1203, 1803, 2203, 2213 or consent of instructor. Understanding and control *of* stencil-making techniques and the printing of editions. Development of concepts and images through the medium of screenprinting.

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: 2113. 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, 3423. 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, 4113. 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. Prerequisite: 4413. 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. 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.

4633
(H,I)Survey of African Art. Art products of traditional sub-Saharan African societies as they have evolved in relation to human needs, religion, philosophy, history, geography and anthropology. The contribution of African art to world art and approaches toward esthetic evaluation.

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 standingg 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.

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. 1-6 credits, maximum 6. Prerequisite: junior standing. For students in the College of Arts and Sciences. Cooperative education experiences not included in departmental offerings. Before enrolling, students must have an individual contract approved by the sponsoring professor and the dean of Arts and Sciences (or administrative officer).

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 (ASTRO)

1104
(N)Elementary Astronomy. Methods of observation and analysis. Current interpretations of observational data in regard to the solar systems, Milky Way galaxy and the universe.

2023
General Astronomy. Prerequisite: PHYSC 1214 or equivalent. More rigorous treatment of material in 1104 for majors in physical sciences and other areas.

2153
Advanced Astronomy. Prerequisite: 1104 or 2023. Topics such as pulsars, quasars, neutron stars, black holes and interplanetary space probes.

3023
Astrophysics. Prerequisite: PHYSC 2114 or consent of instructor; ASTRO 1104 recommended. Analysis and interpretation of astronomical phenomena in terms of the laws of physics; e.g. stellar structure, the interstellar medium, galaxies and cosmology.

3053*
Celestial Mechanics. Prerequisite: MATH 2233. Motion of a particle under various laws of force, potential and attraction of massive bodies, theory of orbit determination and problems of two, three and N bodies.

Aviation and Space Education (AVSED)

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.

1221
Primary Flight Laboratory I. Lab 2. Prerequisite: concurrent enrollment or completion of 1113; FAA Third-class Medical Certificate. Meets the flying requirements for the Private Pilot Certificate. Flight laboratory must be conducted by an OSU flight contractor. Special fee required. **Graded** on a pass-fail basis.

1231
Primary Flight Laboratory II. Lab 2. Prerequisites: 1113 and FAA Third-class Medical Certificate. Meets the flying requirements for the final portion of the FAA requirements for the Private Pilot Certificate. Flight laboratory must be conducted by an OSU flight contractor. Special fee required. Graded on a pass-fail basis.

1403
Basic Aeronautics. A survey of the fundamentals of flight, history of aviation, and government regulations.

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
Secondary Flight. Lab 4. Prerequisite: 1220 or Private Pilot Certificate. First of three courses, 2122, 2132, and 2142 required for the Commercial Pilot Certificate. Maneuvers and cross-country flying. Requires 10 hours of dual and 50 hours of solo. Special fee required.

2132
Intermediate Flight. Lab **4.** Prerequisites: 2122. Flight instruction in night flying, instrument, and cross-country flying. Use of radio navigation and flight computer. Requires minimum of 30 hours dual and 10 hours solo. Special fee required.

2142
Advanced Flight. Lab 4. Prerequisite: 2132; Second-class Medical Certificate. The final phase of flight training in preparation for the Commercial Pilot Certificate. Requires minimum of 15 hours dual and 35 hours solo. High performance aircraft training. Special fee required.

2152
Instrument Flight. Lab **4.** Prerequisite: Private Pilot Certificate. 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.

2214
Theory of Instrument Flight. Prerequisite: 1113 or passed FM Private Pilot Written Examination. Instrument flight rules, the air traffic system and procedures, and elements of forecasting weather trends. Preparation for FAA Instrument Written exam. Flight simulator laboratory experience in an instrument flight environment.

2313
Advanced Theory of Flight. Prerequisite: passed FM Private Pilot Written Examination. Advanced aircraft systems and performance problems, maintenance, operation and inspection of airplanes, and aircraft power plants. Review of aerodynamics, theory of flight, and Federal Aviation Regulations. Preparation for the Commercial Pilot Written Examination.

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 Mufti-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, 1220, 2122, 2313, or consent of instructor. Study of modern, complex aircraft systems: airframe, turbine engines, electrical, avionics, pressurization, fuel and icing. Operations and control of these systems as well as the concept of cockpit resource management. High performance IFR flight, special weather environments, stability augmentation, aircraft monitoring systems, aerodynamics, laser inertial reference systems, electronic flight instrument systems, and advanced aircraft performance.

3341
Multi-engine Flight. Lab 2. Prerequisite: Private Pilot Certificate. Dual flight training in preparation for the Multi-engine Flight Examination. The student will obtain the experience and skill necessary to add an Airplane, Multi-engine Land Class Rating to his or her private or commercial pilot certificate. Study of airplane systems, emergencies, single-engine flight and performance characteristics. Special fee required.

3441
Acrobatic Flight. Lab 2. Prerequisites: 1113 and 1220. A minimum of ten hours dual flight training. Basic, intermediate and advanced acrobatic 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.

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.

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 6 hours credit in AVSED courses. Independent studies, seminars, and training within selected areas of aviation.

4113*
Aviation Safety. Prerequisites: 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. 1-4 credits, maximum 6. Prerequisites: junior or senior standing, consent of instructor. Individually supervised internships in aviation career areas. Directed field experiences related to the participants area of concentration. Graded on a pass-fail basis.

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: Airplanes. Prerequisite: 4133 or concurrent enrollment. Dual flight training to meet the requirements for an FAA Flight Instructor Certificate with an Airplane Category Rating and a Single Engine Class Rating. Approximately 20 dual flight hours including maneuvers practice and practice instruction.

4303*
Aviation Weather. Prerequisite: GEOG 3033 or equivalent. Familiarization with weather products needed to enhance flight safety.

4331
Flight Instructor: Instruments. Lab 2. Prerequisite: Flight Instructor Certificate. Dual flight training to meet the requirement of adding an Instrument Flight Instructor Rating to the Flight Instructor Certificate. Special fee required.

4703*
Cockpit Resource Management. Prerequisite: 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 multiengine simulator. Special fee required.

4771
Flight Instructor: Multi-engine. Lab 1. Prerequisites: 3331, 3551, 3562; valid Flight Instructor Certificate and valid first or second class medical certification. Dual flight training to meet the requirement of adding a Multi-engine Flight Instructor rating to the Flight Instructor Certificate. Requires 10 dual flight hours which includes maneuvers practice and giving maneuvers instruction.

4990
Pilot Proficiency Flight. 1-2 credits, maximum 4. Lab 32. Prerequisites: possess current FAA flight certificate/rating corresponding to AVSED flight courses. 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.

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.

Biochemistry (BIOCH)

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.

3720
Biochemical Laboratory. 2-3 credits, maximum 3. Lab 3-6. Prerequisite: 3653 or concurrent enrollment. Qualitative and quantitative examination of biochemical and molecular biological materials and reactions. Hands-on experience with contemporary aspects of biochemical and molecular biology techniques. Available fall semesters for two hours for non-majors, pre-veterinary, premedical, and nutrition students. Available spring semesters for three hours 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.

8783*
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, mitochondria) 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. Prerequisites: 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: Populations and Ecosystems. Lab 2. Ecological principles, populations, man and environment; genetics, reproduction and development; concepts of evolution, selection, adaptation, speciation and taxonomy. For the nonmajor.

1214
(L,N)Introductory Biology: Organisms. Lab 2. Cellular organization and function, energy relations, maintenance of living systems, coordination and behavior. For the nonmajor.

1304
(L,N)Principles of Biology. Lab 2. Prerequisite: high school chemistry or one semester of college chemistry. Principles of molecular, cellular, population, and community biology including biochemistry, genetics, evolution, ecology, and biical investigation. For majors in biological and Vated fields including the agricultural and health sciences.

1403
(N)Plant Biology. Lab 3. Prerequisite: 1304. Survey of the plant phyla, structure and function of plant organs, water relations, translocation, reproduction, growth and development. Emphasis on the importance of plants to mankind.

1603
(N)Animal Biology. Lab 2. Prerequisite: 1304. 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.

2283
Microbes and Society. Lab 2. Prerequisite: 1114 or 1304 or equivalent. Characteristics of bacteria and techniques used in their isolation, cultivation and identification. Food sanitation, disease transmission and immunity. Water treatment and chemical and physical control of bacteria. For the nonbiology major.

3014*
Cell and Molecular Biology. Lab 3. Prerequisites: 1403, or 1603, 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 1603, or equivalent. Inheritance in plants, animals and microorganisms; molecular and classical aspects.

3034*
General Ecology. Lab 4. Prerequisite: 1403, 1603 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.

Biosystems Engineering (BIOEN)

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, ENGSC 2613. Transducers, signal conditioning, read-out instruments, and electrical controllers. Assembly language programming, interfacing and applications of micro-computers in agriculture.

3113
Engineering Animal and Plant Environments. Prerequisites: ENGSC 3233, PHYSC 2114. Basic physiological mechanisms by which plants and animals react to their environment. Using principles of heat and mass transfer in designing environmental control systems for animal and plant systems. Design and selection of equipment for environmentally controlled animal production and for plant production and storage.

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: ENGSC 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; ENGSC 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.

4223*
Power for Production and Processing. Lab 2. Prerequisites: 3213, ENGSC 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, PHYSC 2014, ENGSC 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 CIVEN 3843.

4400*
Special Problems. 1-4 credits, maximum 4. Investigations in specialized areas of agricultural engineering.

4413*
Processing Biological Materials. Prerequisites: 3423; ENGSC 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, ENGSC 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 CIVEN 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. Prerequisites: 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. Prerequisites: AGRON 5583 or CIVEN 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 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*
(N)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.

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.

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*
Physiology of Ion Metabolism. Prerequisite: 3463 or equivalent. Physiology of ion absorption, translocation, metabolism and functions 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.

5543*
Plant Ecological Genetics. Prerequisites: BIOL 3024 and 3034, or equivalents. Variation below the species level in natural plant populations: genetic basis (including quantitative genetics), ecological implications, and microevdutionary outcomes. Emphasis on morphological, biochemical, and life-history variation and their adaptive significance, with some consideration of the larger processes of coevolution, divergence, and speciation.

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 (BUSAD)

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.

3713
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*
Small Business Management. Prerequisite: Business core courses or consent of instructor. Problems faced in the creation and early growth periods of business enterprises. Accounting, finance, opportunity recognition, legal constraints, management, marketing, taxation and procedural problems. To solidify the concepts covered, students are asked to create a plan for implementation and operation of a new business venture.

4513*
Strategic Management and Business Policy. Prerequisites: senior standing and completion of common body core of the CBA. A terminal integrating course in formulating and implementing basic policy for business. Planning models, policy models and strategy development. Strategic decisions applied to practical examples of problems firms now face and of problems that they will face given current trends in the external environment.

5003*
Computer Applications in Business. Prerequisite: 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, sealing, 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 (BCOMM)

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 (BUSED)

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 (BUHON)

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.

Business Law (BUSL)

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.

3213
Legal and Regulatory Environment of Business. 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 activitiy, 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. Prerequisites: 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. 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.

Business Professions (BUSPR)

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-proceS6-ing** 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.

3753
Executive Secretarial Transcription. Lab 2. Prerequisites: 2313 and 3523 **(or concurrent enrollment** in 3523). Transcription of **executive-level** dictation with exacting standards covering English usage, vocabulary, proofreading and accuracy and speed of transcription.

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 OAED 4213.

4363
Teaching Bookkeeping and Accounting. Pre-requisites: ABSED 3213, ACCTG 2203, skill in secretarial business subjects, and full admission to Teacher 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.

5000*
Thesis. 1-6 credits, maximum 6. Prerequisite: consent of major adviser. Master's thesis.

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. Prerequisite: graduate standing or consent of instructor. Problems, materials, methods, history and current theory and philosophy of vocational business programs.

Cell and Molecular Biology (CLMOL)

3112
Cytology. Prerequisite: BIOL 1304 and BIOL 1403 or 1603; 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: MICRO 2124. Vertebrate host's ability to defend itself against foreign intrusion. Chemistry and biology of the acquired immune response. Same course as MICRO 3254.

4123*
Virology. Lab 4. Prerequisites: BIOL 3014 or one course in biochemistry and one upper-division microbiology course. 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 MICRO 4123.

4264*
Biotechnology. Lab 2. Prerequisites: BIOCH **3653** or BIOL 3014 or MICRO 4224 and MICRO **3133** and **4142** 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. Same course as MICRO 4264.

4273*
Developmental Biology. Prerequisite: 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. Prerequisite: BIOCH 3653 or BOT **3463,** BIOL 3014. Bioenergetic reactions and mechanisms involved in energy production in plants, animals and microbial systems. Same course as MICRO 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 CLMOL.

Chemical Engineering (CHENG)

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 ENGSC 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 CHENG 3013.

3243
Elements of Petroleum Refining. Lab 3. Prerequisite: CHEM 3015. Survey of refining methods and processes. Physical properties of petroleum and its products and their relation to the refining process. Principles of petroleum testing and interpretation of the results.

3473
Chemical Engineering Thermodynamics. Lab 3. Prerequisites: ENGSC 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 CHENG 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.

4363*
Chemical Processes. Prerequisite: senior standing. Chemical process industries are studied from the standpoint of technology, raw materials, products and processing equipment. Thermodynamics and kinetics of industrial processes.

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.

4613*
Fundamentals of Reservoir Engineering. Prerequisites: MATH 2233 and 3473 or MAE 3613. Properties of porous media, properties and phase behavior of reservoir fluids. Computational schemes, including numerical methods, for predicting and optimizing production rates and establishing reserves.

4683*
Petroleum Processes. Prerequisite: 3473. Analysis of the unit processes of petroleum refining.

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 Diffusions! 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*
Biochemical Engineering. Prerequisite: consent of instructor. Application of fundamental chemical engineering principles to challenges posed by biotechnology. Fermentation technology, biological mass transfer and kinetics, and bioprocessing design and scale-up.

5320*
Introduction to Nuclear Engineering. 3-4 credits, maximum 4. Principles and application of nuclear energy. The fission reaction, the behavior of neutrons, nuclear reactor theory and nuclear reactors.

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, rhea logical 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.

5463*
Two Phase Flow and Heat Transfer. Prerequisite: 3013 or MAE **4233.** Thermodynamic relationships in gas/vapor-liquid systems. Flow regimes. Conservation equations for two-phase flows. Pressure effects. Pipeline design. Heat transfer in condensing and vaporizing systems.

5553*
Metallurgical Failure Analysis. Prerequisite: ENGSC **3313** or equivalent. Mechanisms which cause materials failure. Instrumentation used for failure analysis. Case history study of representative failures. Laboratory analysis of failed samples.

5583*
Corrosion Engineering. Prerequisite: ENGSC **3313.** Modern theory of corrosion and its applications in preventing or controlling corrosion damage economically and safely in service.

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.

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*
Advance-process Design and Economics. Prerequisites: 4123, 4223. 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. Computer-based process control techniques. Discrete equivalent to the PID analog controller. Z-transform analysis of sampled-data control systems. Digital control algorithms for feed-back, feed forward, and multivariable control. Application of advanced concepts to distillation control and other chemical process units.

5873*
Air Pollution Control Engineering. Causes, effects and control of atmosphere pollution. Same course as CIVEN 5873.

5953*
Petroleum Technology. Polymerization, catalytic cracking, reforming and other unit processes. Unit operations as applied to petroleum refining. Economics of refining operations.

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. Prerequisites: 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.

1515
(L,N)Generai 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. No credit for students with credit in 3324.

2122
Quantitative Analysis Laboratory. Lab 6. Prerequisite: 2113 or concurrent enrollment. Laboratory work related to material covered in CHEM 2113. No credit for students with credit in 3324.

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 physicochemical 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.

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.

4482*
Chemical Literature and Reference Work. Prerequisites: 2113, and 3015 or 3053. Use of the chemical library; journals, reference works and other sources of information on chemical subjects.

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*

Equilbrium and Kinetics in Analytical 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 cyrstalline 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.

5372*
Spectrometric Identification of Organic Compounds. Lab 3. Prerequisite: 4320. Obtaining and interpreting spectra of organic compounds. Ultraviolet, infrared, nuclear magnetic resonance, circular dichroism, mass spectrometry.

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. Graded on a pass-fail basis.

6050*
Special Topics in Analytical Chemistry. 1-6 credits, maximum 6. Supervised study of topics and fields not otherwise covered.
Prerequisite: one year of physical chemis-

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. Prerequisite: 5362. 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 (CIVEN)

2613
Surveying I. Lab 3. Prerequisite: MATH 1613 or 1715. First course in a measurement science. Introduction and application of plane surveying procedures. Field problems related to linear and angular measurements, differential leveling, traverses and topographic surveys. Computer applications to surveying calculations.

3111
Structural Mechanics Laboratory. Lab 3. Prerequisite: 3113. Experimental determination of properties of engineering materials. Behavior of structural members under load. Preparation of technical reports.

3113
Intermediate Mechanics of Materials. Prerequisite: ENGSC 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.

3613
Surveying II. Lab 3. Prerequisite: 2233. Second course in measurement science. Advanced surveying problems in precise leveling, triangulation and field astronomy. Principles of route surveying; simple compound and transition curves, vertical curves, earthwork and haul quantities. Basic photogrammetry. Computer application for triangulation, curves and profile computations. Introduction to electronic distance measurement equipment.

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: 2112, 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.

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.

3823
Human Impact on the Environment. The activities of humans and how they affect the aqueous, terrestrial and atmospheric environment.

3833
Hydraulics. Prerequisites: CHEM 1515, PHYSC 2014. Basic hydraulic principles and their applications in civil engineering problems. Fundamental properties of water, water pressure and pressure forces, water flow in pipes and networks, water pumps, water flow in open channels, hydraulics of wells, hydraulic similitude and model studies, and water measurements. Basic principles and concepts will be highlighted by laboratory demonstrations and computer solution techniques.

3843
Hydrology I. Prerequisites: 3833, CHEM 1515, ENGSC 3233, PHYSC 2014. Basic principles of surface and groundwater hydrology and their application in engineering problems. Topics include 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 BIOEN 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
Engineering Practice. Prerequisite: senior standing or consent of instructor. Topics of management and administration of civil engineering projects. Specific areas include project management, verbal and written communications, bidding documents, bidding procedures, professional ethics, and professional liability. Also advantages of professional registration and membership in professional organizations.

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, ENGSC 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.

4833*
Unit Operations in Environmental Engineering. Prerequisites: 3813 and 3833. Basic theory of water and wastewater unit operations. Calculation of treatment system design parameters based on theory.

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. Prerequisite: 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 CM. 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. Prerequisite: 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*
Gsotechnical 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. Prerequisites: 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.

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 Al 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. Prerequisite: 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. Prerequisite: 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 darns 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 hyrdologic 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*
Fundamentals of Biochemistry and Microbiology for Environmental Engineering. Prerequisites: adequate background in chemistry and microbiology. Microbiological and biochemical principles applied to environmental engineering analysis and design.

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.

5893*
Hazardous Waste Management. Past and current hazardous waste management practices. Areas of concern and alternative approaches. An overview of important requirements and regulations.

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 geosta-tistics 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: 5113. 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; nonlinear 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 3024. Geologic occurrence and engineering significance of ground failure hazards such as slope movements, streambank erosion, subsidence, meta-stable soils and earthquakes, Emphasis on qualitative identification of ground failure hazards with quantitative assessive and remedial actions.

6843*
Stochastic Methods In Hydrology. Prerequisites: **5843,** or AGEN 4313 and STAT 4053 or equivalent. Stochastic and statistical hydrologic analyses of surface water and ground water systems. Analyses of urban and rural drainage, and detention systems. Same as AGEN 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)

1703
Spoken English for International Students. Lab 1. Oral discussion and laboratory drill designed to improve English pronunciation, intelligibility and orallaural comprehension. Articulation, stress, pitch, intonation and visual cues of English.

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, 3224 and acceptance into professional program. Anatomy and physiology of the hearing mechanism and related physics of sound. Common etiologies of hearing disorders. Practical experience in pure tone audiometry. Study of hearing conservation programs.

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: 3013, 4323, 4413, senior standing 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 speech pathology major. Observation and critiquing of speech and language pathology and audiology clinical activities. Monthly group meetings.

4132*
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. Linguisitic components of sign and various sociological, psychological, and adaptive communication issues having an impact on the deaf community.

4133*
Aural Rehabilitation for the Acoustically Handicapped. Prerequisites: 2213, 3123, 3213, 3224. 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. Amplification units studied.

4214
(N)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: 3013, 3224. Speech and language diagnostic testing and procedures, interpreting diagnostic information and deriving appropriate treatment goals.

4313*
(N)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. Laboratory experience required.

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.

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 pathology.

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 those used most frequently in speech and language pathology and audiology; experience devising and implementing research.

5113*
Language Disorders in Preschool-Age Children. Prerequisites: 3224, **4323.** Principles of language assessment and intervention based upon psycholinguistic theory and current research on preschool children with language disorders. Critical analysis of current research.

5123*
Clinical Audiology. Prerequisites: 3123, 4133, 4313. Hearing disorders and their etiologies. Clinical application of pure tone and speech audiometric tests, including special diagnostic tests. Application to clinical management of the hearing impaired.

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. Prerequisites: 4214, 5263. Nature, diagnosis and treatment of neurologically-based disorders emphasizing aphasia and motor speech disorders.

5173*
Communication Problems of Children with Special Adaptive Needs. Prerequisite: 4313. Recent research in the etiology and management of communicative disorders in individuals with orofacial, physical, and visual anomalies who require specially-adapted educational intervention programs.

5210*
Advanced Practicum. 1-6 credits, maximum 9. Prerequisite: consent of instructor. Practical experience for the advanced student on or off campus.

5243*
Language Disorders of School-Age Children and Adolescents. Prerequisite: 4323 or consent of instructor. Linguistic and related social and pragmatic impairments in school-age children and adolescents. Impact of spoken and written language impairments on academic achievement. Assessment and intervention strategies.

5263*
Normal and Disordered Communication in an Aging Population. Neurophysiology underlying normal and disordered communication; communication changes resulting from the normal aging process and from disease processes common among the elderly. Assessment and intervention theories and strategies for cognitive disorders.

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.

5710*
Special Topics in Communication Disorders. 1-4 credits, maximum 9. Prerequisite: approval of department head. Individual and group investigations of problems in speech and language pathology and audiology.

5720*
Seminar in Communication Disorder's. 1-3 credits, maximum 3. Prerequisite: consent of instructor. Topics relevant to the evaluation and treatment of communication disorders presented on a rotating basis.

5732*
Professional Issues. Prerequisite: graduate standing in speech pathology. Discussion of professional standards, ethics, practice and issues in speech-language pathology.

5740*
Multicultural Applications in Communication Disorders. 1-2 credits, maximum 2. Prerequisites: 3224, **4253,** or consent of instructor. The study of communication differences and disorders in ethnic and culturally diverse groups within the U.S. and clinical applications for assessment and intervention. Case study and program design.

Computer Science (COMSC)

2113
(A)Computer Science I. Lab 2. Prerequisite: MATH 1513 or equivalent. Introduction to programming using a block-structured high-level computer language, including subprograms, arrays, and records. Principles of problem solving, good programming techniques, debugging, and documentation. Elementary methods of searching and sorting.

2133
Computer Science II. Prerequisites: 2113, concurrent enrollment in 2653. Description and implementation of non-numeric problems. The concept of an algorithm in narrative, symbolic and PDL form. Application of iterative and recursive algorithms and elementary data structures.

2143
Computer Science III. Prerequisite: 2133. Elementary system programming using a high-level language; programming with operating system utilities and system calls; basic file structures, processes, client-server systems.

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.

2321
PIJI Programming. Lab 2. Prerequisite: 2113. PUI control structures, data structures, procedures, functions, recursive procedures, based variables, input/output.

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.

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.

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.

3302
ADA Programming. Lab 4. Prerequisite: 2143. ADA-R control structures, data structures, subprograms, types, parallel processing, exception conditions.

3343*
Logic Programming for Artificial Intelligence. Prerequisite: 2653 or MATH 2653 or PHILO 1313 (required), COMSC 4343 (recommended). Propositional and first-order logics. Resolution based automated theorem proving. Programming in Prolog. Artificial intelligence topics with a logic programming perspective.

3363*
Organization of Programming Languages. Prerequisites: 2143, 3653. Programming language constructs. Run time behavior of programs. Language definition structure. Control structures and data flow programming paradigms.

3372
Object-oriented Programming. Prerequisite: 2143 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. Practical application of object-oriented techniques.

3423*
File Structures. Prerequisite: 2143. 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.

3431
The C Programming Language. Prerequisite: 2133. C programming language types, operators, expressions, control flow, functions, structures, pointers, arrays, UNIX interface.

3443
Computer Systems. Prerequisite: 2123. 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.

3613
Theoretical Foundations of Computing. Prerequisites: 2143, 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.

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: 2143, 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: 2143, 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: 2143, 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*
Operating Systems I. Prerequisites: 2143, 3443 or ECEN 3213. 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 Information Processing. Prerequisite: 2143. Storage, structures, data and information structures, list processing, trees and tree processing, graphs and graph processing, searching, sorting.

4443*
Compiler Writing I. Prerequisites: 2143, 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 operat**ing** systems, multiprocessor systems, program**rig** systems or various mathematical and sta**gstidal** packages. Designed to allow students to **study** topics not provided in existing courses.

4883
Social Issues in Computing Sciences. Prerequisites: senior standing, ENGL 3323. 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 INDEN 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 simplexing 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*
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 and Storage Structures. Prerequisite: 4343. Data structures and their application in recursive and iterative algorithms. Static and dynamic data structure representations and processing alga rithms. Dynamic and virtual storage management.

5423*
Information Organization and Retrieval. Prerequisites: 3423, **4343.** Storage, classification and retrieval of information, data bases, errors, multikey files, indexing; dynamics of file reorganization, search strategies.

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. Prerequisite: 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. Pre-requisites: MATH 3013 and COMSC **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 OR factorization, conjugate gradients, OR algorithm, and Lanczos method. Same course as MATH **5553.**

5653*
Automata and Finite State Machines. Prereq-uisite: **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. Lab 2. Prerequisite: graduate standing in computer science. 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 ECEN 5293, INDEN 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 INDEN 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 numeration, branch and bound, and cutting methods. Same course as INDEN 6023.

6240*
Advanced Topics in Computer Organization. 2-6 credits, maximum 12. Prerequisite: 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. Prerequisites: **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. Design and analysis of data bases and other information systems. Hierarchical, network, and relational systems; implementation of data base systems; update and retrieval algorithms; multiuser and security access mechanisms; distributed data base systems. May be repeated with change of topics.

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. Pre-requisites: 5313, 5653. Context-free languages, Kleene languages, Dyck languages, context-sensitive languages; use of algebraic systems to define languages; linear bounded automata.

Construction Management Technology (CONST)

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. Prerequisite: 2252 or 2253. 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: MECDT 3323. Basic timber structures with emphasis on concrete form applications.

3452
Mechanical Equipment of Buildings. Prerequisite: PHYSC 1114. Plumbing, heating and air conditioning systems as applied to residences and commercial buildings.

3462
Electrical Equipment of Buildings. Prerequisite: PHYSC 1214. Electrical and lighting systems as applied to residences and commercial buildings.

3553
Steel Design. Lab 3. Prerequisite: MECDT **3323.** Analysis and design of steel beams and columns. Bolted and welded connections.

3663
Concrete Design. Lab 3. Prerequisite: MECDT 3323. Analysis and design of reinforced and prestressed concrete in accordance with the ACI building code.

3714
Soil Mechanics Technology. Lab 3. Prerequisite: MECDT 3323. Physical and mechanical properties of soils, and tests appropriate for construction management students.

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. Lab 3. 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: senior standing 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. Pre-requisite: 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. Prerequisite: 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.

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.

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 and 3603 or consent of instructor. Developmental levels in selection and organization of content and procedures for primary mathematics education.

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 gov**ernance,** professional organizations, ethics, and **the** nature of teaching.

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. Prerequisite:** 2450. Directed observation and **teaching** in schools, kindergarten through grade current seminar explores multicultural and mainstreaming programs. Graded on a pass-fail basis.

3450
Early Lab and Clinical Experience in Elementary Education III. 1-2 credits, maximum 3. Lab 3-6. Prerequisite: 3430. Advanced clinical experience in schools, kindergarten through grade eight. Concurrent seminar includes formal study of instructional planning. Graded on a pass-fail basis.

3620
Field Experiences in the Middle School. 1-4 credits, maximum 4. Lab 2-8. Prerequisites: 2450 and consent of instructor. 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.

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.

3713
Structure and Utilization of a Mathematics Laboratory. Lab 1. Prerequisite: full admission to Teacher Education. Historical background, future trends, theoretical and practical considerations, construction of laboratory materials and evaluation procedures in a mathematics laboratory. For experienced and inexperienced classroom teachers, superintendents, principals and mathematics supervisors.

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. For students who need 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.

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.

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. Prerequisite: **3132** or equivalent. 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. Prerequisites: concurrent enrollment in MATH, full admission to Teacher Education. Strategies for teaching mathematical modeling. Problem classroom topics.

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.

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.

4142
Teaching Mathematics at the Intermediate Level. Lab 0-2. Prerequisites: **3153** and full admission to Teacher 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.

4143*
Teaching LOGO in the Schools. Lab 0-2. Prerequisite: 3132 or equivalent. Instructional computing course for educators using LOGO language. Includes methods and integration techniques for teaching LOGO in grades K-12.

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. Prerequisite: 3122 or **3132** or consent of instructor. 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. Prerequisite: 3283. 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. Prerequisite: 3283. 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. Prerequisite: 3283. 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. Prerequisites: 3283, 4233, full admission to Teacher Education. 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 LIBSC 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: ABSED 3113, FRCD 3253, or consent of instructor, and full admission to Teacher 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.

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.

4703*
Computer Applications in the Middle School Science Curriculum. Prerequisite: 3132 or consent of instructor. Principles and techniques related to using microcomputer technology in teaching middle school science; microcomputer interfacing, simulation, and interactive videodisk.

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
Methods and Materials in the Schools, K-12. 1-3 credits, maximum 3. Prerequisites: 4713 or equivalent, verification of student teaching internship placement, and full admission to Teacher Education. Continuation of 4713 or equivalent specialized methods course. Taken concurrently with the student teaching internship experience in grades K-12. Available to students in discipline-specialized sections: art, foreign languages.

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. 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.

5023*
Comparative Education. A systematic investigation of educational institutions in various nations for the purpose of an enlarged, critical view of American education.

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. Prerequisite: ABSED 5213 or 5463. Theory and research on teaching applied to classroom teaching behavior.

5053*
Fundamentals of Curriculum Development. A study of curriculum that includes philosophy, history, decision making, major concepts and terms.

5103*
Advanced Computing Applications in Education. Lab 0-2. Prerequisite: 4043 or equivalent. 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. Prerequisite: 4113. Educational design and production of videotape using single camera, small studio production and other technology. Individual and team projects.

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. Prerequisite: 4023. 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. Prerequisite: 3122. 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.

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.

5173*
Kindergarten-Primary Curriculum (K-2). Current kindergarten-primary (K-2) curriculum models and programs including aims, content, methodology and evaluation. Current trends and issues in early childhood education; curriculum design and implementation. Primarily for administrators, supervisors, teachers and advanced students in 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.

5252*
Teaching Mathematics In the Elementary School. Materials, methods and classroom procedures related to mathematics in the elementary school.

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. Prerequisite: 5263. 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.

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. Prerequisite: 4213. 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. Prerequisites: 3283, 4233, 4293 or 4473 or consent of instructor. 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. Prerequisites: 3283, 4233 **and 4293 or 4473** or consent of instructor. 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. Prerequisite: **5423.** Diagnosis of reading **disabilities,** remedial measures and work with clinical cases.

5473*
Clinical Aspects of Reading Disability. Prerequisite: 5463. 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*
Curriculum for the Culturally Different Elementary School-age Child. Procedures, materials, curricula, techniques, instructional strategies, etc. to aid the teacher in developing an educational program for the culturally different child.

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.

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.

5730*
Seminar in Education. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Seminar topics may differ depending upon the nature of current interests and topics in American education.

5740*
Seminar in Teacher Education. 3-9 credits, maximum 9. For cooperating teachers and university supervisors. Problems and issues in pre-service teacher education. Simulation and laboratory experiences in supervision of student teachers.

5750*
Seminar in Mathematics Education. 1-3 credits, maximum 3. Lab 0-2. Prerequisite: consent of instructor. Problems, issues, and trends in mathematics education.

5753*
Educational Technology Strategies. Lab 1. Prerequisite: 4043 or **5053** or consent of instructor. 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 amassment, 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. Prerequisite: 3122. 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.

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. Lab 1-3. Prerequisite: consent of instructor. 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 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. Students examine research related to teacher-classroom behavior, classroom climate and student behavior and develop competencies in several observational systems.

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. Prerequisite: consent of instructor. 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. Prerequisite: 12 credit hours in teaching of 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 effecting change in 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. Prerequisite: 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
(S)Profeesional 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.

3003
(S)Environmental Perspectives on Apparel and Interior Design. Analysis of apparel and interior design, development and use from physical, technological, economic, political, religious, social and aesthetic perspectives.

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. Prerequisites: 2913, 3023. 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 Retelling. Prerequisites: 1433, ACCTG 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.

3643
Apparel and Accessories for Special Markets. Prerequisites: 1433, PSYCH 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
Merchandise Display Essentials. Lab 2. Prerequisites: 1003, 1433 and completion of 60 credit hours. Study and application of principles and practices in arranging and displaying merchandise for commercial and educational purposes. Supervised experience working with merchandise from retail stores.

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. Lab 4. Prerequisites: 3433, 3663 and 3991 (apparel merchandising students); 3013 and 3991 (apparel design students). Directed practical experience in an approved work situation related to the fashion industry.

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.

4553*
Profitable Merchandising Analysis. Prerequisites: **3433** and 3994. Relationship analysis of profit and loss statement. Retail mathematical calculations necessary to plan and control merchandising results, open-to-buy, mark-up, markdown, turn-over, stock-sales ratio.

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.

4993*
(I)Textiles and Apparel in the International Economy. Prerequisites: 2013, 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*
Studio Design Practicum. 1-3 credits, maximum 6. Prerequisite: consent of instructor. An in-depth application of theoretical design models and philosophies to professional practice. 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, PSYCH 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*
Apparel Merchandising and Design Career Internship. 1-6 credits, maximum 6. Prerequisite: consent of instructor and department head. An individualized career-oriented internship. Selected learning experiences in approved work situations in the fashion industry or in selected educational or research activities related to apparel merchandising and design.

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. Prerequisite: 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 2013 or 2023. No general education credit for students also taking ECON 2013 or AGEC 1114.

2013
(S)Introduction to Macroeconomics. Prerequisite: 15 semester credit hours. 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. No general education credit for students also taking ECON 1113 or AGEC 1114.

2023
Introduction to Microeconomics. Prerequisite: 2013. 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.

3010
Special Topics in Economics. 1-3 credits, maximum 9. Prerequisites: 2023, 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: 2023. Application of economic theory and methodology to decision problems of private industry, nonprofit institutions and government agencies; demand and cost analysis, forecasting, pricing and investment.

3113*
(S)Intermediate Microeconomics. Prerequisite: 2023. 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: 2023. 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.

3313*
Money and Banking. Prerequisite: 2023. 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
(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 HIST 4513.

3903*
(S)Economics of Energy and the Environment. Prerequisite: 2023. 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: 2023, 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: 2023; 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*
(S)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)Intemational Economic Development. Prerequisite: 3 credit hours in economics. Problems of underdeveloped economics related to the world economy; obstacles to economic growth and policies for promoting growth.

4713*
(S)Economics of Industries. Prerequisite: 2023. 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: 2023. 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. Required of all first-semester freshmen in the College of Education. An orientation course; study of the profession of education with particular emphasis on the skills and qualities required.

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.

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. Prerequisite: consent of instructor. 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. Prerequisite: consent of instructor. 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.

6020*
Seminars in Education. 2-6 credits, maximum 6. Prerequisite: consent of instructor. Limited to graduate students who have experience in the field and knowledge of elementary techniques in research. Students pursue individual research problems under the direct supervision of members of the staff.

6023*
Doctoral Seminar. Prerequisite: approval of adviser. Open to all doctoral aspirants dealing with preparation of a proposal for the doctoral study. Mechanics and techniques of proposal and dissertation preparation and design of the proposed research.

Educational Administration and Higher Education (EAHED)

4223*
Community Education: A Synopsis. Lab 1. Prerequisite: 3 hours of one of the following: CIED 2113, HEECS 4353, 4413, 4853, LEIS 2413, or SOC 1113. Introduction to community education through classroom and field-based activities and the history, philosophy, organization, roles, and publications of community education. Perspective of how community education has evolved in relation with adult education, community colleges, public schools, and recreation.

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.

5940*
Organization and Administration of Occupational Education. 1-3 credits, maximum 6. The organization and implementation of vocational-technical education, with special attention on federal-state-local organizations and the implications of current legislation for implementing new programs.

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 in EAHED. Decision-making processes utilized in educational systems today.

6230*
Critical Issues in Higher Education. 1-3 credits, maximum 9. Prerequisite: 6753. Issues that have shaped and are shaping higher education in American society.

6243*
Organization and Administration in Education. Research and best practice in the organization and administration of educational organizations.

6253*
The Principalship. Prerequisites: 5813, 6243 and 6263. Strategies, techniques and solutions the principal can utilize in the operation of a public school. Developing policy statements, handbooks, budgets and schedules.

6263*
Supervision. The place of supervision in the improvement of instruction; a study of fundamental principles and procedures.

6323*
Public School Finance. Prerequisite: graduate standing. Development of conceptual bases in economics of education, taxation, distribution systems, policy analysis; application to Oklahoma school finance; and introduction to budget development.

6333*
Public School Business Management. Prerequisite: graduate standing. Knowledge and skills in budget planning and development, administration and evaluation. School accounting, other business management topics.

6353*
The Superintendency. Prerequisite: consent of instructor. Integration of theory and practice through examination of roles and responsibilities of the superintendent. Particular emphasis on leadership, communications, and the changing nature of public education.

6363*
Educational Finance: A National Perspective. Prerequisite: graduate standing. Theory and practice of financing American public education.

6393*
School Personnel Administration. Relationships between administration and other school personnel; recruitment, selection, promotion, morale, salary, staff relations and evaluation of teaching.

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*
Legal Aspects of Education. Legal aspects of education with special reference to Oklahoma. Separate sections for common schools and higher education. Consideration of PL 94-142, section 504 of the Rehabilitation Act of 1973, and other pertinent Oklahoma enactments; attention directed to multicultural legal provisions.

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 are considered.

6573*
School Facilities. Prerequisite: 6453 or equivalent. Established standards and research in school facilities; validity of standards.

6603*
Organizational Theory in Education. Prerequisite: 6243. Selected organizational typologies, conceptuali-zations 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/resources and the development of a total community education program. Skills and competencies for planning, implementing and evaluating community education programs are explored.

6620*
The School-Community Survey. 1-3 credits, maximum 6. Basic principles and assessment techniques applied in the field through needs and resource assessment, program planning, and facility evaluation and planning.

6650*
Problems in Educational Administration. 1-4 credits, maximum 8. Prerequisite: consent of instructor. 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 Junior 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 junior colleges in America.

6703*
Finance in Higher Education. Prerequisite: 6753. 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. Prerequisite: teaching or administrative experience. 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.

6713*
Effective Teaching in Colleges and Universities. Research findings on teaching-learning relationships at the college and university level. Study of methods employed to encourage, guide and evaluate student learning. Investigation and appraisal of newer instructional methods and trends.

6720*
Education Workshop. 1-4 credits, maximum 8. Enables public school and higher education personnel to analyze instructional and/or administrative problems.

6730*
Planning and Educational Change. 1-4 credits, maximum **4.** Includes 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*
Academic Programs: Development and Implementation. 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.

8833*
College and University Presidency. Prerequisite: **6803.** For those who anticipate a career in **college** and university administration or a related management position. The role and function of the presidency.

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. Prerequisite: consent of instructor. 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. Prerequisite: consent of instructor. 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.

Electrical and Computer Engineering (ECEN)

3013
Experimental Methods. Lab 4. Prerequisites: ECEN **3613,** concurrent enrollment in 3113 and **3313.** Basic electrical and electronic measurements and instrumentation techniques and devices. Operating principles and application of various instruments used in the practice of electrical engineering. Experiments in electronics and **electromagnetic** fields, designed to reinforce principles introduced in ECEN **3313** and ECEN 3613. Data processing and reduction techniques.

3113
Energy Conversion I. Lab 2. Prerequisite: 3613, concurrent enrollment in 3013, **3313.** 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. Asynchronos circuit design and analysis. Laboratory experience in implementing combinational and sequential logic devices.

3313
Electronic Devices and Applications. Prerequisites: 3713, concurrent enrollment in 3013, 3113. 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.

3413
Controls I. Prerequisites: ENGSC 2122; ENGSC 2613, MATH 2233, MATH 3013, concurrent enrollment in 3613 and 3713. Laplace and z-transforms, solutions to differential and difference equations. Transfer functions and block diagram manipulation. Modeling of mechanical and electrical systems. Introduction to feedback and control system design using the root locus diagram.

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: ENGSC 2613, MATH 2233, concurrent enrollment in 3413, 3713. Development of Maxwell's equations and their application to engineering problems in electrostatics, magnetostatics, plane wave propagation, and transmission line theory.

3713
Network Analysis. Prerequisites: ENGSC 2613, MATH 2233; concurrent enrollment in 3413 and 3613. Laplace transform, transfer functions, magnetically coupled circuits and two-port networks.

3813
Engineering Optics. Prerequisites: PHYSC 2114, MATH 2365, 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: ENGSC 2613. Application of solid state physics to understanding modern electronic devices. Introductory quantum mechanics. Energy bands in solids. Electronic properties of semiconductors. Junction diodes. Bipolar transistors. Field-effect transistors.

4001*
Electrical Engineering Seminar. Prerequisite: senior standing. Topics on professionalism technical and professional societies, and current industrial developments. Individual or group reports prepared and presented.

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 COMSC 2123. 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 minicomputer 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: COMSC **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 COMSC 4273.

4283*
Computer Networks. Prerequisites: 3213 or COMSC 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 COMSC 4283.

4303*
Digital Electronics Circuit Design. Lab 2. Prerequisite: 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 wideband amplifier circuitry.

4353*
Communication Electronics. Prerequisite: 3313. Design of tuned voltage and power amplifiers, oscillators and mixers, modulation and detection, and parametric amplifiers.

4413*
Controls II. Prerequisites: 3413, 3513, 3713. Design of analog and digital feedback control systems, review of functions and state variable models for continuous-time and discrete-time systems, sampling, relationship between pole locations and time response, frequency domain design, root locus design, continuous-time and discrete-time compensation techniques, state variable feedback and pole positioning design.

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 Finer 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.

4713*
Network Synthesis. Prerequisite: 4703. Network functions and their reliability, driving-point synthesis, passive and active network synthesis.

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.

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 monopolities. 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. Prerequisites: 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.

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 ND 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*
Control Systems I. Prerequisite: 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.

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.

5523*
Estimation Theory. Prerequisite: 5513. Optimal estimation theory including linear and nonlinear estimation of discrete and continuous random functions. Wiener and Kalman filter theory included.

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, pseudo-random 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.

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.

5713*
System Theory. Prerequisite: graduate standing or consent of instructor. Introduction to the theory of deterministic linear and non-linear systems. Applications of matrix methods and vector differential and difference equations to the analysis of lumped-parameter electrical networks, mechanical and fluid systems and discrete-time systems. Computer simulations of system dynamics. Frequency domain techniques in signal and system analysis using Fourier, Laplace and z-transforms. Introduction to stability criteria for nonlinear systems.

5723*
Nonlinear Systems Analysis I. Prerequisite: 5713. Failure of superposition; phase plane and phase space techniques; method of perturbations, asymptotic, orbital and structural stability; subharmonic generation; generalized approaches to nonlinear systems analysis.

5733*
Neural Networks. Prerequisites: 5513, 5713 or equivalent. 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.

5753*
Digital Processing of Speech Signals. Review of digital signal processing; digital models for the speech signal. Short-time Fourier analysis, linear predictive coding of speech and an introduction to man-machine communication by voice.

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*
Fuzzy Systems Theory and Application. Prerequisite: 5723 or MAE 5723. Fuzzy set theory; basic definitions, operations with fuzzy sets and fuzzy relations; extension principle; fuzzy functions; possibility theory; fuzzy systems; fuzzy models and system identification; approximate reasoning; fuzzy control and stability of fuzzy systems; fuzzy neural networks. Same course as MAE 5773.

5783*
Random Systems Modeling and Analysis. Random dynamical systems; development of discrete modeling techniques, analysis procedures for continuous and discrete random systems. Digital implementations of algorithms for random systems featuring engineering tradeoffs between accuracy, response time, equipment requirements and complexity.

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 Optics. Wave propagation in a cylindrical dielectric waveguide. Solution of ray equation for a step index and graded index fiber. Monomode fiber. Optical properties of fibers: dispersion, absorption, scattering. Bandwidth considerations. Laser sources, spectral purity, modulation, bandwidth. Detection systems. Photodetectors and heterodyne detection systems. Noise sources and frequency response.

5853*
Opto Electronics. Hermite-Gaussian beams, optical fibers and waveguides, coupling of modes. Nonlinear optical devices: modulators frequency shifters; optical power detectors. Description of optical circuits. Integrated optical circuits.

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 COMSC 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 COMSC 6253.

6263*
Advanced VLSI Design and Applications. Prerequisites: 5223 and 5263. System timing. Designing testable integrated circuits. Specialized parallel processing architectures. Application examples.

6413*
Digital Control Systems. Prerequisite: 5413. Study of the computer as a control element in complex processes. Basic sampling theory. Analog-to-digital and digital-to-analog conversion of data. Analysis of analog-digital systems via Z-transform methods and difference equations in state-variable form. Stability criteria and design approaches for digital compensation. Simulation of digital control systems on the hybrid computer.

6450*
Control Systems II. 1-3 credits, maximum 6. Prerequisites: 5413 and 5523. Advanced topics in optimal control systems. Dynamic programming and the maximum principle applied to stochastic systems. Optimum state estimation and the separation theorem. Selected topics from recent developments in adaptive and stochastic control.

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 wave-forms for noise immunity. Information transfer in learning systems.

6713*
Advanced Topics in Network Synthesis. Prerequisite: 5753. Chosen from recent developments. R-network synthesis, state model approach to network synthesis. N-port network synthesis, multivariable synthesis, sensitivity.

6723*
Nonlinear Systems Analysis II. Prerequisite: 5723 or MAE 5723. Topics in nonlinear systems theory selected from the current literature. May include nonlinear stability theory, multi-input describing functions, nonlinear feedback control theory, the problem of Lure and Popov's criterion, multiparameter perturbation theory.

6823*
Advanced Optical Techniques. Prerequisite: 5813 or 5853. State-of-the-art optical devices and research methodologies. Investigation and discussion of contemporary developments in nonlinear optical devices and laser applications. Includes both analytical and experimental techniques.

Electronics and Computer Technology (ECT)

1003
(A)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.

1225
Electronic Amplifiers I. Lab 3. Prerequisites: 1104, MATH 1513. Discrete solid state devices. Study of PN junction and field effect devices in amplifier and other circuits. Elements of biasing, stabilization, feedback and gain determination.

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.

2634
LSI Linear Circuits. Lab 3. Prerequisites: 1225, 1244, co-requisite MATH 2133. Advanced topics in linear analog circuits, their specifications, characteristics and configurations, power amplifiers, distortion and feedback theory.

3003
Principles of Electrical Power. Lab 2. Prerequisite: 2213. Polyphase power distribution systems, transformer connections and industrial electrical motors. Selection and methods of control of polyphase induction motors.

3103
Fundamentals of Electronics. Lab 2. Prerequisite: 2213, Corequisite: MATH 2123. Electronics for non-electronics majors. Fundamentals of electronic physics, electronic device principles and characteristics, and transistor circuits. Application of electronic circuits to industrial measurement and control equipment.

3113
Circuit Analysis II. Prerequisites: 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 and computer applications.

3123
Machine Methods in Circuit Analysis. Lab 3. Prerequisites: 2634, MATH 2133. Use of current commercial software such as PSpice in analyzing and solving circuit problems.

3234
Nondestructive Testing. Lab 2. Commonly used nondestructive testing in industry; radiography. Magneflux, liquid penetrant, ultrasonic and eddy current testing.

3253
32-bit Architecture. Lab 3. Prerequisites: 2544, COMSC 2113. Introduction of 32 bit architecture using the Motorola 68000 microprocessor family. Study of the assembly language instruction set, writing, documenting and executing various complex programs.

3263
Electronic Digital Systems. Lab 3. Prerequisites: 2544, 3253. Introduction of microcomputers from a hardware point of view, combining a study of machine language programming and microcomputer hardware in a highly laboratory-oriented presentation. Interfacing the microcomputer as a programmable controller of external systems and devices.

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 and Control. Lab 3. Prerequisites: 2633, 3113. Data acquisition and the control of automatic test equipment through the IEEE 488 BUS. Transducers D/A and ND converters, multiplexers, and sample/hold circuits included. Use of a microcomputer in controlling test equipment. Silicon-controlled rectifiers as power-control devices.

3733
Electronic Design and Fabrication. Lab 3. Prerequisites: ECT 1104, 1225, 1244, 2544, 2634. Design of simple circuit using CAD techniques. Implementation of those circuits on multi-layered circuit cards to mil-spec. Demonstration of circuit functionality, including exposure to environmental testing. Form and finish of circuit conforming to quality control specifications.

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. Senior project in which students design, assemble, test, and demonstrate an electronic product or device. Intended as capstone course.

4314
Elements of Control. Lab 3. Prerequisites: 3113, 3123, **3363,** GENT 3123. Principles of analog and digital control, with an analysis of feedback control systems in their various conceptual configurations. The application of feedback control theory to present day circuits and systems.

4353
Advanced Circuits II. Lab 3. Prerequisites: 3123, **3354, 3363, 4314.** Active filters, digital signal processing, discrete transforms, and non-linear amplifiers form the element of study. Synthesis of skills and knowledge through implementation of a device of student's design.

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. Intended for the last semester, a synthesis of all pertinent skills and knowledge developed in the curriculum. Production of a useful or marketable electronics product or device through design, assembly, test and demonstration phases.

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 adviser. Application of credit to meet degree requirements varies with level and department.

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 adviser. 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 (ENGSC)

2112
Statics. Lab 2. Prerequisites: PHYSC 2014 and MATH 2145. Resultants of force systems, static equilibrium of rigid bodies and statics of structures. 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.

2142
Strength of Materials. Prerequisite: 2112. Bending moments, deformation and displacements in elastic and plastic deformable bodies.

2213
Thermodynamics. Prerequisites: CHEM 1515, PHYSC 2014, MATH 2145. Properties of substances and principles governing changes in form of energy. First and second laws.

2613
Introduction to Electrical Science. Prerequisites: PHYSC 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, PHYSC 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 1515. Introductory level. Relationship between structure and properties of materials and engineering applications. Atomic, microscopic and macroscopic properties.

Engineering Technology

(See specific technology programs listed alphabetically)

English (ENGL)

0003
Remedial Composition for International Graduate Students. Lab 2. Sentence structure, paragraphing, idiomatic usage, punctuation, vocabulary, pronunciation and documentation. 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.

1013
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.

1033
International Freshman Composition II. Prerequisite: 1013 or 1113. 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.

1113
Freshman Composition I. The fundamentals of expository writing with emphasis on structure, development and style.

1213
Freshman Composition II. Prerequisite: 1013 or 1113. Expository composition with emphasis on technique and style through intensive and extensive readings.

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.

2513
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.

3143
(H)American Folklore. Historical perspective, traditions, common cultural experiences and varied ethnic contributions to American life before the century as expressed in American folklore.

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.

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.

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. Prerequisite: 9 credit hours of English. The growth of the English language.

4013*
English Grammar. Prerequisite: 9 credit hours of English. The traditional terminology and concepts of English grammar leading or evolving into the several current systems of description.

4063*
Descriptive Linguistics. Prerequisite: 9 credit hours of English. The methodology of linguistic analysis.

4083*
Applied Linguistics. Prerequisite: 9 credit hours of English. The application of linguistic theory to literary analysis.

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.

4933*
(H)Minority, Ethnic or Regional Literature. The study of minority, ethnic or regional American literature. Topic varies by semester.

4973
Issues in English: Technical Writing. Prerequisite: senior standing. A capstone course for technical writing majors. Issues and professions related to the degree.

4983
Issues in English: Literature. Prerequisite: senior standing. A capstone course for English literature 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 Linguisitics. 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.

5410*
Seminar in British Literature of the 16th Century. 3 credits, maximum 6. Selected writers and their works, themes and literary developments of the.l6th 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 adapation 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.

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.

2653
Insect Behavioral Ecology. Lab 2. Prerequisite: 2023 or consent of instructor. Principles of insect responses to stimulation with emphasis on behaviors related to mating, feeding on plants or animals and to environmental conditions. How these responses affect insect density and distribution.

3003
Livestock Entomology. Lab 2. Economic importance, biology and control of pests affecting domestic animals.

3021
Insect Pests of Stored Products. Lab 4. The biology, damage and control of insect pests of stored products.

3022
(N)Apiculture. Biology of the honeybee and other bees.

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.

3463
Forest Insects. Lab 2. The biology and control of insects injurious to shade tree, forest and forest products.

3644
Insect Morphology. Lab 4. Prerequisite: 2023. Insect development and comparative morphology. Same course as 5644.

4223*
Ecological Methodology. Lab 2. Prerequisites: one course each in ecology and statistics. Methods of estimating animal and plant population parameters, species diversity, community parameters, niche concepts and diet analysis.

4464*
Systematic Entomology. Lab 4. Prerequisite: 2023 or equivalent. Classification and comparative biologies of insects.

4523*
Issues Related to Plant Production Systems. Lab 2. Prerequisites: senior standing; minimum of 12 hours in agronomy, entomology or horticulture. Ecological, economic and social issues related to plant production systems. Resource management for profitable and sustainable production while maintaining environmental quality.

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.

4913*
Pesticides in the Environment. Prerequisites: BIOL 1403, CHEM 1225. A discussion of pesticides (chiefly fungicides, insecticides, herbicides and nematocides), including potential movement, degradation, fate and significance in the environment.

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.

5224*
Classification and Biology of Immature Insects. Lab 6. Prerequisite: 3554. Classification, collection, preservation and biology of immature insects.

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.

5512*
Biological Control. Prerequisite: 4523. Principles and practices of insect control with inimical organisms.

5550*
Advanced Agronomic Entomology. 1-5 credits, maximum 5. Prerequisite: 4523. Special problems in advanced agronomic entomology.

5612*
Host Plant Resistance to Insects. Prerequisite: AGRON 3553. Insect population management by host plant resistance.

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*
Ecological Systems Analysis. Lab 2. Prerequisite: STAT 5023. Concepts, methods and techniques of systems analysis. Use of systems theory in ecological contexts. Review of modeling techniques including an introduction to multivariate analysis applied to ecological systems.

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 permission 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 (ENVIR)

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.

4813
Environmental Science Applications and Problem Solving. Lab 2. Prerequisites: AGEC 3503, BISC 3034, FOR 4813, GEOL 3073, POLSC 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.

5300*
Seminar in Environmental Science. 1-3 credits, maximum 6. Selected environmental problems, individual research, seminar reports and group discussion of reports.

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 professional career areas, acquainting students with the diversity of responsibilities as applied to the variety of audiences served.

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. Prerequisite: HEC 1111 or equivalent. Builds 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)Eariy 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
(S)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 and Guidance. Lab 3. Creation of learning environments that facilitate children's development. Creation of nurturant environments and devising effective guidance strategies. Planning, implementation, and evaluation of developmentally appropriate integrated learning experiences.

3253
Child Development and Guidance: School Age. Influence of the family experience on the physical, intellectual, social and emotional development of children in the school and pre-adolescent years. The role of parents, teachers and community leaders. Application of principles of development and guidance in actual work with 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 through eight years of age. Observation and participation with children in the Child Development Laboratories and other 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. Prerequisite: 3213 or equivalent. Consideration of appropriate experiences in the areas of literature and language arts.

3413
(S)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.

3423
Technology and the Home. Lab 2. Selection, use and application of equipment in the home, including microcomputers and other technologies for management of the home.

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.

4102
Philosophy of Home Economics Education. Basis for developing a home economics education philosophy as related to present day theories of education including multi-cultural education, diversity of learners, characteristics of effective teachers, ethical considerations and other major contemporary issues in public education.

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
Home Economics: Professionalism, Issues and Actions. History and philosophy of home economics. 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.

4212
Extension Programs in Home Economics. Development, organization and methods of home economics public service programs.

4213
Media, Materials and Techniques in Home Economics Education. Lab 6. Prerequisites: 3313 and full admission to University Teacher Education. Application of educational principles to specific home economics subject matter. Experiences with verbal and non-verbal communication, teaching and evaluation techniques, audiovisual materials, 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 kindergarten-primary education.

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.

4333
Organization of School and Community Home Economics Programs. Prerequisite: full admission to teacher education. Leadership responsibility and activities of the home economics teacher in youth organizations, adult education, and effective interaction with parents and community.

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: 3213, 3233, 3303, 3403, 3503, full admission to Teacher Education, and pre-registration with consent of the director of the Child Development Lab. Teaching experience as appropriate for students in early childhood education option. 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.

4453
(S)Women in the Economy. Prerequisites: 2413, CON 1113. Economic roles of women in American society as consumers and producers in the marketplace and in the home. Exploration of issues raised by the changing economic status of women.

4463
Child Development and Guidance: Infancy and Toddlerhood. Development and behavior of infants and toddlers. Directed experience 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)Adulhood: 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.

4720
Student Teaching in Home Economics. 1-12 credits, maximum 12. Lab 3-36. Prerequisite: full admission to Teacher Education and student teaching. Study and development of a philosophy and competencies in home economics education through directed teaching experience in an approved vocational program. Participation starts at the beginning of the semester in the assigned school. Graded on a pass-fail basis.

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*
(I,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.

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; 5253. Directed individual study in child, youth, and adult development and family sciences.

5112*
Computer Applications in FRCD Research. Creating variable codebooks, coding data for input and inputing data for computer analysis using the SPPS-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 antibias 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. Prerequisite: 6 credit hours at graduate level in family relationships. 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 varieties of couple relationships and educational models that enable couples to enrich their relationships. Techniques for analysis and treatment of interpersonal problems through study of case materials. Classroom experience includes simulation of counseling and educational processes.

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.

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.

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.

5753*
Promoting Community Service Programs. Strategies for promoting participation and community support for non-profit programs. Applications to the promotional problems of organizations.

5813*
Family Economics. Prerequisite: senior or graduate standing. Individuals and families interaction in the labor market; decision making regarding time allocations among wage earning, household production and leisure. Economic well-being of individuals and families regarding human capital accumulation, poverty programs, two-earner families, one-person-headed households, and distribution *of* wealth.

5833*
Family Financial Security. Prerequisite: 3433 or consent of instructor. Socioeconomic changes, public policies and programs and management practices related to family financial well-being.

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. 1-2 credits, maximum 30. Prerequisite: consent of major professor. 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 Dieabilities. 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.

6743*
Program Design and Implementation. Theories, resources, strategies and issues for bringing about change in groups and individuals applied to home economics and community services programs.

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.

6933*
Advanced Evaluation Research. Prerequisite: 5933 or consent of instructor. Process of evaluation related to research purpose and design and to assess evaluation research models appropriate to home economics.

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: ACCTG 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. Prerequisite: ECON 3313. Money and capital markets, flow-of-funds, commercial banks and other financial intermediaries.

4213*
(I)Intemational 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.

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.

5213*
International Business Finance. Prerequisite: 5353. 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: 5353. Selected investment topics and advanced portfolio management techniques.

5243*
Financial Markets. Prerequisite: 5353. An analysis of the structure of financial markets, the determination and behavior of interest rates, the functioning of and the flow of funds.

5353*
Theory and Practice of Financial Management. Prerequisite: ACCTG 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.

5550*
Special Topics in Finance. 1-6 credits, maximum 6. Prerequisite: 5353. Theoretical and applied aspects of specialized financial areas. Evaluation of models, current trends and problems.

5613*
Corporate Financial Planning. Prerequisite: 5353. 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.

6513*
Theory of Finance. Prerequisite: 5353. 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 (FIRET)

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. Prerequisite: 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. Prerequisite: prior or concurrent enrollment in all other fire protection courses. 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. 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.

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.

3684
Industrial Loss Prevention. Lab 3. Prerequisites: 1213, 1373, 2483 and 3013; corequisite: ENGL 3323 or consent of instructor. Specific industrial processes, equipment, facilities and work practices for detecting and controlling potential hazards.

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, PHYSC 1114. Description, operation and application of quantitative instruments in general use in industrial hygiene.

4153
Issues in Local Government and Fire Services. Prerequisites: 1213, 2153, MGMT 3013. Current and significant issues that affect local government fire services. The role of the fire service within a local government; management skills necessary to function in a modern system of management. Resources for current information are identified.

4333
System Safety Management. Lab 3. Prerequisites: 2344, 3013, 3143 and 3684. Fire/safety techniques to recognize, evaluate and control potential occupational hazards. Critical path, LAD, PERT and human factors concepts.

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.

4993
Advanced Fire and Safety Problems. Prerequisites: prior or concurrent enrollment in all other required FIRET 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.

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. One-week segment of a nine-week summer field session. Use, values and management of forests and associated natural resources including wildlife, watershed, recreation, range, wilderness, minerals and timber. Visitations to natural resource agency lands and projects. (Condensed laboratory course taught as a one-week summer field course.)

3003
Forest Mensuration iI. Prerequisite: 2003. Three-week segment of a nine-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. (Condensed laboratory course taught as a three-week summer field course.)

3012
Timber Harvesting and Wood Utilization. Two-week segment of a nine-week summer field session. Overview of timber harvest systems, methods, equipment, and planning, including topics in timber procurement, timber sales, harvest economics, logging safety, environmental considerations, and industrial operations. Forest products processing, manufacturing, and marketing. Tours to logging operations and production facilities. (Condensed laboratory course taught as a two-week summer field course.)

3013
Silvics and Field Silviculture. Prerequisites: 2134; BIOL 1403. Three-week segment of a nine-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. (Condensed laboratory course taught as a three-week summer field course.)

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.

3554
Wood Properties. Lab 2. Prerequisite: 3002. Structure, properties, identification of wood; treatment of forest products.

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; AGEC 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.

4103*
Wood Treatments and Preservation. Prerequisite: **3554.** Industrial treatment of wood with respect to drying, adhesion, protective coatings, resistance to decay, and dimensional stability.

4113*
Forest Products. Prerequisite: 3554. Production, distribution and uses of major forest 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. Prerequisite: 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 einvironmental, 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*
(N)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.

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.

5762*
Forest Tree Breeding. Prerequisite: 3443. The application of silvicultural and genetic principles to the commercial production of genetically improved forest trees.

5813*
Land Use and Water Quality. Prerequisites: a basic hydrology class, general chemistry. Nonpoint source pollution; relationships between land use and water quality with an emphasis on forestry, mined land, agriculture, and urban land uses. Focus on current research.

6000*
Research and Thesis. 1-9 credits, maximum 30. Prerequisite: 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 (FRNCH)

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 1 112. 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
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
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
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
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.

3013
French for Reading Requirements. Prerequisite: graduate standing or consent of instructor. Translation of French readings into English.

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
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
Advanced Grammar. Lab 1. Prerequisite: 20 hours of French or equivalent. May be taken before or after 3203.

3343
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
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
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
Orientation to internship Abroad. Prerequisites: 12 hours of French or equivalent proficiency. Preparatory course for summer practicum in French-speaking country.

3903
(H,I)Intemship Abroad. Prerequisite: 3902. Practical studies in a French-speaking country. Supervised research papers and reports, and oral testing, during and following the practicum.

4113
(H)French Literature in Translation. Cultural and humanistic significance of French literature; reading and discussion of selected complete works, using combined lecture, discussion and seminar approaches. Independent tutorial study encouraged for part of course. Taught in English.

4153
(H)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)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)Hlstory 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)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)Background of Modern French Civilization. Prerequisite: 20 credit hours of French or equivalent. Capstone course.

4550
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)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 Administration (GENAD)

4213*
Administrative Strategies for Women in Business. Identification and analysis of the theoretical concepts and practical tools enabling a woman to demonstrate effectiveness in the business environment. Changing advancement opportunities for women, clarification of career goals, conflict management, delegation of authority, division of labor, decision making, motivation, supervision and analysis of executive styles.

General Engineering (GENEN)

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)

1103
Industrial Materials. Structures, physical and mechanical properties *of* industrial materials used in manufacturing processes. Methods *of* testing industrial materials; methods of production of metals.

1153
Engineering Design Graphics with CAD. Lab 6. Sketching and using CAD system to generate 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 design technology with consent of their advisers.

1222
Machine Tool Practices. Lab 3. Fundamental hand and machine tool processes; correct usage of tools and instruments. Cutting, filing, squaring, drilling, reaming, tapping, threading, boring, milling and precision inspection.

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 PHYSC 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.

Genetics (GENE)

5102*
Molecular Genetics. Prerequisites: BIOCH 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. The major organizing concepts of economic and cultural geography. Man's geographic behavior in terms of his spatial organization of the earth's surface and his development of regional and political systems.

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.

3023
(N)Climatology. Characteristics and distribution of world's climate. Patterns and associations of temperature, precipitation, pressure and winds, Field trips.

3033
(N)Meteorology. Physical elements which cause and influence weather.

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
(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.

3143
(S)Historical Geography. The reconstruction of the historical landscape of selected regions from a geographical point of view. Spatial relationships recorded in journals and literature of the past in the light of the present. These materials related to present through sequential developments of patterns of spatial organization.

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.

3313
Cartography. Lab 2. Prerequisite: junior standing. Theory, design, and effective portrayal of data on maps.

3333
Spatial Analysis. Prerequisite: STAT 2013. The utility and goals of geographic inquiry in the solution of problems including concepts of spatial structures, distributive processes, networks, interactions and areal associations.

3703
(S)Geography of Oklahoma. Geographic interpretation of physical, economic, historical and scenic features.

3713
(S)Geography of the United States and Canada. A geographic analysis of the United States and Canada with emphasis on regional variations of social, economic and physical phenomena.

3723
(I,S)Geography of Europe. Location and analysis of natural, economic and cultural features of Europe.

3733
(I,S)The Former Soviet Bloc. 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.

4003*
Natural Hazards and Risk Assessment. Human perception of and response to extreme natural events (such as tornadoes, floods, earthquakes, drought and disease). Examination of mitigation and relief procedures at local, state and national levels.

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: BISC 1403 or BISC 1603 or consent of instructor. Distribution of plants and animals and processes causing distribution. Human impact on biotic resources considered along with policy and management practices.

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.

4163*
Geography of International Economic Systems. Prerequisite: 2253 or 3163. Emphasis on international flows of goods and services resulting from differences in comparative economic advantages. International trade and aid patterns from a geographic perspective. Resource use, transportation patterns, and levels of economic development.

4173*
Geography of Retail Location. The critical role that geography plays in marketing decisions. Emerging socio-economic and life-style trends and the changing spatial pattern of American cities.

4183*
Regional Analysis. An introduction to methods of examining and analyzing economic dimensions of regions.

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.

4313*
Field Techniques and Geodata Collection. Prerequisite: STAT 2013. 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. Use of packaged computer programs to produce maps on both the printer and the plotter.

4333*
Remote Sensing. Lab 2. Prerequisite: 3523 or FOR 3882 or GEOL 3202 or 5153. 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. Lab 1. Prerequisite: 4323 or 4333 or consent of instructor. Evaluation and application of various manual and computer-assisted Geographic Information Systems (GIS); sources of data, conceptual approaches, equipment, and software. Discussion of various output products, specific applications, and GIS relationships to modeling.

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.

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.

4921*
Applications of Geographic Analysis. Prerequisites: 3523, 3533. For geography majors or minors only. Applications of concepts and techniques relating to the students' specializations. Designed to reinforce and synthesize knowledge gained from previous course work.

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. Spatial perspectives of selected topics in resource geography.

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.

5160*
Regional Analysis and Development Seminar. 1-3 credits, maximum 9. Prerequisite: 4183. Application of regional analysis.

5313*
Geographical Analysis. Lab 2. Prerequisite: one course in statistics. Application of models to geographic problem solving. Library, field techniques questionnaires and data processing in geographic research contexts.

5343*
Advanced Geographic Information Systems. Lab 3. Prerequisite: 4343. Theory and methods of design, development, implementation, and applications of geographic information systems.

5403*
Progress in Geography. 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)Geoiogy 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
(N)Prehistoric Life and Development of the Continents. Lab 3. Prerequisite: 1014 or 1114 or consent of instructor. Earth formation and the development *of* continents and oceans through time including the origin and evolution of life. Field trips 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, PHYSC 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 and Mountain Building. Prerequisite: 3014. Principles and major concepts of plate tectonics, the unifying theory of earth sciences. Tectonic evolution of major mountain chains of North America, Europe and Asia 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 groundwater systems as well as general problems related to ground-water occurrence, quantity, quality and pollution. Field trip required.

4463*
Hydrogeology 11. 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*
(N)Global Geologic Resources. Prerequisite: 1014 or 1114 or consent of instructor. Description, distribution and analysis of global mineral and energy resources. Economics of mining, transporting and use by industrial societies. Field trips required.

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 micropaleontology. 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: PHYSC 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.

5373*
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.

5443*
Engineering Geophysics. Lab 3. Prerequisites: 1114 or 3024; PHYSC 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,** COMSC 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.

5473*
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.

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
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
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
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
German for Reading Requirements I. Reading in the humanities and the sciences. Translation from German to English.

3023
German for Reading Requirements II. Prerequisite: 3013 or equivalent. Intermediate and advanced reading in the humanities and sciences. Translation from German to English.

3343
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
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)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
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)Survey of German Literature I. Prerequisite: 20 credit hours of German or equivalent. German literature from the beginning to 1785.

4163
(H)Survey of German Literature II. Prerequisite: 20 credit hours of German or equivalent. German literature from 1785 to the present.

4333
(H)Backgrounds of Modem 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)The Age of Goethe. Prerequisite: 20 credit hours of German or equivalent. Principal figures of German Classicism and Romanticism.

4523
(H)19th Century German Theater. Prerequisite: 20 credit hours of German or equivalent. Kleist, Buchner, Grillparzer, Hebbel, Hauptman and others.

4533
(H)19th Century German Novelle and Lyric. Prerequisite: 20 credit hours of German or equivalent. Prose and lyric from Romanticism to Naturalism.

4543
(H)20th Century German Literature. Prerequisite: 20 credit hours of German or equivalent. Main currents in German literature from Naturalism until present day.

4550
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. Credit will vary depending on the program of each traveling scholar, maximum 12. Prerequisite: graduate-degree candidacy. 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 (GREEK)

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 (HLTH)

2213
Foundations in Health Education and Wellness. Analysis of major concepts, e.g., degenerative disease, human exercise capacity and health behavior.

2220
Laboratory and Clinical Experiences in Health. 1-3 credits, maximum 3. Prerequisite: health majors and minors. Directed observation and supervised laboratory and clinical experiences in appropriate teacher education and wellness program areas. Graded on a pass-fail basis.

2602
First Aid. Lab 2. A competency- and performance-based first aid course.

2603
Total Wellness. Knowledge, attitudes and practices related to self-direction of health behavior for total well-being.

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.

3613
Community and Consumer Health. Structure and function of community agencies and programs related to health and parameters essential for being an informed consumer.

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.

3901
Pre-internship Seminar. Prerequisite: junior standing. Capstone course for the community wellness program that prepares majors for the health internship experience.

4033*
Alcohol and Drug Education. Use and misuse of alcohol and drugs. Physiological and psychological effects of drugs and the attendant problems of abuse. Guest speakers from several disciplines lend an interdisciplinary approach. Current education materials and rehabilitation programs.

4433*
Program Design in Health Promotion. Prerequisite: 2603 or consent of instructor. Theory and practice of effective health promotions with emphasis on ethnicity, behavior, learning theory, development levels, and cultural background.

4480
Internship in Health. 6-12 credits, maximum 12. Prerequisite: last-semester-senior year with cumulative GPA of 2.50. Supervised experience in either the school or community related settings in order to qualify for appropriate teaching and/or professional certifications. 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.

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.

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.

4902
Athletic Therapy Modalities. Lab 1. Prerequisite: 2663. Commonly used therapeutic devices used for training rooms.

4983*
Human Electrocardiographic Interpretation. Prerequisite: PE 3114. Knowledge concerning the collection and interpretation of the electrocardiogram (EKG) and its relationship to heart anatomy, physiology and electrophysiology.

4992
Athletic Rehabilitation. Lab 1. Prerequisite: 2663. Scientific methods in conditioning athletes and rehabilitation of injured athletes. Practical rehabilitation will be under the direct supervision of the OSU medical faculty.

4993*
Strategies in Teaching Human Sexuality. Prerequisite: 2603 or consent of instructor. Development of techniques, strategies, and methodologies for teaching sex education in schools and/or community settings.

Health, Physical Education and Leisure (HPEL)

3010
Health, Physical Education and Leisure Sciences Workshop. 1-3 credits, maximum 6. Concentrated study of selected areas of health, physical education and leisure sciences. Problems in instruction and administration not normally available in undergraduate curriculum.

3763
Health and Physical Education for Elementary Age Children. Prerequisite: HLTH 2603. Methods of teaching health and physical education to elementary age children. Two eight-week sessions: one session for health and nutrition instruction, and one session for physical education instruction.

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.

5000*
Thesis or Report. 1-6 credits, maximum 6.

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, Physical Education and Leisure Workshop. 1-6 credits, maximum 6. Selected areas of health, physical education and leisure.

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, Physical Education or Leisure Sciences. 1-6 credits, maximum 6. Individual investigations.

5043*
Trends and Issues in Health, Physical Education and Leisure Sciences. Major trends and issues in higher education and professional preparation; principles, practices, problems and improvements in HPEL; future needs and program innovations.

5053*
Research Design in Health, Physical Education and Leisure. Prerequisites: PSYCH 5303 or STAT 5013 or equivalent. Research design with applicability toward HPEL. Provides the student with a conceptual understanding of theory, tools and processes involved in designing research studies.

5073*
Sport: Psychological Aspects. Psychological foundations of sport emphasizing performance enhancement by athletes through psychological training techniques.

5143*
Health Promotion and Marketing. Prerequisite: HLTH 4433. Conceptual framework in dealing with health topics as they apply to targeted populations. Direction in developing needs assessment and measuring tools in behavioral modification with strong emphasis on health promotion proposal writing and marketing strategies.

5403*
Interpretive Services in Recreation. 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 Recreation. Systematic approach to problem solving and decision making for structure, personnel management, finance and program development for recreation delivery systems.

5423*
Camp Administration and Programming. Management, budget, site development, program evaluation and selection and training of personnel.

5433*
Development of Leisure Services Delivery Systems. Concepts and principles of administration and management, including planning, organization, supervision and evaluation for a variety of leisure services delivery systems.

5443*
Social Foundations of Recreation and Leisure. Social and philosophical foundations of recreation and leisure with emphasis on the contributions of recreation and its effect on humans throughout history.

5453*
Practicum for Human Service Professionals. A wilderness-based program for educators and human service professionals utilizing Colorado Outward Bound Schools experiential educational model for adapting traditional teaching methodologies.

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 the Physically Disabled. Prerequisite: LEIS 3483 or consent of instructor. Role of therapeutic recreation in the treatment and rehabilitation of individuals with physical disabilities with emphasis upon terminology, prognosis, etiology of specific disabilities program development and assessment.

5493*
Recreation for the Emotionally Disturbed and Mentally Retarded. Prerequisite: LEIS 3483 or consent of instructor. Leisure services for the emotionally disturbed and mentally retarded with emphasis upon prognosis, treatment and methodologies of recreation programs.

5513*
Organization and Administration of School and Community Health Education. Basic functions and principles of organization and administration pertaining to both school and community agencies.

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.

5613*
Cardiac Rehabilitation. Prerequisites: HLTH 2653 and PE 3114 or equivalent. Factors involved in cardiovascular disease. History, implementation and administration of cardiac rehabilitation programs.

5663*
Physical Education for the Learning Handicapped. Characteristics, psychomotor development and functioning of mentally retarded, learning disabled and emotionally disturbed individuals. Knowledge base and practicum experience for providing assessment, prescription and programming services for individuals with learning handicaps.

5723*
Curriculum Development In Health, Physical Education and Leisure Services. Identification and analysis of curriculum theories with emphasis on traditional and innovative approaches to curriculum design for programs in HPEL.

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 the Physically Handicapped. Prevention, detection and correction of remediable physical defects.

5793*
Mechanical Analysis of Physical Education Activities. Prerequisites: 5843 and PE 3663. Application of physical laws to physical education activities.

5823*
Advanced Applied Anatomy. Prerequisite: HLTH 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: PE 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: PE 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 and higher education with emphasis on grant writing, public relations, interdisciplinary strategies, and advocacy.

6000*
Doctoral Thesis. 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, Physical Education and Leisure Services. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Supervised readings, research or independent study of trends and issues related to the areas of health, physical education and leisure studies.

6020*
Research Colloquium. 1-3 credits, maximum 6. Exploration and presentation of selected topics and research in health, physical education and leisure.

6060*
Statistical Computing and Proposal Writing. 1-3 credits, maximum 3. Prerequisite: 5053. Instruction in the use of SPSS and BMDP software using the University mainframe. Preparation of research proposals for students in health, physical education and leisure.

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 POLSC 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 POLSC 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 POLSC 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 POLSC 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.

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)Eastem 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)Eastem 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. cial, 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)Modem 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)Imperlal 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.

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 modem 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 lumbus 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.

3923
(S)Science in Society. Impact of science on society and of society on science during selected periods of history.

3943
(H)Religion in America. Impact of the varieties of American religious experience on national life.

3953
(t1,1)Religfon 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.

4533
(S)Blacks in America. Achievements of blacks in America and their participation in the development of the United States.

4543
Indians of Oklahoma. The Five Civilized Tribes and Plains Indians and their role in the history of Oklahoma to the present.

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 (HONOR)

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 lecture and discussion format. For the Honors student. No credit for students with prior credit in HONOR 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 HONOR 2113.

1033
(H)The Early Modem 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 HONOR 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 HONOR 2223.

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,I)Ethicai 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. Prerequisite: 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 **ap** roved public and private employers in horticulture and related fields. Credit will not substi**tute** 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.

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 AGRON 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.

3083
Plant Propagation. Lab 1. Prerequisites: 1013, AGRON 2124 and BIOL 1403. BOT 3233 and 3463 suggested. 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, AGRON 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.

3312*
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.

3322*
Landscape Plant Materials II. Lab 2. Prerequisites: 3312 and BIOL 1114 or 1403. Identification, adaptation, tolerance and use of evergreen trees, shrubs, vines and ground covers in the landscape.

3433*
Commercial Vegetable Production. Prerequisites: 1013, AGRON 2124 and BIOL 1403. Commercial production and marketing of vegetable crops.

3544*
Nursery Production. Lab 2. Prerequisites: 3312 and 3322, AGRON 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.

4212
Vocational Horticulture. Lab 4. Prerequisite: concurrent enrollment in AGED 4200. An overview of horticulture including floriculture, ornamentals, vegetables, landscape design, fruits and nuts as they relate to vocational agriculture programs. Taken in conjunction with AGED 4200.

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.

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.

5122*
Temperature Stress Physiology. Prerequisite: BIOCH 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.

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.

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, AGRON 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 2113. Analysis and development of service management skills, including leadership behavior, motivation, communication, training, staffing and professional service staff behavior.

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.

3363
Lodging Front Office Systems. Lab 2. Prerequisites: ACCTG 2203. 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. Prerequisite: 3213. Supervised experience in an approved work situation related to a future career in the hospitality industry.

3473
Mechanical Equipment and Building. 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, completion of 60 credit hours. 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: junior standing. 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.

4223*
Concepts and Practices in the Tourism Industry. Prerequisite: GEOG 2253 or consent of instructor. Handling and managing group tours involving airline, ocean-going, and ground transportation. Economic impact of tourism on related hospitality industry operations. Travel industry financial management, technology, economic planning, and policy formulation. The creation of the corporate travel department.

4333*
Food, Beverage and Labor Cost Controls. Prerequisites: ACCTG 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. Conceptional 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. Prerequisites: 3473, 4365. 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 Hospitality Industry Administration. Prerequisites: completion of all required HRAD course work, including concurrent courses. 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 4. Prerequisites: 4365, MGMT 3313. Study of policy and procedure influencing the human side of hospitality management. Management decisions of multi-unit franchising, finance, menu strategy and marketing.

4983*
Conference and Meeting Planning. Prerequisite: junior, senior or graduate standing; an upper-level management and promotion or sales course. 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.

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.

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.

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 6. 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 6. 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.

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.

5151*
Interdepartmental Seminar. Analysis of current issues from the perspective of human environmental sciences. Application of research findings related to issues.

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.

Industrial Engineering and Management (INDEN)

2903
Introduction to Industrial and Systems Engineering. Lab 2. Prerequisites: ENGR 1412; 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. Corequisite: ENGSC 3313. Manufacturing processes used to transform raw materials including metals and nonmetals 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, breakeven 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 or 2713. 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.

3603
Industrial Operations Analysis. Prerequisite: sophomore standing. Production management, covering the main aspects of organization, design and control. Decision making within a systems approach. Not available for credit in industrial engineering curriculum.

3703
Engineering Computation and Interactive Modeling. Prerequisites: ENGR 1412 or COMSC 2123; and MATH 2145. Advanced programming techniques using pseudocode and Pascal. Using the computer for engineering analysis, design and problem solving.

3802
Industrial Safety Engineering. The theory of safety engineering with emphasis upon fundamental concepts in the industrial environment.

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 3623, 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 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: 3312, 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. Lab 3. 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. Lab 2. Prerequisites: 3503, ENGSC 2213, 3233. 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. Philosophy is to improve profits through optimal energy and water utilization. Outside speakers utilized when appropriate. Lab work required on audit equipment.

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*
Quantitative Foundations for Industrial Engineering. Prerequisite: MATH 2233 or 3623. Fundamental quantitative methods necessary for advanced study in various areas of industrial engineering. Includes matrix algebra, real analysis, calculus of finite variables and transform methods. Application of theorems to industrial engineering and related areas.

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 algarithm 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 simplexing 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 COMSC 5013.

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.

5032*
Sequential Decision Processes and Dynamic Programming. Prerequisites: 4014, 5003. The determination of policy that optimally allocates resources to the various stages of a finite-stage system. Deterministic and stochastic systems including serial systems, diverging branch systems, converging branch systems and loop systems.

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 Baldridge 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. Prerequisite: 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. Computer-aided design (CAD) and computer-aided manufacturing (CAM). Design, development, implementation and operation of modern manufacturing systems. Prototype systems design, implementation and testing as well as applicable systems engineering concepts.

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*
Theory of Systems Organization I. Prerequisite: 4413 or concurrent enrollment. Advanced study of the engineering organization and management process. Engineering process, activities, roles, and current issues.

5503*
Advanced Engineering Economic Analysis. Prerequisites: 3503, 4014, STAT 4033. Objectives and functions of the firm. Advanced treatment of interest and equivalence, using discrete and continuous cash flows. Transform techniques in cash flow modeling. Depreciation and corporate taxation. Selecting the MARR. Deterministic and stochastic alternative selection, including decisions under risk and uncertainty. Utility theory. Capital budgeting models. Evaluation of public sector investments and public utilities. Replacement analysis.

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. Manufacturing planning and control philosophies and methods for production. Materials requirements planning, including information integrity, capacity planning, shop floor control, purchasing, master scheduling, production planning, and demand management. Also just-in-time as used in both Japan and the U.S., including total quality control, total cost reduction, and total productive maintenance.

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 aggregrate 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. Prerequisites: STAT 4033 and FORTRAN. 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 SLAM simulation language.

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: 3813, STAT 4013 or STAT 4053. 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.

5933*
Artificial intelligence and Expert Systems. Lab. 2. Prerequisite: graduate standing in industrial engineering and management. 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, ECEN 5293 and MAE 5793.

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 numeration, branch and bound, and cutting methods. Same course as COMSC 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*
eory of Systems Organization 11. Prerequi- site: 5413 or consent of instructor. Theory and practice of internal and external engineering consulting. Investigation of the engineering-client interface, effective engineering consultations in relationship to existing organizational cultures and practices, and the engineering 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, noninfor-mative 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.

Japanese (JAPAN)

1115
Elementary Japanese. Pronunciation, conversation, grammar and reading.

2115
Intermediate Japanese I. Prerequisite: 1115 or equivalent. Reading, the writing system, culture, grammar, conversation.

2123
Intermediate Japanese II. Prerequisite: 2115 or equivalent proficiency. Oral and written practice of Modern Japanese. A continuation of 2115.

2223
Intermediate Japanese III. Prerequisite: 2123 or equivalent proficiency. A continuation of 2123.

3012
Advanced Japanese Conversation I. Designed to increase facility and naturalness of delivery in dialogue. Development of general oral and aural proficiency.

3112
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.

3233
Introduction to Technical Japanese. Prerequisites: 3133 or equivalent; concurrent enrollment in 3333. Introduction of the student to scientific and technical Japanese.

3333
(I)Readings in Japanese 11. Prerequisite: 3133. Designed to be taken concurrently with 3233.

Journalism and Broadcasting (JB)

1393
Mass Media Style and Structure. 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.

2393
Reporting. Lab 3. Prerequisite: 1393. Reporting and writing through enterprise techniques for news coverage.

2413
News Editing I. Lab 3. Prerequisite: 2393. Copy editing, design and headline writing for newspapers and magazines.

2873
Radio Production Techniques. Lab 3. Prerequisite: 1393. Theory and practice of communication using electronic media. Students prepare and present materials in a broadcasting situation.

3013
Advertising Media and Markets. Prerequisite: 2013 or consent of instructor. Analysis and evaluation of mass media for advertising; media and market research; media plans, budgets and sales presentations; advertising law and ethics.

3163
Mass Communication Law. Statutes and case decisions in print and broadcast law, including government regulation of broadcasting by the FCC and media relations with other regulatory agencies.

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.

3283
Public Relations Case Studies. Prerequisite: 2183 or consent of instructor. Case-study analysis of public relations techniques, policies and programs in specific areas of public relations practice.

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.

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.

3393
Computer-assisted Journalism. Lab 6. Prerequisite: 3553. 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.

3400
Journalism, Advertising and Public Relations Laboratory. 1-3 credits, maximum 5. Prerequisites: junior standing and completion of 1393, 2393, or 2413 or consent of instructor. Laboratory and/or internship practice for qualified students who wish creative communications experience beyond that available in the classroom.

3413
Public Affairs Reporting. Lab 5. Prerequisites: 2393, POLSC 3613. Coverage of social problems, people and events in fields of government, business, science, sports and entertainment.

3423
News Editing II. Lab 6. Prerequisite: 2413. 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.

3553
Radio and Television News Writing. Lab 3. Prerequisite: 2393. 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 3. Prerequisites: 2013, 2413. 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.

3900
Radio-Televislon Laboratory. 1-2 credits, maximum 5. Lab 6. Prerequisites: junior standing and completion of 1393 and 3553, or consent of instructor. Preparation and participation in all phases of radio-television and cable through active internship program.

3913
Television Production. Lab 3. 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.

4223
Broadcast Sales. Prerequisites: 1393, 2873. 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.

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.

4360
Special Problems in Journalism and Broadcasting. 1-3 credits, maximum 6. Prerequisites: junior standing, a minimum of 3.00 GPA, and consent of instructor. Independent study and project development to fit the student's major or minor specialization.

4413
Advanced Reporting and Writing. Lab 5. Prerequisite: 2413. Enhancement of writing style and reporting techniques: evaluation of sources and polling practices, and investigative coverage of newsmakers and events.

4433
Feature Writing for Newspapers and Magazines. Prerequisite: 15 semester hours of English or journalism, including 4413 for journalism majors. 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 newswriting and other communication methods; the role of the news media in agriculture and related fields. Same course as AGCOM **4453.**

4493
Public Relations Media. Lab 6. Prerequisites: 2183, 2393. 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: **3553** and 3913. 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
Advanced Advertising Copy and Layout. Lab 3. Prerequisites: 3013, 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. Lab 3. Prerequisite: 4653. 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 3. Prerequisite: 3603. Functions and characteristics of broadcast advertising; copywriting, scriptwriting, story boards, marketing plan; film and videotape commercial production.

4843
Public Relations Programs. Prerequisite: 4183. Research, preparation and presentation of public relations campaigns. Integration of public relations principles and methods; work in teams in organizational and agency situations.

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, utilizingg 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. Prerequisite: 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: CIVEN 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 Ill. 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 only during the summer session. Can be substituted for landscape architecture design courses II through IV.

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.

4584*
Landscape Environmental Planning. Lab 6. Prerequisite: 3324. Development of landscape architectural projects in the context of conservation, preservation, urban, regional planning and other developmental design problems encountered by the landscape architect.

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 (LATIN)

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.

Leisure (LEIS)

1212
Beginning Swimming. Lab 2. Theory and practice of swimming strokes; techniques and basic water safety skills.

1222
Beginning Fencing. Lab 2. Theory and practice of foil fencing; fundamentals of footwork, defense, and attack; tactics and strategy; bouting; officiating and etiquette.

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 minitramp.

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
Modem Ballet. Lab 2. Theory and practice of fundamental skills and techniques of ballet through the use of modern themes.

2282
Beginning Jazz Dance. Lab 2. Theory and practice of fundamental skills and techniques for the contemporary form of jazz dance.

2292
Beginning Jazz and Tap Dance. Lab 2. Theory and practice of fundamental skills and techniques for jazz and tap dancing.

2312
Modem 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 Recreation and Leisure. 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 which serve the recreation needs of society.

2422
Social Recreation. Lab 2. Methods and materials for planning, organizing and conducting social activities for groups of various sizes and ages in a variety of social situations.

2433
Introduction to Therapeutic Recreation. Theory and application of therapeutic recreation with emphasis on types of illnesses and disabilities, delivery systems, programming and 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.

3430
Practicum. 1-3 credits, maximum 3. Prerequisites: 2413, 2422. Supervised practical experience with leadership responsibilities for planning, conducting and evaluating activities and programs. Graded on a pass-fail basis.

3453
Theory of Recreation Leadership. Principles and practical applications of group leadership techniques; 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-intemship Seminar. Prerequisite: completion of 15 hours in LEIS. Preparation for internship in recreation and leisure services.

4213
Water Safety Instructorship. Lab 1. Prerequisite: American Red Cross Emergency Water Safety or Lifeguard Training Certificate. 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 Recreation. Prerequisites: 3463, PE 3773. Planning, design and development of areas and facilities in recreation and physical education.

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. 6-12 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.

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*
Industrial and Commercial Recreation Management. Prerequisite: 3463. Industrial and commercial recreation management: budgeting, facilities, programming and operational procedures.

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 cornpetencies in back country navigation, emergency medical care and evaluation, winter Nordic mountaineering, technical rock climbing, hazard analysis and expedition planning.

Library Science (LIBSC)

1011
The Use of Libraries and Learning Resources Centers. Orientation to the use of libraries and learning resources centers, including the special book and nonbook features of the OSU library, basic materials and services.

3023
Management of School Libraries and Learning Resources Centers. Introduction to practical problems in management of library learning resources centers; state, regional and national standards; understanding of the routines, methods and records necessary for the daily operation and supervision of the elementary or secondary school center; direction and training of student assistants; consideration of established library policy in school and community relationships.

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.

4213*
Selection of Book and Nonbook Materials. Selection principles, practices and problems in terms of library and learning resources centers objectives; examination of basic bibliographic aids and reviewing media involved in book and nonbook selection; analysis and practice of annotations; oral and written reviews of books, films, instructional materials and other media.

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.

4550*
Special Studies in Libraries and Learning Resources Centers. 1-6 credits, maximum 6. Designed to meet individual and group needs of library educational media specialists, teachers and others; includes enrichment tours and workshop or institutes.

5013*
Libraries in the Social Order. Prerequisite: consent of instructor. Libraries and the profession of librarianship; evolution of the library as a social institution; functions of modern library; implications of new media and techniques on library service; survey of professional library literature; professional philosophy and ethics.

5613*
Bibliography of Special Fields. Prerequisite: consent of instructor. Bibliographical literature and data banks in the humanities, sciences, and social sciences; theory and underlying principles, practices, and control of descriptive and systematic bibliography; practice in preparation of subject bibliographies. Print and computer data banks.

5713*
Documents and Pamphlets Material. Introduction to the most-used governmental publications and indexes; selection, acquisition and care of pamphlet materials.

Management (MGMT)

3013
Management. Prerequisites: completion of 50 credit hours and ACCTG 2203, ECON 2013, MSIS 2103, STAT 2023. Management principles and techniques of analysis. Decision making as applied to management systems, organizations, interpersonal relationships and production.

3123
Organizational Behavior and Management. Prerequisites: 3013, and SOC 1113 or PSYCH 1113. Behavioral science concepts relevant to the study of organizational and managerial behavior. Provides an understanding of the components and dynamics of organizational behavior essential to any manager. Managerial applications stressed.

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 orga= nizations. 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.

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
Innovation and Technology Management. Prerequisite: 4313 or equivalent. Business applications of research, practice, and theory in the management of innovation and technology at the enterprise level. Essential tools, techniques, and methodologies required to manage the development and application of new product and process technologies, innovative services, and other innovations that enhance performance.

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 Personnel Management. Prerequisite: admission to MBA program or consent of MBA director. Theory and application of methods used in managing human resources in public and private organizations. Function, methods and characteristics of a personnel program.

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, fife 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 COMSC 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.

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, ACCTG 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.

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.

4223*
Management Information Systems. Prerequisites: 3223 and an introductory course in computing. Design, operation and implementation of computer-based information systems for decision making: current developments in management information theory. Value of information, data bases, decision support systems, interactive languages and statistical software; and applications to managerial problems in marketing, manufacturing and finance.

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.

4413*
Management Systems Applications. Prerequisites: 3233 and a course in a scientific programming language. Development and implementation of complex computerized decision models. Projects include data-base utilization, optimization and report generation.

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, BUSAD 5003, ACCTG 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: BUSAD 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 orientated 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.

Manufacturing Technology (MFGT)

3343
Physical Metallurgy. Lab 3. Prerequisite: GENT 1103 and CHEM 1314. Ferrous and nonferrous metals including alloy steels and cast irons. Atomic theory, dislocation theory and corrosion. The influence of micro-structure and heat treatment on the mechanical properties of metals. Metallographic specimen preparation, inspection and testing.

3573
Production Processes. Lab 3. Prerequisites: GENT 1103, MATH 1513. Processes used by the manufacturing industries in the production of durable goods. Foundry, plastics, powder metallurgy, hot and cold forming, and welding. Techniques of design, application and selection.

4050
Advanced Manufacturing Problems. 1-4 credits, maximum 4. Prerequisites: junior standing and consent of instructor. Special problems in manufacturing.

4303
Computer Integrated Manufacturing. Prerequisites: GENT 1103, 1222, MATH 1613. Introduction to programming techniques and manufacturing applications of Computer Numerical Control (CNC). Machine capabilities and tooling requirements, with programs being prepared manually and with computer assistance.

4313
Applied Robotics and Automated Manufacturing. Lab 3. Prerequisite: ECT 3003 or ECT 3103. Industrial applications of computer-controlled robotic and automated manufacturing equipment. Emphasis on machine characteristics, techniques of efficient utilization and control, and evaluation criteria.

4453
Physical Metallurgy of Nonferrous Metals. Lab 3. Prerequisite: GENT 1103. Properties and selection of nonferrous metals, ceramics, polymers and composites. Includes aluminum, coppers, titanium, ceramics, refractories, polymers, composite fibers, matrix materials, and metal matric composites.

4883
Tool Design. Lab 3. Prerequisite: 3433, MECDT 2213. Basic design and development of special tools for processing or manufacturing engineering materials. Design and specification of jigs, fixtures, assembly, fabrication and inspection tools using appropriate techniques of engineering graphics and analysis,

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 vanety 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.

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.

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: JB 4723 or consent of instructor. Trade area surveys; building and plant engineering; management of human, physical and financial assets; labor-management relations; estimating and cost controls.

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.

5231*
Global Competitive Environment. Prerequisites: 5122, 5142. Study of economic interrelationships and interdependence among nations. Role of trade relationships, pacts and policies.

5241*
Managerial Communication Skills. 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*
Integrative Decision Making I: The Corporate View. Prerequisites: consent of MBA director and completion of minimum of 15 MBA credit hours. Integration of knowledge and skills developed in MBA functional courses. Strategic decision making within the context of the firm's internal and external environments.

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.

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 from their graphs. Linear, exponential, logarithmic, periodic functions and rates of change. Special emphasis on 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.

2603
Finite Mathematics. Prerequisite: 2103. Discrete probability, vectors and matrices and linear programming. For students of business and social sciences.

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 COMSC 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 Modem 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.

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 Modem 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: 4153 and STAT 4113. Measure theoretical presentation of probability, integration and expectation, product spaces and independence, conditioning, different kinds of convergence in probability theory and statistical spaces. 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 INDEN 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. Prerequisite: 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 COMSC 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 COMSC 5543.

5553*
Numerical Analysis for Linear Algebra. Prerequisites: 3013, and 4513 or COMSC 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, OR algorithm, and Lanczos method. Same course a§ COMSC 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. Prerequisites: 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 COMSC 5313 or COMSC 5113 and COMSC 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 COMSC 5653.

5663*
Computability and Decidability. Effectiveness, primitive recursivity, general recursibility, recursive functions, equivalence of computability, definitions, decidability, recursive algorithms. Same course as COMSC 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. Prerequisite: 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 metrizability, 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 Kunneth 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 COMSC 5543, and 5553 or COMSC **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. Prerequisites: 3403, INDEN 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: ENGSC 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. Prerequisite: 3403, co-requisite 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: ENGSC 2142 and ENGSC 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: ENGSC 2213. A continuation of ENGSC 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. Prerequisites: 3403, ENGSC 2213 and 3233. 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, ENGSC 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: ENGSC 3233 and 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 L Lab 3. Prerequisites: ENGSC 2112, ENGSC 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
Dynamic Systems I. Prerequisites: ENGSC 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.

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.

4063*
Mechanical Vibrations. Prerequisites: 3043 and 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 balancing, whirl, nonlinear effects, and self-excited vibrations.

4143
Advanced Materials and Processes. Innovation in advanced materials and processing, building U.S. strengths for maintaining a competitive edge in the market place. Utilizing the U.S. Patent Depository in the OSU Library to research selected areas of advanced materials and/or processing. Student inventions or invention possibilities. Highly interactive, with extensive group discussions.

4223*
Experimental Aerodynamics. Lab 3. Prerequisites: 3113, 3253, 4283. Experimental study of fundamental aerodynamic principles for internal and external flow-fields. Aerodynamic characteristics of airfoils and the finite wing as well as internal duct air flow. Application of low-speed wind tunnel testing techniques along with state-of-the-art instrumentation, diagnostics, and computerized data acquisition/analysis. Flight test evaluation of performance, stability, control, and handling qualities of a propeller-driven airplane.

4243*
Gas Power Systems. Prerequisites: 3223 and ENGSC **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 ENGSC 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, ENGSC 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. Prerequisites: 3123, 3323, ENGSC 3313. 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: ENGSC 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, 4353 or 4703 or 4733. 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: 3112 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: 3033, 3113, 4243, 4283, 4513, 4353 or 4703 or 4733. Multidisciplinary conceptual and early preliminary design of aerospace systems. Prediction of all systems characteristics. 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.

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.

4523*
Aerospace Structures II. Prerequisite: 4513. Deflection analysis of thin-skin structures. Classical methods of structural analysis. Indeterminate aircraft structures.

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 Poinscot 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: ENGSC 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: ENGSC 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 10^8. Design and control of precision machines and instruments, dimensional and surface metrology, scanning probe microscopy, ultra-precision machining and grinding, and precision assembly.

5203*
Inviscid Fluid Mechanics. Prerequisite: ENGSC 3233. Basic principles and analytical methods underlying the theory of the motion of an inviscid and incompressible fluid.

5233*
Viscous Fluid Dynamics. Prerequisite: 4233 or equivalent. 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: 4233. 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.

5293*
Gas Dynamics I. Prerequisite: 4293. Fluid dynamics of compressible flows at subsonic and supersonic speeds for two-dimensional and axisymmetric geometries. Comprehensive treatment of linear aerodynamic theories and the generation and propagation of aerodynamic noise.

5323*
Plasticity and Metal Forming. Prerequisite: ENGSC 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.

5423*
Dynamics of Mechanisms. Static and dynamic force analysis of plane and space mechanisms using vector, matrix and dual quaternion approaches. Simulation of mechanical systems. Study of transient effects. Vibration analysis and balancing of linkages.

5433*
Robotics: Kinematics, Dynamics and Control. Design and performance analysis of robots and manipulators as applied in flexible manufacturing and automation. Structural synthesis, kinematic and dynamic analysis, dexterity analysis, motion programming, and control system analysis and synthesis.

5443*
Lubrication, Friction and Wear. Prerequisite: ENGSC 3233. Theories of lubrication, friction and wear; fundamentals of viscous fluid flow; the Navier-Stokes equations; Reynolds equations; hydrodynamic theory and applications to fixed, pivoted and thrust plane-slider bearings, journal bearings, disks, gears; optimization of bearing performance; hydrodynamic squeeze theory and applications; analysis of hydrostatic bearings; gas lubrication; solid friction and theories of adhesion and deformations; wear and theories of adhesion and abrasion.

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.

5473*
Automatic Control I. Prerequisite: 4053 or ECEN 4413. Input output and state space representations of linear continuous and discrete time dynamic systems. Controllability, observability, and stability. Design and analysis of single- and multivariable feedback control systems. Introduction to identification, adaptive, and optimal control.

5483*
Digital Data Acquisition and Control. Lab 2. 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.

5493*
Software Design for Real-time Distributed Systems. Prerequisite: 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.

5513*
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.

5533*
Analysis of Structural Systems. Prerequisite: 4513. 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*
Modem Materials. Prerequisite: ENGSC 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.

5583*
Corrosion Engineering. Lab 2. Prerequisite: ENGSC 3313. Modern theory of corrosion and its applications in preventing or controlling corrosion damage economically and safely in service.

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.

5723*
Nonlinear Systems Analysis I. Prerequisite: 4053 or ECEN 4413. Failure of superposition; phase plane and phase space techniques; method of perturbations; asymptotic, orbital and structural stability; subharmonic generation; generalized approaches to nonlinear systems analysis.

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*
Fuzzy Systems Theory and Application. Prerequisite: 5723 or ECEN 5723. Fuzzy set theory; basic definitions, operations with fuzzy sets and fuzzy relations; extension principle; fuzzy functions; possibility theory; fuzzy systems; fuzzy models and system identification; approximate reasoning; fuzzy control and stability of fuzzy systems; fuzzy neural networks. Same course as ECEN 5773.

5793*
Artificial Intelligence and Expert Systems. Lab 2. Prerequisite: graduate standing in mechanical engineering. Fundamental concepts: search-oriented problem solving, knowledge representation, losical 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, ECEN 5293, and INDEN 5933.

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: ENGSC 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. Prerequisites: 3253 and knowledge of FORTRAN, or consent of instructor. 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. Prerequisites: 4063, 4283, 4523. Interaction between aerodynamic, inertial and elastic forces. Influence coefficients of modern wings. Calculations of the normal modes and frequencies of flexible airplane and missile structures. Deformations of structures under dynamic loads by rigorous and approximate methods of analysis.

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.

6063*
Stochastic Processes in Physical Systems. Prerequisite: 4063. Application of probability theory to the analysis of physical systems. Introductory probability theory and random processes.

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.

6333*
Modeling of Materials Processing. Prerequisites: 5563 or equivalent, and consent of instructor. Modeling of non-linear materials processing problems in metal forming, heat transfer, polymer processing, and forming of composites. Simulations to be done by various available software. Applicable finite element formulations. Tours of industry to provide additional processing background.

6463*
Fluid Power Control II. Prerequisite: 5453. Computer-aided analysis and design of fluid control systems; effect of system parameters on dynamic performance and stability. Distributed parameter analysis of signal and power transmission lines. Case studies of feedback control systems used in transportation, aircraft and missiles, machine tools and power plants.

6483*
Automatic Control II. Prerequisite: 5473 or ECEN 5413. Methods of formulation and solution of engineering system control problems based on optimal dynamic behavior, advanced techniques for model identification, computational solution of dynamic optimization problems. Applications include mechanical, electrical, fluid and thermal systems.

6543*
Advanced Aerospace Structures. Prerequisites: 4523 and 5533. Modern methods for the design and stress analysis of complex flight structures. Analysis of thin-walled plate and shell structures by exact and approximate analytical methods.

6563*
Advanced Solid Mechanics. General nonlinear 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 Design Technology (MECDT)

1223
Computer-aided Drafting and Design. Lab 4. Prerequisite: GENT 1153 or equivalent. 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.

1843
Descriptive Geometry. Lab 6. The graphical analysis of points, lines and planes in space with practical applications to engineering working drawings.

1913
Computer Systems for Technology. Lab 2. Introduction to microcomputers and mainframe computers. DOS operating system, flow charting, C Programming Language, spreadsheets and graphs. Emphasis on solving problems common to engineering technology.

2213
Machine Drafting. Lab 6. Prerequisites: 1223, GENT 1153 or equivalent. Detail and assembly drawings of machines and products using drafting machines and computer-aided drafting techniques.

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.

3102
Materials Testing. Lab 3. Prerequisite: 3323. Standard test techniques for the determination of the mechanical properties of various materials. Testing of structural components and structures.

3123
Product Design. Lab 5. Prerequisites: 1843 and GENT 1222. Industrial design functions and techniques, the creative process in product design innovations and improvements, human factors (person/machine interface) and techniques in graphic and model presentations of design concepts.

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.

3563
Production Planning. Lab 3. Prerequisites: GENT 1103, 1153, and 1222. Basic forecasting, planning and control of industrial production.

4003
Machine Design I. Prerequisites: 3323 COMSC 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. Prerequisites: 2213, COMSC 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 Problems. 1-4 credits, maximum 4. Prerequisite: junior standing and consent of instructor. Special problems in mechanical design.

4123
Senior Design Projects. Lab 6. Prerequisites: 3123, 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, COMSC 2113, and MATH 2133. A continuation of 4003 emphasizing the design of machine components such as gears, bearings, fasteners, springs, and weldments.

4213
Kinematics and Mechanisms. Lab 6. Prerequisites: 3003, COMSC 2113, GENT 1153. Analysis and design of mechanisms such as the 4-bar linkage, slidercrank, cam and gear. Graphical techniques are emphasized.

Mechanical Power Technology (MPT)

1103
Introduction to Prime Movers. Lab 2. Prime movers as used in the industrial world. Basic principles of design, construction, and operation of internal combustion engines, turbines, electric and hydraulic motors. Laboratory practices in inspection, measurement, and comparisons of characteristics.

2113
Power Transmission Systems. Lab 2. Prerequisite: 2313. Power trains and transmission of power from internal combustion engines by mechanical, hydraulic and electrical means. Manual and automatic transmission, fluid couplings, torque converters, industrial transmissions, electrical systems. Special problems assigned.

2313
Fundamentals of Hydraulic Fluid Power. Lab 3. Prerequisites: ECT 1003, MATH 1513. Basic fluid power concepts. Standard hydraulic symbols, component design and application, fluid power system considerations, design and operation.

2413
Fundamentals of Pneumatic Fluid Power. Lab 3. Prerequisites: 2313, ECT 1003, MATH 1513. Basic pneumatics concepts, gas laws, component design and application, system design considerations. Air logic.

3114
Basic Instrumentation. Lab **4.** Prerequisite: 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, vibrations and constituent analysis.

3123
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.

3313
Applied Fluid Mechanics. Prerequisites: 2313, MATH 2123, and PHYSC 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.

3322
Fluid Mechanics and Properties Laboratory. Lab 2. Prerequisites: 1103, 3313. Utilize standardized test procedures to evaluate properties of fluids, including fuels, lubricants and water. Fluid mechanics tests to demonstrate the principles of fluid piping systems and pressure and flow measurements.

3433
Basic Thermodynamics. Prerequisite: concurrent enrollment in MATH 2123. Basic scientific principles of energy and the behavior of substances as related to engines and systems. Gas laws, vapors and engine cycles.

3503
Gas Turbines for Non-majors. Lab 3. 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.

3553
Gas Turbine Powerplant. Lab 3. Prerequisite: 3433. Major engine sections including accessories and systems. Student participation in engine disassembly, inspection, assembly, operation and testing.

4050
Advanced Technology Problems. 1-4 credits, maximum 6. Prerequisites: junior standing and consent of department head. Special technical problems in a mechanical power area.

4223
Indoor Heating and Cooling Technology. Prerequisite: 3433. Indoor heating and cooling systems, psychometrics, load calculations, equipment selection, operation, and sizing.

4313
Electrohydraulics and Motion Control. Lab 2. Prerequisites: 3313, ECT 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.

4433
Heat Transfer. Prerequisites: 3433 and MATH 2133 or equivalent. Conduction, convection, radiation, condensation and boiling heat transfer. Analysis and sizing of heat exchangers. Methods of enhancing exchange of heat.

4443
Power Station Technology and Design. Prerequisite: 3433. Steam, hydro and internal combustion power plants; technical design, energy balance and economic evaluation.

4453
Advanced Internal Combustion Engines. Prerequisites: 3114 and 3433. Advanced internal combustion engine theory; real cycles, mixtures, combustion, balancing and associated engine systems.

4463
Thermodynamics Laboratory. Lab 6. Prerequisite: 3433. Application of thermodynamic principles to vapor power cycles and gas power cycles.

4473
Senior Design Project. Prerequisite: senior standing. Lab 6. Selected problems in design, combining principles of drafting, analysis, materials and fabrication methods. Design projects typically supplied by industry.

Mechanized Agriculture (MECAG)

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.

3152*
Electricity in Agriculture. Lab 2. Prerequisite: MATH 1513. Electricity applied to the farm and rural home including farmstead distribution and use and National Electric Code requirements. Laboratory activities include simple circuits, practical wiring, home wiring planning, electric motors and controls.

3173*
Buildings for Agriculture. Lab 2. Prerequisite: MATH 1213. Planning and selection of buildings and equipment for agriculture, including functional, environmental and structural requirements. Laboratory activities include materials selection, materials testing, Wind and solar effects and farmstead planning.

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 MECAG 3311. Analysis, planning and management of soil and water resources.

3331
Irrigation. Lab 4. Prerequisites: 1413, MATH 1513. Principles, planning and analysis of water use and application systems.

3342*
Field Machinery. Prerequisites: MATH 1513, PHYSC 1214. Machine elements and machine performance as related to crop production. Selection of farm machinery for crop production systems.

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.

4303*
Equipment Management and Systems Planning. Prerequisites: 3173 and 3233. Identification of variables in agricultural production systems. Determination of optimum size and combination of equipment. Layout and selection of equipment for efficient production.

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 (MICRO)

2124
Introduction to Microbiology. Lab 4. Prerequisites: one year of chemistry; and BIOL 1304, and 1403 or 1603. General principles of microbiology.

3124*
Microbial Ecology. Lab 4. Prerequisites: 2124 and one semester of organic chemistry. Roles of microbes in biogeochemical cycles and energy transfers.

3133*
Molecular and Microbial Genetics. Prerequisites: 2124, BIOL 3024 and one semester of organic chemistry. 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.

3134*
Pathogenic Microbiology. Lab 3. Prerequisite: 2124. Examination of pathogenic bacteria as they relate to humans, other animals, plants and insects. Same course as PLP 3134.

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.

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 CLMOL 3254.

4000
Honors in Microbiology. 1-4 credits, maximum 10. Prerequisite: consent of departmental honors committee. Supervised study and research in microbiology.

4113*
Microbiology of Soil. Lab 6. Prerequisite: 2124. Microorganisms of the soil and their relationship to soil fertility.

4123*
Virology. Lab 4. Prerequisites: BIOL 3014 or one course in biochemistry and one upper-division MICRO course. 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 CLMOL 4123.

4133*
Current Topics in Microbiology. Lab 2. Prerequisite: permission of instructor. Subject matter may vary from year to year as new knowledge and techniques develop. Inquire as to current subject offering.

4142*
Microbial Genetics Laboratory. Lab 4. Prerequisite: 3133 or concurrent enrollment. Comprehensive laboratory course in research techniques involving classical and modern methods of gene transfer and fusions.

4224*
Microbial Physiology. Lab 4. Prerequisite: BIOCH 3653 or BIOL 3014. Subcellular structure and function of microorganisms. Synthesis, translocation, and metabolism of cellular macromolecular constituents. Substrate transport and metabolism.

4264*
Biotechnology. Lab 2. Prerequisites: 4224 or BIOCH 3653 or BIOL 3014; and MICRO 3133 and 4142 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. Same course as CLMOL 4264.

4323*
Bioenergetics. Prerequisites: BIOCH 3653, BIOL 3014 or BOT 3463. Bioenergetic reactions and mechanisms involved in energy production in plants, animals, and microbial systems. Same course as CLMOL 4323.

4732
Modern Microbiology. Prerequisite: senior standing. A capstone course describing recent advances in microbiology, integrating various subfields of microbiology, and discussing the impact of the field on problems of our society (social, political, economic and environmental).

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.

5153*
Advanced Molecular Genetics. Prerequisites: 3133 and 4142 or concurrent enrollment and BIOCH 3653 or BIOL 3014. Structure, function and regulation of nucleic acids. Gene transfer mechanisms, genetic recombination and plasmid biology. Emphasis on recent developments in recombinant DNA technology.

5160*
Seminar. 1 credit, maximum 2. Required of all graduate students majoring in microbiology.

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.

6113*
Advanced Virology. Lab 6. Prerequisite: 4123. 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*
Current Topics in Microbial Physiology. Lab 3. Prerequisite: 4224 or consent of instructor. Discussion of current literature in microbial physiology with emphasis on critical analysis of research papers.

6253*
Microbial Evolution. Prerequisites: 2124, BIOCH **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.

Military Science (MILSC)

1000
Introduction to Military Skills. 1 credit, maximum 2. Lab 2. Prerequisites: enrollment in 1112 and 1212. Introduction of military skills, such as rappelling, drill and ceremony, land navigation, individual first aid, individual training in small unit tactics. Practical exercises in patrolling, immediate action drills, raid and ambush techniques. Some laboratories will be on selected weekends.

1112
Survey of Military Science. History and organization of the Army and Reserve forces and their role in the National Defense policy. Legal, moral, and ethical responsibilities of the military officer. Reserve Officers Training Program and methods of commissioning. Exposure to military skills such as rappelling and first aid.

1212
Leadership. Leadership theories, leader and follower roles, principles and traits of leadership, communications, problem solving, motivation, and self-development. Taught through group discussion and practical exercises in leadership skills.

2000
Intermediate Military Skills. 1 credit, maximum 2. Lab 2. Prerequisites: enrollment in 2232 and 2312; completion of MILSC 1000 or consent of department head. Intermediate level tactics, techniques and procedures. Course is built on content of MILSC 1000.

2122
Basic Camp. Lab 2. Military training and performance in leadership and training environment for six weeks.

2130
Military Physical Conditioning. 1 credit, maximum 2. Lab 2. Prerequisite: must be enrolled in MILSC theory classes. Theory and practice of physical conditioning instruction, based on the UU SS Army physical training program, designed to develop cardiorespiratory endurance, muscular strength, muscular endurance, flexibility, and body composition.

2232
Leadership and Military Skills I. Leadership and individual military skill development. Instruction in land navigation; marksmanship; first aid, individual skill training in rappelling, communications, physical fitness and leadership. Taught through a combination of classroom instruction and outdoor practical application exercises.

2312
Leadership and Military Skills ii. Prerequisite: 2232. Leadership, management and military skill development. Theory and tactics for military operations; individual skill training in rappelling and patrolling taught through a combination of classroom instruction and outdoor practical application.

2333
Fundamentals of Military Operations. Lab 2. Prerequisite: placement by department head. Course geared for leadership and individual military skills development. Taken in lieu of 2233 and 2313 with department head approval. Theory and tactics for military operations taught through classroom lecture and outdoor practical application exercises. Some laboratories will be on selected weekends, by arrangement.

3113
The Platoon Leader I. Lab 2. Prerequisites: completion of lower-division MILSC or equivalent, and approval of PMS. The functional role of the platoon leader with practical work in leadership, ethics, land navigation, basic rifle marksmanship and drill and ceremony. Prepares cadets for advanced camp and eventual commissioning as an officer in the U.S. Army. Some laboratories will be on Saturdays, by arrangement.

3223
The Platoon Leader II. Lab 2. Prerequisites: completion of lower-division ROTC program or basic ROTC summer camp or equivalent, qualification by physical and aptitude standards set by Department of the Army and approval of PMS. Platoon defensive operations, patrolling, communications, land navigation and map reading, branches of the Army and the officer personnel management system. Some laboratories will be on Saturdays, by arrangement.

4014
Advanced Summer Camp. Lab. Prerequisites: 3112 and 3223. Military training and performance as leaders for six weeks.

4123
Contemporary Command Issues and Management. Lab 2. Prerequisites: 3112 and 3223. Staff organization and procedures, preparing and conducting military training, effective speaking and presentation. Discussion of other contemporary issues critical to integration of newly-commissioned officers.

4223
Military Ethics, Justice and Professionalism. Lab 2. Prerequisites: 3113 and 3223. Special obligations and responsibilities of the military profession. In-depth study of military justice as it relates to the new officer. Discussion of military ethics with case studies.

Music (MUSIC)

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
Plano 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. Prerequisites: 2672 or successful completion of Music Theory Placement Examination. Development of skills in sightsinging and aural perception. Taken concurrently with MUSIC 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 MUSIC 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).

2041
Vocal Techniques. Prerequisite: 1031. Assists non-vocal majors in understanding the physical and psychological processes required for correct singing tone production.

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 1. 1-2 credits, m
Lab 3-5.

2620
Symphony Orchestra I. 1-2 credits, maximum 6.

2630
University Choral Ensembles 1.1-4 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.

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

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.

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.

3713
(H)Muslc and the Arts. Dominant themes of human self-expression as discovered through study of music and its integration with art and culture from the late Middle Ages to the early 20th century, with emphasis on the humanistic ideas they embody.

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. Prerequisite: 3260 and successful completion of recital attendance requirements.

4270
Major Voice. 1-6 credits, maximum 12. Prerequisite: 3270 and successful completion of recital attendance requirements.

4280
Major Violin. 1-6 credits, maximum 12. Prerequisite: 3280 and successful completion of recital attendance requirements.

4290
Major Viola. 1-6 credits, maximum 12. Prerequisite: 3290 and successful completion of recital attendance requirements.

4300
Major Cello. 1-6 credits, maximum 12. Prerequisite: 3300 and successful completion of recital attendance requirements.

4310
Major Double Bass. 1-6 credits, maximum 12. Prerequisite: 3310 and successful completion of recital attendance requirements.

4320
Major Guitar. 1-6 credits, maximum 12. Prerequisite: 3320 and successful completion of recital attendance requirements.

4330
Major Harp. 1-6 credits, maximum 12. Prerequisite: 3330 and successful completion of recital attendance requirements.

4340
Major Flute. 1-6 credits, maximum 12. Prerequisite: 3340 and successful completion of recital attendance requirements.

4350
Major Oboe. 1-6 credits, maximum 12. Prerequisite: 3350 and successful completion of recital attendance requirements.

4360
Major Clarinet. 1-6 credits, maximum 12. Prerequisite: 3360 and successful completion of recital attendance requirements.

4370
Major Saxophone. 1-6 credits, maximum 12. Prerequisite: 3370 and successful completion of recital attendance requirements.

4380
Major Bassoon. 1-6 credits, maximum 12. Prerequisite: 3380 and successful completion of recital attendance requirements.

4390
Major Trumpet. 1-6 credits, maximum 12. Prerequisite: 3390 and successful completion of recital attendance requirements.

4400
Major French Horn. 1-6 credits, maximum 12. Prerequisite: 3400 and successful completion of recital attendance requirements.

4410
Major Trombone. 1-6 credits, maximum 12. Prerequisite: 3410 and successful completion of recital attendance requirements.

4420
Major Euphonium. 1-4 credits, maximum 8. Prerequisite: 3420 and successful completion of recital attendance requirements.

4430
Major Tuba. 1-6 credits, maximum 12. Prerequisite: 3430 and successful completion of recital attendance requirements.

4440
Major Percussion. 1-6 credits, maximum 12. Prerequisite: 3440 and successful completion of recital attendance requirements.

4450
Major Harpsichord. 1-4 credits, maximum 8.

4480*
Lessons in Applied Music (Minor Field). 1-4 credits, maximum 4. Prerequisite: completion of basic applied minor field(s) in bachelor's degree, or equivalent performance level. Minor applied music field(s).

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. Prerequisite: 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.

Natural Science (NATSC)

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.

Nutritional Sciences (NSCI)

2111
Professional Careers in Dietetics. Career opportunities in dietetics. Roles, responsibilities and professional expectations of dietetics professionals. Routes to professional memberships and current issues in professionalism.

2113
Introductory Food Preparation and Management. Lab 3. Selection, preparation, management and service of food.

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 nonfood 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.

4323*
Human Nutrition and Metabolism. Prerequisite: 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: ACCTG 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. Prerequisite: 2114 or equivalent. 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.

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 2. 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.

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 instruction. 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.

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 and Adult Education (OAED)

3012
Analysis and Assessment of Training Needs. Prerequisites: TECED 3103, TIED 3203, and full admission to Teacher Education. 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
Career Education: An Introduction. Introduces current and prospective teachers 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.

4103
Methods of Teaching Occupational and Adult Education. Lab 2. Prerequisite: full admission to Teacher Education. 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 and Adult 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. Exploring 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. 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 BUSPR 4213.

4223*
Program Planning and Development in Occupational and Adult Education. Prerequisites: 3113 and 4103. 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. Prerequisite: consent of major adviser. 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.

5113*
Principles of Occupational and Adult 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.

5123*
Program Evaluation in Occupational and Adult Education. Prerequisite: background in a vocational area. 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.

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 and Adult 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.

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. Prerequisites: 5203 and 5213. 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.

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.

5340*
Special Problems. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Directed independent study of special topics involving assigned readings, library research, field work or a combination of these.

5443*
Interpreting Research In Occupational and Adult Education. Prerequisite: elementary statistics. 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.

5533*
Human Resource Development. Prerequisite: admission to the master's degree program. Introduction to training and development, including history and nature of the field, trainer roles, needs analysis, program development, evaluation, and techniques of conducting training.

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 occupational and adult education.

5880*
Internship. 3-6 credits, maximum 6. Prerequisite: consent of instructor. Supervised experience working in business, industry, human service, or education settings.

5912*
Organization and Administration of Adult Basic Education Programs. Prerequisites: 5203 and 5213. Organizing and administering adult basic education for occupational programs.

6000*
Doctoral Thesis. 2-10 credits, maximum 15. Required of all candidates for the Doctor of Education degree in occupational and adult education.

6103*
Philosophy of Occupational and Adult Education. Prerequisites: graduate course in philosophy or philosophy of education. Alternative perspectives for developing a philosophic position in occupational and adult education.

6110*
Graduate Reading in Occupational and Adult Education. 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.

6213*
Aging, Learning and Work. Prerequisite: graduate standing. 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.

6343*
Financing Vocational-Technical Education. Prerequisite: graduate standing. Development of conceptual and legal bases for dunding 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.

6533*
Critical Issues in Human Resource Development. Prerequisite: 5533. 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.

6870*
Doctoral Seminar. 1-2 credits, maximum 2. Seminar required for students admitted to the OAED doctoral program. Professional ethics, responsibilities, research expectations, and departmental procedures.

6880*
Internship in Occupational and Adult Education. 1-8 credits, maximum 8. Prerequisite: consent of instructor. 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.

Petroleum Technology (PET)

1113
introduction to Petroleum Industry. Lab 2. Prerequisite: MATH 1113 or one unit of high school algebra. Exploration, drilling, production, transportation and marketing.

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.

2333
Basic Petroleum Production. Lab 2. Prerequisites: 1234; GENT 2323 (pre- or corequisite). Original completion of oil and gas wells. Design, sizing and selection of production equipment. Performance and interpretation of basic testing connected with oil and gas production. Solutions to routine production problems.

3114
Petroleum Drilling Practices. Lab 2. Prerequisites: 2234, GENT 2323 and 2333 (pre- or corequisite). Basic well planning. Casing setting depths. Casing design and costs. Drill string design. Bit selection. Mud and mud circulation system requirements. Drilling and cementing practices. Well control. Specification and selection of rig components and power requirements. Drilling cost estimates.

3234
Petroleum and Natural Gas Processing Fundamentals. Lab 2. Prerequisites: 2234; MATH 2123; COMSC 2113; MPT 3433 (pre- or corequisite). Material balances, energy balances, PVT relations, and phase behavior relations applied to petroleum and natural gas processing.

3454
Petroleum and Natural Gas Unit Operations. Lab 2. Prerequisites: **3234;** MATH 2133. Petroleum and natural gas operations are studied qualitatively and quantitatively, Distillation, absorption, dehydration, sweetening, refinery processes, instrumentation and controls.

4050
Advanced Technology Problems. 1-4 credits, maximum 6. Prerequisites: junior standing and consent of head of department. Special technical problems in a petroleum area.

4122
Advanced Petroleum Problems. Lab 3. Prerequisites: 4224; senior standing. Individually selected topics in advanced petroleum drilling, production (primary, secondary or tertiary), recovery, transportation and storage.

4224
Petroleum Reservoir Engineering. Lab 3. Prerequisites: 3234; MATH 2133; or consent of instructor. Reservoir mechanics, reservoir fluids, flow through porous media. Petroleum and gas reservoir measurements, analyses, evaluations and predictions.

4334
Advanced Petroleum Production. Lab 3. Prerequisites: 2333, 4224, and MECDT 3323. Remedial and workover operations on producing oil and gas wells. Analysis and design of artificial lift techniques. Well testing and problem well evaluation.

Philosophy (PHILO)

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.

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)Modem Philosophy. Major philosophers and problems in Western thought from the 16th through the 19th century. Emphasis on Descartes, Hume and Kant.

3300
(H)Philosophy and the Quality of Life. 1-3 credits, maximum 3. Series of self-paced, one-credit modules dealing with the arguments and values in controversial Issues affecting the quality of life of persons and societies.

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)Sociai Philosophy. Major social thinkers and contemporary issues. Social authority, human rights, political forms and justice. Emphasis on Aristotle, Locke, Mill and Marx.

3533
(H)Philosophical Study of Marxism. The work of Marx and Engels and of selected later writers such as Kautsky, Lenin, and Gramsci.

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.

3913*
(H)Existenttalism. 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)Conternporary Issues in Philosophy. Selected current controversies and recent trends in philosophy.

3943*
(H,I)Oriental 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.

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.

4303*
(A)Principles of Symbolic Logic. Symbolic analysis and calculus of propositions. Applications in various fields.

4313*
(H)Phltosophy 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.

4990*
Special Studies in Philosophy. 1-3 credits, maximum 10. Selected philosophical topics or works.

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.

Physical Education (PE)

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 Motor Skills I. Prerequisite: HPEL majors and minors only. Theory and practice of soccer, golf, volleyball and physical fitness; analysis and practice *of* skills in each area; basic rules and strategies.

1822
Pedagogy of Motor Skills II. Prerequisite: HPEL majors and minors only. Theory and practice *of* basketball, weight training, softball, and archery; analysis and practice of skills in each area; basic rules and strategies.

1832
Pedagogy of Motor Skills III. Prerequisite: HPEL majors and minors only. Theory and practice of track and field; gymnastics apparatus; gymnastics (floor), and social dance; analysis and practice of skills in each area; basic rules and strategies.

1842
Pedagogy of Motor Skills IV. Prerequisite: HPEL majors and minors only. Theory and practice of badminton, folk and square dance, tennis, and rhythmical aerobics; analysis and practice of skills in each area; basic rules and strategies.

2052
Sports Officiating. Current rules and techniques. Students who perform satisfactorily may apply for official ratings.

2712
Psychomotor Development. Prerequisites: 1753 or concurrent enrollment; HPEL majors and minors only. Fundamental aspects of motor development for infants, children, youth and adults.

3114
Physiology of Exercise. Lab 2. 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.

3663
Kinesiology and Biomechanics. Prerequisites: HLTH 2653; MATH 1513 or consent of instructor. A systematic approach to analysis of human movement through anatomical, mechanical, and kinesiological concepts. Quantitative and qualitative analysis related to kinematic and kinetic principles.

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.

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.

4480
internship in Physical Education. 6-16 credits, maximum 16. Prerequisite: last-semester-senior year with cumulative GPA of 2.50. Supervised practical experience in physical education setting, Graded on a pass-fail basis.

4723
Measurement and Evaluation in Health and Physical 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.

4793*
Adapted Physical Education. Lab 2. Prerequisites: 3663, 3753; or consent of department head. Characteristics of various handicapping conditions; adapting the physical education program to meet the needs of atypical students.

4813
Organization and Administration of Interscholastic Athletics. Organization and management of competitive athletics, including public relations, staff functions, contracts, legal considerations, facilities and equipment.

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.

4972*
Adapted Aquatics. Prerequisite: LEIS 3212 or consent of instructor. Mechanical principles, skill analysis, evaluation techniques, lesson and unit planning, and practical experience in teaching swimming to persons with mental and/or physical disabilities.

Physics (PHYSC)

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. No credit for students with credit in 1014.

1214
(L,N)General Physics. Lab 2. Prerequisite: 1114. Continuation of 1114; electricity, magnetism, optics, quantum physics, atomic and nuclear structure.

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.

2413
Electronics. Prerequisite: 2114 or consent of instructor. AC circuits, vacuum tube and transistor amplifiers, oscillators and power supplies. Pulse and digital circuits.

2520
Electronics Laboratory. 1-3 credits, maximum 3. Lab 3. Prerequisite: 2413 or concurrent enrollment. Special projects. Construction and testing of circuits studied in 2413.

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*
(N)Optics. Prerequisites: 2114 and 3513, or consent of the instructor. Geometrical optics; interference, diffraction, dispersion, absorption and polarization of light.

3313*
(N)Modern Physics for Engineers. Prerequisite: 2114 or equivalent. Emphasis on nuclear, molecular and solid state physics with engineering applications.

3321*
Laboratoryi. Lab 3. Use of lasers, lens systems, spectroscopy, interferometry, interaction of light with matter, thermal physics, and wave propagation.

3513*
(A)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.

3522*
Radioactivity and Nuclear Physics laboratory. Lab 6. Prerequisite: 4663 or 4213 or concurrent enrollment. Basic measurement techniques in nuclear physics.

3621
Laboratory ii. Lab 3. Laboratory experiments on atomic physics, electron interference, gamma ray spectroscopy, the photoelectric effect, and nuclear resonance.

3713
Modern Physics I. Prerequisite: 2114. Atomic physics, special theory of relativity, and introduction to solid state and nuclear physics.

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*
(N)Introductlon to Solid State Physics. Structure, specific heat, dielectric properties, lattice vibrations, free electron theory, band structure and superconductivity of solids.

4313*
Biophysics. Prerequisites: 1214 or 2114; BIOL 1403 or 1603; CHEM 3015. Application of physical concepts to biological structures and processes. Interaction of light with biological materials, effects and radiation on living systems, electrical processes of biological systems, thermodynamics, nature of biological materials and the application of physical concepts in biological instrumentation.

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.

4613*
Advanced Electronics. Lab 3. Prerequisites: 2413 and 2520. Transmission lines, servome-chanisms, operational amplifiers, solid state switching devices, measurement and control circuits.

4663*
Radioactivity and Nuclear Physics. Prerequisite: 3313. Natural and artificial radioactivity, decay laws; absorption, detection and measurement of radiations; nuclear transformations.

4712*
Laboratory Ill. Lab 3. Laboratory experiments on electrical measurements and microcomputer applications to analysis and control of measurements. Advanced individual research projects.

4812*
Laboratory iV. Lab 3. Continuation of advanced projects from 4712.

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. 1-9 credits, maximum 9. Prerequisite: consent of major professor.

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. Semiclassical 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, O-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 Biophysics and Bloenergetics. Prerequisites: 1214 and BiOL 3014 or BIOCH 4113 or CHEM 3354 or PHYSC 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 ZOOL 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.

5513*
Selected Topics in Acoustics. Prerequisites: 4423, 5453. Radiation, transmission and absorption of acoustic waves, acoustic impedance; high-intensity effects; ultrasonics.

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: ASTRO 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.

Physiological Sciences (PHSI)

5000*
Research and Thesis. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Research problems to meet the requirements of the M.S. degree.

5110*
Problems in Physiology. 1-5 credits, maximum 20. Prerequisite: approval of instructor. Investigations in physiology for graduate and advanced undergraduate students.

5113*
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.

5116*
Veterinary Gross and Developmental Anatomy I. Lab 7. 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. Emphasis on the integration of developmental gross, radiographic and applied aspects of veterinarian anatomy as they relate to a topographical appreciation of the living individual. integrated lecture-dissection laboratory format. An overview of domestic bird and laboratory animal anatomy.

5125*
Veterinary Histology and Cytology. Lab 5. Prerequisite: first-year standing in College of Veterinary Medicine. Organization and structure of cells and tissues of domestic animals.

5134*
Veterinary Physiology I. Lab, 4 hours per semester. Prerequisite: first-year standing in the College of Veterinary Medicine or consent of instructor. Medical physiology of basic control mechanisms, including the autonomic nervous system, blood and cardiovascular system and respiratory and renal physiology of domestic animals.

5224*
Integrative Vertebrate Cell Structure and Function. Prerequisites: BIOCH 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: first-year standing in the College of Veterinary Medicine 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.

5234*
Veterinary Physiology II. Lab 2. Prerequisite: 5134 or consent of instructor. Veterinary medical physiology of the renal, digestive, and neurological systems of domestic animals. Aspects of connective tissue and integumentary physiology. Behavioral traits of animals.

5245*
Veterinary Metabolism and Nutrition. Prerequisite: first-year standing in the College of Veterinary Medicine or consent of instructor. Functional metabolism in domestic animals. Metabolic disorders using certain diseases as models. Veterinary nutrition and the application of these principles in the prevention and treatment of diseases of animals.

5333*
Veterinary Endocrinology and Reproduction. Two 2-hour labs and one 4-hour lab. Prerequisite: second-year standing in the College of Veterinary Medicine. Functions of the endocrine and reproductive systems of domestic animals.

5353*
Veterinary Pharmacology I. Prerequisite: second-year standing in the College of Veterinary Medicine or consent of instructor. Introduction of 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 statuatory and regulatory guidelines using a combination of didactic, cooperative, and problem-based learning.

5434*
Veterinary Pharmacology II. Lab, 8 hours per semester. Prerequisite: **5353** or consent of instructor. A continuation of PHSI 5353 that includes the mode of action, toxicities and contraindications of corticosteroids, antacids, antispasmodics, sedatives, tranquilizers, anticonvulsants, analgesics, antiinflammatory drugs, diuretics, cardiotonics, autocoids, bronchodilators, local anesthetics and antihypertensive agents. in-depth focus on the problems associated with the application of pharmacological principles in the clinical setting including consideration of dose, dose form, dosing interval, route of administration, drug interactions and toxic manifestations of chemotherapeutic agents.

6000*
Research and Thesis. 1-15 credits, maximum 50. Prerequisite: consent of instructor. Independent research for the doctoral dissertation under the supervision of a graduate faculty member.

6110*
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.

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 neuro-pharmacology; chemotherapeutics; heavy metal, chemical or plant toxicology or blotoxicology. Repeatable; reenrollment permits study of additional topics.

6223*
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.

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 regula-, ton 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.

6440*
Applied Veterinary Agronomics. 1-3 credits, maximum 6. Lab 2-6. Applications of soil-plant-animal interrelationships to the practice of veterinary medicine.

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.

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.

6701*
Veterinary Physiological Science Topics. Lab 1. Prerequisites: 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.

Plant Pathology (PLP)

3134*
Pathogenic Microbiology. Lab 3. Prerequisite: MICRO 2124. Pathogenic bacteria as they relate to humans, other animals, plants and insects. Same course as MICRO 3134.

3344
Plant Pathology. Lab 4. Prerequisite: BIOL 1403. Concepts of disease development, spread and control of fungal, bacterial, viral, nematode, and environmental diseases.

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.

5000*
Research. 1-6 credits, maximum 6. Research for the M.S. degree.

5004*
Plant Hematology. 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*
Phytobacteriology. Lab 4. Prerequisite: 3344. Bacteria as plant pathogens, with examination of the taxonomy, genetics, ecology, physiology, host-parasite interaction and control of phytobacteria.

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.

5560*
Problems in Plant Pathology. 1-5 credits, maximum 10. Prerequisite: consent of instructor.

5724*
Physiology of Host-Pathogen Interactions. Lab 4. Prerequisites: **3344** and BIOCH 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*
Soilbome 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.

Political Science (POLSC)

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.

2043
Introduction to International Politics. Structure and function of the international system focusing on the interrelationships among states, international bodies and critical issues.

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. Political dynamics and machinery of international relations with emphasis on nationalism, imperialism, self-help, collective security and foreign policy formulation and execution.

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.

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*
(1)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.

3173*
(I)Politics and Administration in Mexico, Central America and the Caribbean. Governmental institutions, administrative processes and contemporary trends in the politics of Mexico, Central America and the Caribbean.

3183*
(1)Politics and Administration in South America. Governmental institutions, administrative processes and contemporary trends in the politics of selected South American states, with special emphasis given to Argentina, Brazil and Chile.

3213*
(I)Politics and Administration in South Asia. Political processes, governmental institutions and administration in India, Pakistan, Bangladesh, Ceylon and Nepal. Primary attention given to India.

3223*
(I)Polltics and Administration in East Asia. Political processes, governmental institutions and administration in China, Japan and Korea.

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)Governmente 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*
Parties and Interest Groups. Political parties and interest groups as institutions; their role in elections and government.

3413*
Public Opinion, Mass Media and Campaigns. The formation and measurement of public opinion, its interaction with the mass media, and consequent effects on campaigns.

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, PHILO 2113. Identification of policy options open to policy makers and examination of measurements and rationales underlying governmental programs.

3613*
State and Local Government. Political processes, government and administration of American states, cities and counties; special emphasis on Oklahoma.

3663*
(H)Political Thought. The teachings of the three lasting traditions of Western political thought classical, Christian and modern.

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. Prerequisite: 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.

4313*
(S)Jurisprudence and Criminal Justice. An introduction to theoretical issues of public law and law enforcement, with emphasis upon criminal justice.

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.

4473*
Comparative Public Administration. The nature and context of comparative administration. Theories concerning the political, social and cultural settings of administration and the study of specific administrative systems.

4513*
(S)American Politics. Significant developments and issues in American politics, including American political behavior and political leadership.

4553*
(H)Arnerican 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*
(8)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. Prerequisites: 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.

5010*
Quantitative Methods of Political Analysis. 1-6 credits, maximum 6. 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.

5110*
Seminar in Public Policy. 3-6 credits, maximum 6. Public policy process including policy design, implementation and change. Approaches to public policy including design science, rational choice, policy sciences, normative models, and institutionalism.

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.

5310*
Seminar in Public Administration. 3 credits, maximum 6. Administration in the public sector, stressing traditional and emerging organization structures. Emphasis on awareness of administrative processes and environment that include program design and implementation and administrative accountability.

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.

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.

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.

5710*
Seminar in American Political Institutions. 1-3 credits, maximum 6. American institutions, including Congress, the presidency, courts, political parties and interest groups.

Psychology (PSYCH)

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.

3213
Quantitative Methods in Psychology. Prerequisite: 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.

3733*
(H)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, prosocial 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.

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 psycholegal 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 Blopsychology. 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*
Individual Mental Tests. 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. Practice in understanding, administering and interpreting the Stanford-Binet, WAIS, WISC-R and other mental tests.

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*
Minority Issues. Prerequisite: six credit hours of psychology and consent of instructor. Social issues related to pluralism with emphasis on community and social psychology.

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.

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.

6483*
Neurobiological Psychology. Prerequisite: 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 ABSED 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 Pyschology. 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. Prerequisites: 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*
Objective Psychodiagnostic Methods. Prerequisites: 3443, 4813; graduate standing in the clinical program of the Department of Psychology or the doctorate counseling psychology program, or consent of instructor. Restricted to graduate students in programs designed to prepare students for the professional practice of psychology. Complex objective personality and interest tests and their diagnostic and clinical uses.

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.

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.

3293*
(H)History of Christianity. An intellectual and cultural history of Christianity from the second century to the present day.

3303
(H)Modem Christian Thought. Important issues for Christianity in the last two centuries: the historical Jesus, the validity of faith, the authority of the Bible and the challenge of modern science.

3403*
(H,I)The Religions of India. Recommended: 1103. The beliefs and practices of Hinduism, Buddhism and Islam in India. Emphasis is placed on the historical origins, scriptures and current developments of each religion.

3413*
(H,I)The Religions of China and Japan. Recommended: 1103. The beliefs and practices of Confucianism, Taoism, Buddhism and Shinto. Emphasis is placed on historical origins and contemporary trends.

3512
(H)The Jewish Tradition. Recommended: 1103 or 3013. An introduction to Judaism, with emphasis placed on the ideas and values emerging from the historical experiences of the Jewish people.

3533
(H,I)The Islamic Tradition. Recommended: 1103. An introduction to Islam, providing an historical survey up to the modern period, with emphasis on the Quran, the prophet Muhammad and major aspects of Muslim thought and civilization.

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.

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
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.

2325
Intermediate Russian III. Prerequisite: 2115. A continuation of grammar review and the development of skills in reading, writing, and speaking Russian.

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 POLSC 3003.

3113
Russian Conversation. Prerequisite: 2225. Development of conversational skills in formal and informal Russian language; study of oral communication and idioms; vocabulary enhancement.

3123
(H)Russian Culture and Civilization. Art, literature, music, architecture, and contemporary life of Russia. Course taught in English.

3223
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)Russian Literature in Translation I. Russian literature from its beginning to mid-19th century: Pushkin, Lermontov, Goncharov, Gogol, Turgenev and Dostoevsky. Readings in English. Classes conducted in English.

4123
(H)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
Russian Language and Literature for an Educated Life. Prerequisite: 3113 or 3223. A survey of original literary texts by major Russian authors of the 19th and 20th centuries. Conducted in Russian. Capstone course.

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.

1123
Social Issues and Human Values. Social issues discussed and debated. Oral and written expression of views encouraged on a variety of social issues ranging from racism to the role of the police in the modern industrial state. Course draws on many of the social sciences, with major emphasis being in sociology.

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.

2993
Sociology of Racism. Sociological phenomena of racism: developmental processes, problems and consequences.

3113
Theoretical Thinking in Sociology. Prerequisite: 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.

3373*
(S)The Sociology of Developing Societies. Prerequisite: one course in sociology or consent of instructor. Theories and practice of development in the Third World since World War II. Emphasis on plans, programs and projects of various national and international agencies and the effects on the culture, social relations, and social structures of Third World countries.

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)Sociology of American Family. Relationship between the family and other American institutional structures. Specific attention to values and behavior in mate selection, sexual behavior, marital relationships and sexual role differentiation.

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*
(A)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)Sociology of Human Sexuality. Prerequisite: junior standing or consent of instructor. Sociological and social psychological aspects of human sexual behavior, attitudes, and relationships. Theoretical concepts, empirical research, and descriptive rates of behavior are discussed.

4223*
(S)Sociology of Mental Health. Sociological approach to mental health and mental disorder. Social and cultural factors and their impact on the therapist-patient relationship. Etiology and treatment of emotional disorders. Opinions and attitudes about mental health.

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 immigrant 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. SStructure, change and development of the local community in rapidly changing society. Emphasis on community organization and planned change.

4433*
(S)Social Ecology and Life Processes. Human interdependencies and interrelationships with the social and physical environments, with special focus on the mutual impact of human values, human environment and life phase.

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.

4513*
(S)Demography of Minorities. Compares several minority groups along major demographic dimensions, i.e., a comparison across minority groups as well as within minority groups. Emphasizes social, political and economic factors as affected by population variables.

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: A Cross-cultural Perspective. Compares the roles of women in different types of societies (hunting and gathering, horticultural, peasant and agricultural). Social, familial, economic and legal status of women in American society. Same course as ANTH 4643.

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*
Methods of Demography. Prerequisite: STAT 4013. Introduces the student to methods of collecting and analyzing data in the field of demography. Emphasizes population analysis utilizing the three basic variables: birth, death and migration and the attendant statistical mathematical applications.

5243*
Social Research Design and Analysis. Techniques in design, data collection, analysis and interpretation of data for qualitative and quantitative sociological research.

5253*
Sociology of Small Groups. Prerequisite: 3223 or equivalent. Structural variation, ordering, communication, social bonding and task performance in small-group association.

5263*
Methods of Social Research II. Prerequisite: 4133 and STAT 4013, or equivalents. Advanced techniques in sociological research and data analysis focusing on the formulation of substantive research questions and application of a variety of statistical techniques and computer programs to answer such questions.

5273*
Qualitative Research Methods. Examination of ethnographic studies and implementation issues connected with qualitative research. Research project required.

5323*
Social and Cultural Change. Classical and modern theories of social, cultural and societal change. Particular emphasis on societal development in the modern world system and its impact on individuals and social relationships.

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.

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.

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.

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.

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
Intermediate Reading and Conversation I. Lab l. Prerequisite: 1225 or equivalent. (May have been gained in high school.) Reading and discussion of simpler Spanish texts, mostly cultural. May be taken concurrently with other 2000-level Spanish courses.

2113
Intermediate Conversation and Composition I. Lab 1. Prerequisite: 1225 or equivalent. (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 Spanish courses.

2222
Intermediate Conversation and Composition II. Lab 1. Prerequisite: 2113 or equivalent. (May have been gained in high school.) Readings, vocabulary building, conversation, guided composition. May be taken concurrently with other 2000-level Spanish courses.

2223
Intermediate Reading and Conversation II. Lab 1. Prerequisite: 2112 or equivalent. (May have been gained in high school.) Reading and discussion of more advanced Spanish texts, mostly literary. May be taken concurrently with other 2000-level Spanish courses.

3003
(H)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
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
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)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
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)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)Hispanic Drama. Prerequisite: 20 credit hours of Spanish or equivalent competence. Reading and interpretation of dramatic works selected from the Hispanic literatures.

4220
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
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)Masterpleces 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)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)Hispanlc 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
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.

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.

3711
Employment Interviewing. Lab 1. Prerequisite: junior standing. Prepares student to understand, prepare for, and participate in employment interviews. Resumes, researching job opportunities and other forms of preparation for an interview.

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
Verbal Communication. The nature, function and structure of verbal behavior. Cognitive, linguistic and social influences on verbal communication and its development.

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*
(I)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*
(A)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*
(A)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, nonlinear regression, dummy variables, influence statistics.

4053*
Statistical Methods for Engineers. Lab 2. Prerequisite: 4033. Methods of experimental'statistics for engineers. Analysis of variance, multiple comparison test, 2n factoral arrangement of treatments, fractional factorials, randomized block designs, simple and multiple linear regression. No credit for students with credit in 4013 or 5013.

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. Prerequisite: MATH 2155 and one other course in MATH which 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 4053 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, 4053, 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 or 4053. 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 4053 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 4153. Measure theoretical presentation of probability, integration and expectation, product spaces and independence, conditioning, different kinds of convergence in probability theory and statistical spaces. 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 INDEN 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. Prerequisites: 4223 and MATH 4153. 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 or 4053 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 factoral 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, 4053 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. Advanced regression topics; mean model theory and application to fixed models; orthogonal polynomials; data structures, observational and sum of squares identities, mean model identities. Building linear models from data structures, parameterizations and reparameterization, conventional linear model theory, variance components, computing techniques.

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 24. Prerequisite: consent of advisory committee. Directed research culminating in the Ph.D. thesis.

6013*
Genetic Statistics. Prerequisites: 4213 or 4223, and ANSI 6003; or consent of instructor. Linear models for quantitative traits, genetic relationship and linkage. Theory of selection and crossbreeding. Mathematical techniques in inbreeding. Path coefficient theory.

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. Prerequisites: 5113, and 5203 or 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. Prerequisite: 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 fractorials, 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.

Technical Education (TECED)

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.

5223*
Curriculum Development In Technical Education. The interrelationship of mathematics, science, technical specialty and general education in technical curricula. Contemporary practices in constructing, revising and evaluating technical curricula.

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.

Technical and Industrial Education (TIED)

2000
Field Experience in Industrial Practice. 2-6 credits, maximum 16. Prerequisite: consent of instructor. 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. Prerequisites: two years teaching experience, satisfactory completion of the required basic 16 credit hours of TIED courses and consent of instructor. 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. Prerequisite: consent of instructor. 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, fund-raising 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. Prerequisite: 4103. 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. Prerequisite: vocational teaching experience. 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. Prerequisites: 4344 and consent of instructor. Provides opportunity for experienced teachers to incorporate the latest industrial technology into their course of study.

Technology Education (TE)

2442
industrial Plastics and Ceramics. Lab 3. Production and manufacturing processes common in the plastics and ceramics industry. Information about careers and developing trends in the industry.

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.

3012
Industrial Tools and Equipment. Lab 3. Proper selection, use and care of shop and laboratory tools and equipment. Laboratory exercises in the purchase, maintenance and repair of tools and equipment commonly used in the industrial arts programs of local schools.

3022
Theory and Practice in Home Maintenance. Lab 2. Principles of home maintenance and practice in the use of tools, equipment and materials necessary to maintain properly functioning heating, cooling, plumbing and electrical systems.

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.

3053*
Teaching Technology in the Elementary School. Educational projects and activities for stimulating student interest in technology. Analysis of historical development, basic foundations, concepts, and systems of technology. Practical aspects of planning, designing, and integrating technology-based activities into elementary and special education curriculums.

3103
Architectural Drawing. Lab 3. Prerequisites: GENT 1153 and MECDT 1223 or equivalent or consent of instructor. Architectural drafting skills and information based on current drafting standards and trends in the architectural industry. Preparation of a complete set of drawings in residential or light commercial drafting. Computer graphics as a drafting tool.

3223
Electronic Communication Fundamentals. Lab 3. Prerequisite: 3023. A general introduction to contemporary electronic communication technology including telecommunications, hard-wired, computer, light, and acoustic systems. An overview of the products and impacts of electronic communication systems and the nature of the electronic communication industry.

3301*
Metrics Measurement for Occupational and Adult Education. Practical applications of the International Metric System as it relates to industry and technology. Prefixes, exponents and symbols, weights and mass, length, volume, and temperature with practical exercises in calculations, conversions, and the use of terminology.

3312
Manufacturing Materials and Testing. Lab 3. Physical properties and testing of materials used in industry such as metals, woods, plastics, ceramics, cements, adhesives and fasteners; stresses the use of such materials in industrial arts and technology education programs.

3323
Manufacturing Processes. Lab 4. Prerequisite: 3033 or permission of instructor. Methods and procedures for processing materials used in product manufacturing and development. Laboratory practical experiences in processing materials with implications for industrial arts and technology education programs in public schools.

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.

3672
Fundamentals of Power Transmission. Lab 2. Basic mechanics of power transmissions including mechanical, hydraulic and pneumatic systems. Design and selection of power sources, piping, filtration, accumulators and actuators for programs of industrial arts and technology education.

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.

4212*
Materials Finishing. Lab 3. Materials, tools and techniques for finishing fabricated products. Laboratory experiences in finishing and refinishing with emphasis on instructional applications.

4322*
Industrial Technology. Industrial materials and manufacturing and processing techniques including automation and distribution systems as observed in films, field trips and lectures. Employer-employee relations are studied as the human element in the system.

4343*
Curriculum Development in Industrial Technology Education. Prerequisite: admission to Teacher Education. Principles, practices and problems in construction of industrial arts and technology education curricula.

4440*
Industrial Crafts. 1-2 credits, maximum 6. Development of knowledge and skills in working with materials, tools and equipment used in various industrial crafts. Special emphasis placed on specific crafts that are most applicable to the elementary and special education curriculum.

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.

5133*
Teaching Technology Education. Prerequisite: 3423 or equivalent, or consent of instructor. Advanced techniques and activities associated with teaching technology education systems. Specific emphasis on scientific inquiry, decision making, problem-solving concepts and activities in the public school technology education programs.

5233*
Special Problems in Machine Woodworking. Materials, processes, designing and cost accounting in the unit woodworking shop. Selection and use of appropriate machine equipment.

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.

5443*
Special Problems in the General Shop. Problems concerning the organization and management of classes and personnel organizations, as well as special teaching methods and class control.

5563*
Critical Issues in Technology Education. Analysis of current trends, issues, directions, and research in technology education. Applications to current classroom and program practices.

5663*
Special Problems in Industrial Drawing. Special problems, techniques and methods applicable to the teaching of mechanical drawing in industrial arts courses. Selection and use of equipment, preparation of course materials and practice in the application of advanced techniques.

Telecommunications Management (TCOM)

5012*
Telecommunications Laboratory. Lab 2. Prerequisites: graduate standing and consent of program director. 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*
Telecommunications Industry Overview. Prerequisites: graduate standing and consent of program director. The development of telecommunications technology, industry and policy in the United States, interrelationships among industry, government bodies and policies, and users. A broad view of telecommunications (terrestrial, satellite, and optical transmission systems) and the direction of the industry, A review of the players in the industry (common carriers, vendors, users and regulatory agencies), trends and directions, and implications for management. All forms of transmission media, including private and public networks. Trends resulting from the deregulation of the industry and the divestiture of AT&T.

5123*
Managing with Information and Telecommunication Technologies. Prerequisites: graduate standing and consent of program director. Applications of telecommunications and information technologies to competitive management in a global economy. Strategic as well as operational applications of technologies. Case studies of several national and international companies. Opportunities and challenges presented by multinational telecommunications.

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.

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. Prerequisite: 2413 or consent of instructor. 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.

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 Ill. 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.

3963
Technical Production II. Lab 4. Elementary techniques of costume craft and stagecraft for the stage. Basic costuming skills. Practical experience preparing departmental productions.

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. Prerequisites: 2413, 2663 or 3963 and 4963. 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 afaculty 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.

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.** Prerequisites: 2413, 4963. Approaches to basic costume design including research, conceptual analysis, figure drawing, and executions of sketches and renderings.

4983*
Scene Painting. Lab 3. Prerequisite: 2613. 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.

5243*
Problems In Advanced Acting. Prerequisites: 4143 and graduate standing or consent of instructor. Experimentation iii 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 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.

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.

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. Prerequisite: 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: 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!. 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.

Veterinary Parasitology, Microbiology and Public Health (VPARA)

3123
Animal Hygiene. Prerequisite: junior standing in the College of Agriculture. Principles of sanitation and of prevention and control of common diseases of livestock.

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. Same course as ZOOL 5593.

5224*
Veterinary Bacteriology and Mycology. Lab 2. Prerequisite: first-year standing in the College of Veterinary Medicine or consent of instructor. Pathogenic bacteria of fungi of domestic animals and their relationship to diseases of veterinary medical importance. Methods for isolation and identification of common pathogens.

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.

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.

5322*
Food Hygiene. Prerequisite: second-year standing in the College of Veterinary Medicine. Public health principles and standards applying to the maintenance of a wholesome food supply. Regulations and procedures for inspection of animals slaughtered for food and of food products of animal origin. Human nutrition, environmental and consumer aspects of food quality.

5333*
Veterinary Parasitology. Lab 3. Prerequisite: second-year standing in the College of Veterinary Medicine or graduate standing with major in certain biological sciences. Protozoan and external parasites of domestic animals.

5404*
Techniques in Parasitology. 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.

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 6. 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.

6203*
Advanced Concepts in Veterinary Immunology. Prerequisite: 5113 or BIOCH 3653 or MICRO 3254. Induction of immune responses, host defense mechanisms, immunoregulation, antigen presentation and immune recognition by B and T lymphocytes, using contemporary research publications.

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.

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 Pathology (VPATH)

5000*
Thesis. 1-6 credits, maximum 6. Prerequisite: graduate standing. Research in veterinary pathology. Graduate credit in meeting requirements of the M.S. degree.

5315*
Veterinary Pathology I. Lab 2. Prerequisite: second-year standing in the College of Veterinary Medicine or written consent of department head. 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.

5413*
Clinical Pathology. Prerequisite: second-year standing in the College of Veterinary Medicine or graduate standing with consent of department head. 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 written consent of department head. Continuation of 5315. Lectures and laboratories covering the pathology of those systems not covered in preceeding course.

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*
Thesis. 1-15 credits, maximum 40. Prerequisite: graduate standing. Research in veterinary pathology. Graduate credit in meeting requirements of the Ph.D. degree.

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
Advanced Pathology Techniques and Special Problems. 1-6 credits, maximum 20. Prerequisites: graduate standing in biological sciences with written consent of department head. Seminars on contemporary techniques and methods used in diagnosis, technical work and research in pathology.

6612*
Poultry and Laboratory Animal Diseases. Prerequisite: 5425 or written consent of department head. Biological characteristics, husbandry, diagnosis, prevention, and treatment of diseases of domestic poultry and selected species of animals used in teaching and biomedical research.

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. 1-2 credits, maximum 2. Prerequisite: 6701 or written consent of department head. Etiology and pathogenesis of spontaneous and experimentally induced diseases of common-used species of laboratory animals.

6950*
Advanced Systemic Pathology. 3-4 credits, maximum 18. Prerequisites: **5425,** graduate standing or written consent of department head. 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. Prerequisites: 5425 or equivalent, graduate standing, and written consent of department head and instructor. Applied clinical biochemistry, organ function tests and related cytologic examination.

6973*
Advanced Hematology. Prerequisites: 5425 or equivalent, graduate standing, written consent of department head and instructor.The etiology and pathogenesis of the diseases of the blood and bone marrow.

Zoology (ZOOL)

2104
Human Anatomy. Lab 3. Prerequisite: BIOL 1603. 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.

2513
Introduction to Wildlife Conservation. Prerequisites: BIOL 1114 or 1303. The profession of wildlife conservation; the interdisciplinary nature of wildlife conservation is emphasized by lectures, guest speakers, films, and slide presentations.

3013*
Biological Microtechnique. Lab 3. Prerequisite: BIOL 1403 or 1603. Techniques for preparation of biological materials for microscopic examination. Same course as BOT 3013.

3104*
Invertebrate Zoology. Lab 4. Prerequisite: BIOL 1603. Morphology, physiology, reproduction and ecology of major invertebrate groups.

3115*
Vertebrate Morphology. Lab 6. Prerequisite: BIOL 1603. 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.

3133*
Evolution. Prerequisite: 3123 or BIOL 3024. Development of the evolutionary concept: speciation, evolutionary mechanisms and phylogenetic concepts.

3143
(N)**Oceanography.** Ocean basins, circulation, tides, waves, chemistry of sea water, life in the ocean, ocean communities.

3204*
(N)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 Environmental Crises. 1 credit, maximum **4.** Current environmental issues presented by films and speakers. Critiques written on several selected presentations.

3513*
Principles of Wildlife Ecology. Prerequisites: 60 credit hours, including BIOL 3034. Application of ecological principles to the production and control of natural populations.

3700
Readings and Special Studies in Zoology. 1-3 credits, maximum 6. Prerequisites: BIOL 1603 and consent of instructor. Discussion of selected readings.

4103*
(N)General Parasitology. Lab 2. Prerequisites: BIOL 3104 or BIOL 1603 and consent of instructor. Fundamentals of parasitism with emphasis on: life cycles, disease conditions, epidemiology, diagnosis, treatment, historical significance, terminology, taxonomy and parasitological techniques.

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.

4154*
Herpetology. Lab 6. Prerequisite: BIOL 3034 or consent of instructor. Systematics, evolution, distribution, life histories, ecology, behavior, techniques of collection and preservation of North American reptiles and amphibians. Three weekend field trips required.

4164*
Ornithology. Lab 4. Prerequisite: BIOL 1603. Classification, evolution, distribution, identification, life histories, and morphological, ecological and behavioral adaptations of birds. One weekend field trip required.

4174*
Mammalogy. Lab 3. Prerequisite: 3115 or consent of instructor. Classification, distribution, life histories, economic importance, techniques of field study, methods of collection and preservation of mammals.

4215*
Mammalian Physiology. Prerequisites: CHEM 3015 and BIOL 1603. 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 2. Prerequisite: BIOL 3014 or BIOCH 3653. Cellular activities and fundamental physiological processes.

4404*
Ichthyology. Lab 6. Prerequisite: 3115 or consent of instructor. Systematics, evolution, distribution and morphological, ecological and behavioral adaptations of fishes. Emphasis on Oklahoma forms. Two weekend field trips required.

4414*
Fisheries Management. Lab 4. Prerequisite: BIOL 3034. Techniques and principles involved in management of fishes. Field trip fee required.

4434*
Llmnology. 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. Lab 3/day. Prerequisite: 4 hours of zoology or biology. An extension course taught at the Oklahoma City Zoo. Conservation of endangered species, animal acquisition and transport, restraint, sanitation and animal health, behavior, exhibit planning and architecture, zoo administration and research potential. Students undertake a research project in exhibit design. Lecturers include professional staff members of the Oklahoma City Zoo and guest speakers.

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. Prerequisite: approval of major adviser. Independent research for the M.S. thesis under the supervision of graduate faculty member.

5010*
Graduate Seminar. 1-3 credits, maximum 10. Prerequisite: consent of instructor. 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.

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. Prerequisites: 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.

5203*
Physiological Systems Modeling. Lab 1. BASIC programs to model and analyze simple physiological processes. Models to evaluate more complex physiological processes. No prior experience with computers or programming necessary.

5223*
Membrane Biophysics and Bioenergetics. Prerequisites: PHYSC 1214, and BIOL 3014 or BIOCH 4113 or CHEM 3354 or PHYSC 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 PHYSC 5353.

5314*
Wildlife Toxicology. Lab 6. Prerequisites: BIOCH 3653, BIOL 3024, 3034. 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. Prerequisites: BIOCH 3653, BIOL 3014 or consent of instructor. Basic toxicological principles, mechanism of toxicity, and toxicological testing procedures. Toxic effects of environmental exposure to xenobiotics.

5413*
Principles of Ecotoxicology. Prerequisites: BIOCH 3653 and consent of instructor. Integration of major processes involved with transport, exposure and response of biological systems to xenobiotics.

5424*
Analysis of Environmental Contaminants. Lab 6. Prerequisites: organic chemistry and graduate standing. Analytical methods for measuring environmental contamination or pollution; toxicity bioassay, gas chromatography, atomic absorption, infrared and ultraviolet spectrometry.

5433*
Advanced Fishery Science. Lab 4. Prerequisite: consent of instructor. Application of ecological and evolutionary theory to problem solving in fishery research and management.

5463*
Stream Ecology. Lab 1. Prerequisite: BIOL 3034 or eqivalent. 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 furbearers.

5593*
Diseases and Parasites of Wild Animals. Lab 2. 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 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. Prerequisite: 30 credit hours of acceptable graduate work. Independent research for the Ph.D. dissertation under the supervision of a graduate faculty member.

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