OKLAHOMA STATE

Catalog 1981-82

Academic programs at Oklahoma State University are kept relevant through continuous revision of curricula.

Although the curriculum may be revised before a student graduates, a student who makes normal progress toward graduation (completing a four-year degree program in not more than six years) will be held responsible for degree requirements in effect at the time of matriculation (date of first enrollment), plus any changes that are made, so long as these changes do not result in semester credit hours being added or do not delay graduation.

Matriculation occurs when a student first enrolls in an accredited institution of higher education. A student has the option of following the requirements that were in effect at the time of matriculation if he or she meets all of the requirements for the bachelor's degree in not more than six years from date of matriculation or meeting any or all of the new requirements that have been adopted since matriculation

When a student first enrolls at OSU, the requirements for the degree programs being offered are made available. A prospective student may obtain a detailed listing of the requirements for any degree being offered at OSU by writing to the Office of the Registrar or to the departmental office through which the degree is offered.

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OKLAHOMA STATE UNIVERSITY

CATALOG

1981-1982

OSU

EQUAL EDUCATIONAL OPPORTUNITY POLICY

Oklahoma State University in compliance with Title VI of the Civil Rights Act of 1964 and Title IX of the Education Amendments of 1972 (Higher Education Act) does not discriminate on the basis of race, color, national origin, sex, qualified handicap or disability in any of its policies, practices, or procedures. This provision includes but is not limited to admissions, employment, financial aid, and educational services.

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ROSCOE ROUSE, JR., Ph.D., *University Librarian*

* Selected campus-based administrators directly responsible for academic and service programs for students.

University Calendar

Summer 1981

Regular 8-Week Summer Session

May 28, **29**	Thursday, Friday	Registration
June 1	Monday, 7:30 a.m.	Class work begins
July **4**	Saturday	Independence Day recess
July **24**	Friday, 5:00 p.m.	Session closes
July 29	Wednesday, 5:00 p.m.	Grades due

*Shor*t *summer* sessions, between May 18 through August 21 of one week through six weeks duration, will be offered in those courses and to those students where need is demonstrated.

First Semester 1981 - Fall

August 20, 21	Thursday, Friday	Registration
August 24	Monday, 7:30 a.m.	Class work begins
September 7	Monday	Labor Day recess
October 21	Wednesday, 5:00 p.m.	Progress reports for Freshmen
October 17-20	Saturday thru Tuesday	Fall recess
November 2	Monday	Pre-enrollment for Spring Semester
November 25	Wednesday, 7:30 p.m.	Thanksgiving recess begins
November 30	Monday, 7:30 a.m.	Class work resumes
December 7-11	Monday thru Friday	Pre-finals week
December 14-18	Monday thru Friday	Final examinations
December 18	Friday, 5:00 p.m.	Class work ends
December 28	Monday, 5:00 p.m.	Grades due

Winter Intersession

December 7-11	Monday thru Friday	Registration
December 28	Monday	Intersession begins
January 8	Friday	Intersession ends

Second Semester 1982 - Spring

January 7, 8	Thursday, Friday	Registration
January 11	Monday, 7:30 a.m.	Class work begins
February 24	Wednesday, 5:00 p.m.	Progress reports for Freshmen
March 6	Saturday, 12:00 Noon	Spring recess begins
March 15	Monday, 7:30 a.m.	Class work resumes
March 26	Friday	Pre-enrollment for Fall Semester
April 26-30	Monday thru Friday	Pre-finals week
May 3-7	Monday thru Friday	Final examinations
May 7	Friday, 5:00 p.m.	Class work ends
May 8	Saturday, 7:30 p.m.	Commencement
May 12	Wednesday, 5:00 p.m.	Grades due

Summer 1982

Regular 8-Week Summer Session

June 3, 4	Thursday, Friday	Registration
June 7	Monday, 7:30 a.m.	Class work begins
July **4**	Sunday	Independence Day
July 30	Friday, 5:00 p.m.	Session closes
August 3	Tuesday, 5:00 p.m.	Grades due

Short summer sessions, between May 10 through August 20 of one week through six weeks duration, will be offered in those courses and to those students where need is demonstrated.

First Semester 1982 - Fall

August 19, 20	Thursday, Friday	Registration
August 23	Monday, 7:30 a.m.	Class work begins
September 6	Monday	Labor Day recess
October 6	Wednesday, 5:00 p.m.	Progress reports for Freshmen
October 18, 19	Monday thru Tuesday	Fall recess
November 8	Monday	Pre-enrollment for Spring
November 24	Wednesday, 7:30 p.m.	Thanksgiving recess begins
November 29	Monday, 7:30 a.m.	Class work resumes
December 6-10	Monday thru Friday	Pre-finals week
December 13-17	Monday thru Friday	Final examinations
December 17	Friday, 5:00 p.m.	Class work ends
December 22	Wednesday, 5:00 p.m.	Grades due

Winter Intersession

December 6-10	Monday thru Friday	Registration
December 27	Monday	Intersession begins
January 7	Friday	Intersession ends

Second Semester 1983 - Spring

January 6-7	Thursday, Friday	Registration
January 10	Monday, 7:30 a.m.	Class *work* begins
February 23	Wednesday, 5:00 p.m.	Progress reports for Freshmen
March **5**	Saturday, 12:00 Noon	Spring recess begins
March 14	Monday, 7:30 a.m.	Class work resumes
March 25	Friday	Pre-enrollment for Fall Semester
April **25-29**	Monday thru Friday	Pre-finals week
May 2-6	Monday thru Friday	Final examinations
May 6	Friday, 5:00 p.m.	Class work ends
May 7	Saturday, 7:30 p.m.	Commencement
May 11	Wednesday, 5:00 p.m.	Grades due

The University

Oklahoma State University was founded in 1890 as Oklahoma Agricultural and Mechanical College. The name was changed to Oklahoma State University July 1, 1957. The first classes were held on December 14, 1891. The first Commencement was in 1896 with six male graduates.

Oklahoma State University is located in north central Oklahoma in Stillwater, a town of about 38,000 population. It is almost equal distance to Tulsa and Oklahoma City. The University is coeducational and has an enrollment of approximately 28,200 students of which about 22,500 are on campus, 3,100 at Okmulgee and 2,600 at Oklahoma City.

The OSU campus is one of exceptional beauty with modified Georgian style architecture in all of the new buildings. The campus physical plant is valued at nearly $200,000,000. These facilities include one of the largest and most modern libraries in the entire Southwest, a large Student Union complete with hotel facilities, the new Colvin Physical Education Center, and the Seretean Center for the Performing Arts.

While Oklahoma State University is a large multi-university, its size does not minimize the amount of personal attention to which each and every student is entitled. The individual is more than just a number in this University. OSU is structured so that all students are encouraged to identify the department in which they wish to major when they first enroll. 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. Since the average number of students majoring in any one department is less than 150, the student is rarely aware of the largeness of the University when he or she seeks counsel and advice.

On the other hand, the largeness of the University has many distinct advantages its 1,200,000 volume library, its vast research laboratories and equipment, its fabulous physical education-recreation and student union facilities, its plush coeducational living, its outstanding Allied Arts program, its well-balanced social activities including 39 nationally-affiliated fraternities and sororities, and its highly qualified and nationally recognized professional staff. The University offers bachelor's, master's and doctor's degrees in a large number of fields, as well as the professional Doctor of Veterinary Medicine degree. Specialist and associate degrees are also offered in selected fields.

Accreditation

Oklahoma State University is on the list of approved institutions of the Association of American Universities. It has been continuously accredited by

the North Central Association of Colleges and Secondary Schools as a degree-granting institution since 1916. It is also a member of the Association of Land-Grant Colleges, the Association of American Colleges and the American Council on Education. The University is on the approved list of colleges and universities of the American Association of University Women.

It is an institutional member of the American Association of Colleges for Teacher Education and the National Association of Schools of Music. It is a member of the Associated Collegiate Schools of Architecture and its School of Architecture and the College of Engineering, Technology and Architecture are registered by the University of the State of New York. The accrediting agency for engineering and engineering technology programs is the Accrediting Board for Engineering and Technology. Refer to the appropriate pages in this Catalog for information on accreditation of specific programs. The School of Architecture is accredited by the National Architectural Accrediting Board. The College of Veterinary Medicine is accredited by the Council on Education of the American Veterinary Medical Association. The School of Journalism and Broadcasting is accredited by the American Council on Education for Journalism. The College of Business Administration is fully accredited by the American Assembly of Collegiate Schools of Business.

The Honors Program

Oklahoma State University encourages college-centered Honors Programs designed to provide, for qualified students, opportunities for challenging work suited to their needs for independent study, discussion, and initiative. Completion of an Honors degree will be stated on the student's diploma and transcript.

For details of Honors offerings and awards, students should consult the director of student services of their college (or, in the College of Arts and Sciences, the director of the College of Arts and Sciences Honors Program).

Bachelor of University Studies

Individualization and flexibility are the features of the program leading to the degree of Bachelor of University Studies. The 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. This degree program 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 Univerity available to students in accomplishing unique educational objectives. The program may or may not prepare a student for a particular occupation or entry into a professional school.

A student who believes that his or her educational objectives can best be fulfilled through a Bachelor of University Studies degree program should

obtain an application for admission in the office of the dean of 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.

Graduate Credit for Seniors

Senior students who are graduating at the end of a semester or summer session may take graduate courses for graduate credit under the following conditions: (1) the credits must not be required or needed for the bachelor's degree; (2) the total registration must not exceed 18 credit hours for a semester or 9 credit hours for the summer session; (3) the student must either complete the requirements for the bachelor's degree at the end of the semester or session or be within 12 semester credit hours of completing requirements at the beginning of the semester or summer session in which graduate credit is requested; (4) admission to courses taken for graduate credit must have the approval of the head of the department in which the courses are offered and the **Dean** of the Graduate College; (5) not more than 14 credit hours taken while a senior may be approved for graduate credit, and a minimum of 16 credit hours must be completed in residence after the student registers in the Graduate College; (6) 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; and (7) 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 a minimum 3.00 grade-point average in *all* courses taken during the semester to receive graduate credit.

The request to receive graduate credit must be made on forms available in the Graduate College Office before the end of the fifth week of class instruction **of a** regular semester or the second week of a summer session.

Admission

Admission to OSU is based in part on the student's residence status. The student may determine that status from the following categories, and then consult the section which explains in detail the necessary requirements:

OKLAHOMA RESIDENTS: Freshman
Transfer
Special Admission

NONRESIDENTS OF OKLAHOMA:
Freshman
Transfer

READMISSION: Oklahoma Residents and Nonresidents.

Any student who can present a disciplinary record satisfactory to the University and an academic record that meets the appropriate requirements listed below will be accepted. It is the responsibility of the student to present these records.

The admission requirements are not the same for residents and nonresidents of Oklahoma; therefore, it is important that one first determine residence status. Although the provisions given here are not all-inclusive of the regulations governing the classification of students as residents or nonresidents for fee payment purposes, they should permit most students to determine their residence classification. Any student who cannot determine his or her classification from these provisions should write the Registrar and ask for a ruling.

Residence Status. A married student, or a student 18 years of age or over, who has lived in Oklahoma for at least 12 months immediately preceding enrollment at Oklahoma State Univeris,ty will normally be classified as an Oklahoma resident for fee payment purposes. However, attending college or being stationed in Oklahoma under military orders does not, within itself, entitle a student to claim residence under this provision.

A minor student who is not married and whose parents have established permanent residence in the state of Oklahoma prior to the student's enrollment in a semester will be classed as an Oklahoma resident for that semester. A nonresident student who marries a resident may declare Oklahoma as his or her domicile at the beginning of the semester following such marriage. A student who is single and under 21 years of age may retain his or her Oklahoma .residence status for a period of 12 months from the date that his or her parents established their domicile in another state and if, during those 12 months, the student reaches the age of 18 or marries, the student can retain status as an Oklahoma resident. *NOTE:* These provisions are not all-inclusive

of the regulations governing the classification of students as residents or nonresidents. Any student who cannot determine his or her classification from these provisions should contact the Office of the Registrar for information.

Oklahoma Residents-High School Seniors. A student *enrolled* in an accredited Oklahoma high school *as a senior* in *fewer than five credit courses for a semester* and is eligible to complete all requirements for graduation from high school no later than the spring semester may be accepted for concurrent enrollment at OSU if he or she meets the admission requirements as stated below under *Oklahoma Residents Freshmen,* with the exception of being a high school graduate.

High school seniors who wish to apply for concurrent enrollment should contact the Office of Admissions for instructions on how to proceed.

Oklahoma Residents-Freshmen.Any resident of Oklahoma who (a) is a graduate of an accredited high school, (b) has participated in the American College Testing Program, and (c) meets at least one of the following requirements is eligible for admission to any of the state universities in the Oklahoma State System of Higher Education:

(1) Maintained an average of "B" or above in the four years of high school study (3.00 or higher on a 4.00 scale).
(2) Ranked scholastically among the upper one-half of the members of his or her high school graduating class.
(3) Attained a composite standard score on the American College Testing program which places him or her among the upper one-half of high school seniors, based on twelfth-grade national norms.

An individual not eligible for admission as stated above may, if he or she is a high school graduate and has participated in the American College Testing Program, be admitted on probation for study in any summer session. A student admitted under this provision who (a) carries a credit-hour load ofsix or more hours of regular college study, and (b) achieves a grade-point average of 1.60 or higher (based on a 4.00 scale) will be eligible for continued enrollment in the fall semester.

Admission with advanced standing. Many high school seniors are enrolled in accelerated courses in various fields and others have mastered subjects beyond the level typical of a high school curriculum. These students are encouraged to establish college credit by passing examinations. Some of the subjects in which students may wish to apply for credit are algebra, physics, trigonometry, chemistry, English, history, biology, and foreign languages. Students who wish to apply for these examinations should write to the Office of Admissions, Oklahoma State University, during the last semester of their senior year in high school, but not later than April 20. Students who participate in this testing program and who enroll at Oklahoma State University will have their

examination papers evaluated by the department in which advanced standing is sought. If the student successfully passes the examination, college credit will be granted in the course and a grade of "P" will be recorded.

Oklahoma Residents-Transfers. For information on transfer of credits please refer to the section on *Transfer of Credits.* An Oklahoma resident transferring from another institution must meet the following minimum requirements:

(1) Must have been honorably dismissed from the college or university from which he or she is transferring.

(2) Must have a "C" average over all college work attempted.

An Oklahoma resident transferring from another institution with less than a "C" average in all college work attempted *may* be admitted on probation if he or she earned a grade-point average of at least 1.50 for the immediately past academic year and his or her grade-point average over all hours attempted is equal to or above that specified below:

Total hours attempted in all colleges	*Minimum grade point average required*
fewer than 36	1.5
36 through 54	1.6
55 through 73	1.7
74 through 90	1.8
91 through 108	1.9
over 108	2.0

Oklahoma Residents-Special Admission. *An Oklahoma resident 18 to 20 years of age* who has not graduated from high school may be admitted provisionally if:

(1) The high school class of the applicant has graduated prior to the date of the application, and the applicant has attained a composite standard score on the American College Test (ACT) which ranked among that of the upper one-half of high school seniors, based on twelfth-grade national norms,

or

(2) the applicant's academic performance (American College Testing [ACT] results, high school grades, General Educational Development [GED] results, etc.) is reviewed by the admissions committee and is found to be acceptable.

This provisional admission will be probationary for a period of two semesters. At the end of that time the student must be making satisfactory progress in accordance with the University retention standards in order to continue to enroll as a regular college student.

An Oklahoma resident 21 years of age or older who has not graduated from high school may be admitted on a probational basis. A student admitted under this regulation must make a "C" average over the first semester's work to be eligible to return for a second semester.

Nonresidents of Oklahoma-Freshmen. All out-of-state students must file with their applications for admission a $10 application fee which is not refundable.

A nonresident of Oklahoma in order to be eligible for admission to study as a first-time-entering freshman at any institution in the Oklahoma State System of Higher Education (a) must be a graduate of a high school accredited by the regional association or by an appropriate accrediting agency of his or her home state, and (b) must have participated in the American College Testing Program or a similar acceptable battery of tests.

In addition, the student must have met one of the following requirements:

(1) Ranked scholastically among the upper one-half of the members of his or her graduating high school class.

(2) Attained a composite standard score on the American College Testing Program, or a similar acceptable battery of tests, which places him or her among the upper one-half of high school seniors, based on twelfth-grade national norms.

Advanced standing: For information on admission with advanced standing please refer to *Admission Requirements, Oklahoma Residents Freshmen.* The policy that applies to Oklahoma residents also applies to nonresidents.

Nonresidents of Oklahoma-Transfers. For information on transfer of credits please refer to the section on *Transfer of Credits.*

All out-of-state students must file with their application for admission a $10 application fee which is not refundable.

A nonresident of Oklahoma transferring to Oklahoma State University must meet the minimum requirements listed below:

(1) Must have been honorably dismissed from the college or university from which he or she is transferring.

(2) Must have made satisfactory progress (a grade-point average of 2.00 or better) in all college work attempted.

Readmission. Oklahoma residents and nonresidents who have attended Oklahoma State University and did not attend OSU the immediately past semester must file an application for readmission. Students who have attended another college or university since last attending OSU must file a transcript of all work attempted after leaving Oklahoma State University. If the student's grade-point average is above "C" and his or her disciplinary record is satisfactory to Oklahoma State University, he or she will be admitted.

Transfer of Credits

Students who desire to complete or who have completed one or more semesters of work in residence at an accredited college or university and transfer credits so earned to Oklahoma State University should be guided by the following information:

Except as excluded below, college-level credits earned in residence at accredited colleges will be accepted by Oklahoma State University and those credits will apply toward baccalaureate degrees in the same way that they would apply had they been earned in residence at OSU.

(1) A minimum of 24 semester credit hours (30 in the College of Business Administration) that apply toward a degree must be earned in residence at Oklahoma State University.

(2) The *last* 18 semester credit hours (30 in the College of Business Administration) that apply toward a degree must be earned in residence at Oklahoma State University.

(3) Credits earned in *a junior college* cannot be used to satisfy OSU upper-division (junior and senior) level requirements, and cannot exceed a total of 65 hours.

(4) A minimum of one-half of the upper-division requirements in a student's major field must be earned in residence at Oklahoma State University.

(5) A maximum of 65 credit hours earned at a junior college can apply toward a baccalaureate degree at Oklahoma State University.

(6) A minimum of 60 credit hours must be earned in a senior college.

Enrolling Procedure

Enrollment at Oklahoma State University depends upon the status of the applicant as either:

FIRST-TIME COLLEGE STUDENT
TRANSFER STUDENT
FORMER OSU STUDENT
CONTINUING OSU STUDENT

Students who desire to attend Oklahoma State University as beginning freshmen should write to the Office of Admissions and request an application packet. This packet will contain all the application forms that the student must file with the University.

Application for Admission. Although Oklahoma State University will accept applications for admission at any time, no advantage is gained by the student who applies far in advance of the time of his anticipated enrollment.

Oklahoma State University does not admit students on a quota system and, therefore, all students who apply for admission and who meet the admission requirements are automatically accepted. Students who are applying for scholarships and who need an early confirmation of their acceptance should furnish, along with their request for early acceptance, their academic records in as complete form as possible. Students who cannot show need for early acceptance will be required to submit a complete academic record (in the case of a high school senior, this means a transcript showing date graduated), before acceptance can be unconditional.

Freshman Enrollment Periods. Fall enrollment periods for the entering freshmen are during the months of May, June and August. The enrollment process usually takes only one-half day to complete. Academic counselors are available to assist the student in exploring areas of interest, formulating educational plans for the future and selecting a major. After making application to OSU, the student will be mailed information in regard to enrollment dates, money to bring with him or her at the time of enrollment, schedule of events, and other pertinent instructions.

Student Health Services and Requirement.It is required that all students enrolling in Oklahoma State University present record of a physical examination by their local or family physician prior to enrolling or else a recent equivalent record of physical examination, such as a place of employment or a school, or in the Armed Forces. However, the student must complete the front page of the OSU *Medical History and Physical Examination Record.* This health report is for determination and evaluation of the condition of the student so that corrective preventive measures may be taken and he or she may be correctly classified for ROTC and physical education.

University Housing Application. One sheet of the above-mentioned application packet is an application for housing. On-campus housing fills rapidly at OSU. The student is urged to complete the application for housing rather early during the senior year of high school. This increases the chances of getting the choice of residence halls.

Transfer Students

Students who have attended Oklahoma State University before and desire to transfer credits back to OSU should follow procedures given under ***Former Students.*** **Students** who wish to transfer to OSU and who have never attended OSU should file their applications for admission with the Office of Admissions. They should also have each college attended mail an official copy oftheir transcripts to the Office ofAdmissions. Upon receipt of the application for admission and official copies of all transcripts, the Office of Admissions will notify student of his or her admission status and instruct those students who are accepted on how to proceed to enroll. The student should bring with him or her a $40 enrollment deposit when he or she comes to the campus to enroll.

Former Students

Students who have attended OSU but did not enroll in the immediately past semester should file an application for readmission. The application form may be secured by writing to the Office of Admissions. If the student has attended another college after leaving OSU, he or she must submit official transcripts of all work attempted after leaving OSU. Upon receipt of the application for readmission and official copies of transcripts, the Office of Admissions will inform the student of his or her admission status. Those students who are admissible will be giveninstructions on how to enroll.

Costs

The required fees and nonresident tuition for Oklahoma State University are listed below. These fees are based on level of course. All costs are subject to change without prior notice.

Oklahoma Residents:

	'Lower-Division Courses Per Credit Hour	*" Upper-Division* Courses Per Credit Hour	*'Graduate-Division* Courses Per Credit Hour
General fee	$14.50	*$17.00*	*$20.50*
Required student activity fee	*$ 2.00*	*$ 2.00*	*$ 2.00*
Total	$16.50	$19.00	*$22.50*

Nonresidents of Oklahoma

General fee	$14.50	$17.00	*$20.50*
Required student activity fee	*$ 2.00*	*$ 2.00*	*$ 2.00*
Nonresident Tuition	*$33.00*	*$38.25*	*$46.00*
Total	*$49.50*	*$57.25*	*$68.50*

At Oklahoma State University 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.

College of Veterinary Medicine

Oklahoma residents: $575.00 per semester is required of students enrolled in the College of Veterinary Medicine. In addition to the *$575.00* per semester, Veterinary Medicine students will pay *$2.00* per credit hour for the student activity fee.

Fees for Facilities and Special Services. (Required of all students.) Students regularly enrolled in the University are assessed facility fees which entitle them the use of the Student Union, the Colvin Physical Education Center and participation in the student health program. 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 use the facilities and will not be charged facility fees.

Colvin Physical Education Center fee	$19.20 per semester, $9.60 per summer
Student Union fee	$12.25 per semester; $6.12 per summer
Hospital fee	$18.25 per semester; $9.12 per summer

Students will not be billed facility fees and will not have access to the facilities 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 (medical technology, geology and forestry summer camps). Such courses typically are offered at unusual times and presented in a concentrated curriculum format.

Other Fees

Correspondence course fees:	
High school courses	$25.00 per credit (1/2 unit)
College courses	20.00 per semester hour
Extension course fees:	
Undergraduate courses	$25.00 per semester hour
Graduate courses	25.00 per semester hour
Specialized courses	50.00 per semester hour
Off-campus at military bases:	30.00 per semester hour
On-campus courses	20.00 per semester hour
Special fees:	
Individual lessons in music	15.00 per semester hour
Group lessons in music	15.00 per semester hour
Beginning class lessons in music	7.50 per semester hour
Organ practice	7.50 per semester hour
Maximum charge per semester for music instruction	60.00 per student
Speech clinic services	25.00 per course
Advanced standing examination fee	5.00 per credit hour
Irregular examination fee	1.00
Late registration fee	5.00 first day 10.00 maximum

Re-enrollment after withdrawal	5.00
Transcript (per copy after first one)	1.00
Late payment fee	1.00 per day 5.00 maximum
Automobile parking permit	15.00 per year (campus residents) 25.00 per year (off-campus residents)
Graduation fee:	
Associate degree	$ 5.00
Bachelor's degree	10.00
Master's degree	15.00
Doctor of Veterinary Medicine degree	12.50
Specialist in Education	
Doctor of Philosophy and Doctor of Education degrees	20.00
Thesis binding fee	At cost
Audit, without credit	Same charge as regular fee
Application fee for nonresident students	*$10.00*

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.

Withdrawal Refund Poliey.A student withdrawing from the University (not to be confused with dropping a course) prior to completion of the semester or summer session will pay a certain percentage of the total fees in order to cover administrative and/or instructional expenses. These will be levied in accordance with the schedule below:

Withdrawal prior to the third week of classes of a semester or second week of a summer session	20% of total fees
Withdrawal during third or fourth week of classes of a semester or the second week of a summer session	50% of total fees
Withdrawal during fifth or sixth week of classes of a semester or the third week of summer session.	75% of total fees
Withdrawal after sixth week of classes of a semester or the third week of a summer session	100% of total fees

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 to the extent of the amount that was paid previously for enrollment. Alternative: if the University feels that it is not feasible to issue a credit certificate, 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.

Fee Policy for Staff Members. Regular staff members at Oklahoma State University may enroll in or audit courses and be charged fees at the rate of one-half the amount charged other students. The term "regular staff members" as used herein means full-time and permanent employees. It should be assumed that an employee's enrollment in a course of study is for the benefit of both the employee and the institution.

Fee Policy for Graduate Assistants. The University will waive the nonresident tuition for graduate assistants employed at least one-fourth time in instruction or research whose salaries are paid from the Educational and General Operating Budget. *Such waiver will include the summer term immediately following employment as a graduate assistant for the academic year, or for the second semester of the academic year, even though the student is not employed for that summer term.*

Faculty and Staff Enrollment in University Courses

Faculty enrollment in University classes is a privilege provided by the University as an opportunity for the professional growth and development of the faculty. Members of the faculty may enroll for credit in one course per semester and pay only one-half the fee in effect at that time. If a faculty member teaching full time wishes to enroll in more than one course, approval of the department head, dean, and the Vice-President for Academic Affairs is required. Full-time faculty members may audit courses after securing an audit card for a fee of one-half the regular tuition fee per course.

Staff Enrollment. With the approval of the director or the department head, a full-time classified employee who can meet the academic requirements of the University may register for not more than six credit hours per semester, provided that not more than one course (maximum of four credit hours) be taken during the normal hours of employment. Time lost in taking this course shall be made up at a time directed by the supervisor. Exceptions to the six-credit-hour limit may be made in exceptional or unusual circumstances, if justified by the employee and approved by the director, department head and dean (or equivalent level of supervision).

Facilities and Services

Housing

Single Student Housing. Residence halls at OSU offer single students a variety of living arrangements in 14 halls, ranging from the older, more traditional halls to modern high-rise air-conditioned complexes. There is, in addition, a range of price options on rooms and meal plans allowing students to select a room rent and meal charge that meets their financial needs.

A major responsibility of Single Student Housing, in addition to making pleasant living accommodations available, is that of offering an environment in which learning experiences can take place. This is the advantage of a residential community which has been designed and organized to blend the importance of individual and group learning and living.

Single Student Housing thus attempts to meet the wide range of student needs by offering a variety of services, from the purely academic to the purely social. These services include: hall libraries, quiet hours, classes in the halls, faculty lunch program, scholarship recognition of individuals, floors and halls with high academic achievement, seminars on current issues, films, lecture series, art shows, concerts, leadership training, special-interest groups, intramural sports, employment opportunities, and recreational facilities. All of these are in addition to those facilities that serve the day-to-day needs of students, including laundry facilities, kitchens, vending machines and continuous meal service.

Finally, in every hall there is a well-trained professional staff as well as a student staff whose primary function is to see that the student benefits educationally from his or her residence hall living experience.

Assistance or further information may be received from the Single Student Housing office on the second floor of the Student Union.

Married Student Housing. University apartments for married couples attending Oklahoma State University are cheerfully decorated, modern residences designed especially for privacy and livability.

Students and their families may live year-round in these spacious, furnished, two-bedroom apartments while attending the University. Each apartment has a large living area, dining and kitchen facilities plus the bedrooms.

The all-brick units are constructed in one and two-story fashion, four to twelve units each. Wide attractive courtyards and play areas surround the units. In addition, playing fields for all sports accentuate the landscape, and off-street parking is available for everyone.

Married residences have attractive outdoor surroundings combined with nearness to both the main campus and a shopping and service area. Laundries are provided in the family housing areas for the convenience of residents. Directly adjacent is Oklahoma State University's recreation center with two

swimming pools, basketball courts, handball, and golf facilities.

Married students may choose living quarters on- or off-campus. Applications for on-campus married housing must be made at the earliest possible oppportunity to insure consideration.

Fraternities - Sororities. The fraternity and sorority system at OSU has served the campus and community for over sixty-five years. During this time the system and many of the individual fraternities and sororities have been recognized as the outstanding chapters in the United States.

Twenty-four national social fraternities for men and fifteen national sororities for women provide informal family-style housing adjacent to the campus. The life-style of the chapters affords students the opportunity to assume responsibility, practice leadership skills and establish lasting friendships. Though autonomous in their operations, these organizations come under the same rules and requirements placed on students housed in University residence halls.

The "Greek" organizations participate in team intramural programs, sponsor service projects for the campus and community, and seek to maintain high social and scholastic standards among their members.

Student Health Services

It is required that all students enrolling at Oklahoma State University for the first time present a record of a physical examination by their local or family physician prior to enrolling, or else a recent equivalent record of physical examination, such as from a place of employment or a school, or in the Armed Forces. However, the student must complete the front page of the OSU *Medical History and Physical Examination Record.* This health report is for determination and evaluation of the condition of the student so that corrective preventive measures may be taken and the he or she may be correctly classified for ROTC and physical education.

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; and poor health, either physical or emotional, can impair both the academic and the extra-curricular career.

The University Hospital and Clinic maintains a staff of 8 full-time physicians, a clinical psychologist, 15 registered nurses, 3 laboratory and x-ray technicians, a physiotherapist, a dietitian, and other necessary supportive and ancillary personnel who make a specialty of providing the best possible care at the least possible expense for students. Along with this full-time help, there are part-time specialists in internal medicine, psychiatry and radiology. Specialists in all other fields are available for individual cases as consultants if needed.

The latest in modern diagnostic x-ray, physiotherapy and laboratory

equipment is available for use in the hospital and clinic. Most injuries and illnesses can be treated, except major surgical cases, which can be diagnosed and then referred to either the family surgeon if time permits, or to a local surgeon in Stillwater.

There are no charges for office visits to see the physicians, or for most physiotherapy treatments. Most of these services are covered by a portion of the general fee paid by the student. To cover direct costs on laboratory, x-ray, pharmacy and hospital services a moderate fee is imposed. The Clinic is open from 8 a.m. to 11:45 a.m. and 1 p.m. to 4:45 p.m. Monday through Friday.

There are 19 beds available for hospitalization and isolation if needed. A registered nurse is on duty in the hospital at all times for emergency care of patients and a physician is on call at all times.

Financial Assistance for Students

Students who need financial assistance to attend college are encouraged to consider the many types of financial aid available through the OSU Department of Financial Aids. These programs include scholarships, grants, loans and part-time jobs. Students and parents are invited to make an appointment with a loan officer to discuss financial needs.

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

Institutional loans are of two types: short-term loans-normally not exceeding $400-which are to be repaid in monthly installments at 12 percent interest during the semester borrowed; and long-term loans which are to be repaid on a monthly basis beginning three to six months after graduation or termination of college attendance.

Oklahoma State University participates in the National Direct Student Loan (NDSL) and Guaranteed Student Loan (GSL) programs. The rate of interest on NDSL during the period of repayment is 4 percent simple interest per annum on the unpaid balance. The rate of interest on the GSL is 9 percent.

Oklahoma State University awards approximately 500 scholarships to freshmen each year who have attained a high scholastic standing and otherwise accumulated an outstanding record in high school. Application for these scholarships must be made by March 1. Applications may be obtained from the high school principal or the OSU Department of Financial Aids.

Oklahoma State University awards approximately 600 upperclass university scholarships each year to sophomores, juniors and seniors who have an outstanding academic record. Application for these scholarships must be made by April 1.

Scholarships. Oklahoma State University offers a large number of scholarships for freshmen, sophomores, transfers and upperclassmen.

Transfer scholarships are offered each year to students transferring from junior colleges. Applicants must apply by April 1 preceding the academic year in which they plan to attend. A transfer applicant will be placed in consideration for a Junior College Transfer Scholarship and a Wentz Service Scholarship.

The Graduate College of Oklahoma State University offers approximately 400 graduate fee waiver scholarships each year.

Applications for upper-class and junior college transfer scholarships may be obtained from the OSU Department of Financial Aids.

Grants. Oklahoma State University participates in two Federal Grant programs.

Supplemental Educational Opportunity Grants are given primarily to those who have applied for a National Direct Student Loan and have established a sizeable financial need. Once need is established and other forms of aid have first been awarded, if the other aid is insufficient to meet the need, this grant supplements the other awards in meeting the remaining need.

The *Basic Educational Opportunity Grant Program* is the main source of federal student financial aid. The purpose of the basic grant program is to provide a "floor" of financial aid to help defray the costs of post-secondary education whether it be at a two-year or four-year college or university, or at a proprietary or vocational-technical school. Eligible students must carry at least six semester credit hours to qualify. A student may receive a basic grant until he or she receives an undergraduate degree. These grants range from $200 to $1,900 per academic year. Basic grants need not be repaid. Basic grant applications may be obtained from high school counselors and college student financial aid officers.

College Work-Study Program. This program is designed to provide part-time employment for students with financial need who are willing to work to help pay part of their educational expenses. College Work-Study is combined with other forms of financial aid to help meet educational expenses. By attempting to place students in areas in which they are interested, the College Work-Study Program helps to stimulate the development of a worthwhile work experience for the student while attending college.

Student Employment. The Student Employment Office is maintained within the Office of University Personnel Services. Its primary aim is to help OSU students find employment, both on campus and in the community. The office is located at 407 Whitehurst Hall, telephone 624-5373. Office hours are 8 a.m. to 12 p.m. and 1 p.m. to 5 p.m., Monday through Friday.

Students who are interested in working part-time should contact this Office and file an application. This may be done by either mail or personal visit. After completion of the application, an interviewer will talk with the student concerning his or her employment interests and needs. An interview is

necessary before a job can be attained; however, it isn't necessary for the student to make a special trip to Stillwater for this purpose.

The best time to seek employment is at the beginning of each semester, although there are always some jobs available. Students who are interested only in summer employment need not file an application until the middle of March.

Pay scales and types of employment for campus and community areas vary. On campus the minimum rate of pay is at $3.35 per hour with an average work load of 12 to 20 hours per week. On-campus jobs deal mainly with the areas of skilled trades, secretarial, food service and manual labor. Off-campus opportunities deal basically with the same areas, including many temporary and child-related areas.

University Counseling Services

The University Counseling Services provides free and confidential professional counseling assistance to students. Students experiencing concerns related to any of the following areas may find this service helpful to them:

(1) Personal and emotional problems as they affect personal goals, academic progress and relationships with others.
(2) Selection of a major area, when such selections are more complicated or difficult than usual.
(3) Problems, concerns, and experiences relating to educational difficulties; i.e. study habits, unusual test-taking stress, lack of motivation, or attitudes related to school.

The resources of the University Counseling Services are available on both an individual and a group basis. 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.

Other services available to students through the University Counseling Services are the Career Information/Learning Resources Center (lower level, South Murray Hall, 624-5135), Minority Programs and Services, International Student Advisement, Substance Abuse Educational Programs, and Native American Programs and Services.

To make appointments students may call 624-5472 or come to Room 310, Student Union (Monday-Wednesday from 8 a.m. to 9 p.m. and Thursday-Friday 8 a.m. to 5 p.m., except noon hours).

General Problems of Campus Life. The Office of Student Affairs, Room 369 Student Union, provides assistance to students in interpreting and reviewing University policies and regulations, in becoming involved in the campus community, and in developing new programs to meet special interests or needs. The professional staff of the Office is also available to advise on student problems and to assist students in gaining information to answer their ques•

tions. The staff of the University Counseling Services (see above section) can also serve as a resource to students in answering questions and solving problems relating to general campus life.

Academic Advisement. Each student has an academic adviser who is available to assist students in clarifying their long-range goals, developing educational plans and selecting courses for realizing their goals. *The student is responsible for identifying and completing the degree program requirements.* Advisers are available as facilitators in helping students use University resources. The college directors of academic services, representing the academic deans, are in a position to assist in matters which may be of concern to the student. These people can provide information on academic rules, regulations, procedures and programs. The student will also find among the University faculty many who can be of help, not only in the solution of specific matters related to his or her specialty, but also in guiding the student in seeking and finding satisfactory answers to the questions raised by the challenging situations imposed by the college environment.

Placement Services

The University recognizes its obligations to assist students and graduates to maximize their efforts in preparing for and seeking careers. The Office of University Placement Services provides over-all coordination of the University placement programs. Specialized services are available in the offices of the college deans, along with assistance in locating part-time and summer employment provided by the Student Employment Office, Personnel Services. Several hundred regional and national firms conduct employment interviews on campus each fall and spring.

Veterans' Information

The Office of Veterans' Affairs (OVA) has the primary responsibility to coordinate activities throughout the University for veterans' programs. Specific objectives include informing veterans of services and benefits available, maintaining and distributing literature on veterans' programs, assisting in securing tutorial services and counseling, and assisting in career guidance and placement. It is also the responsibility of the OVA to seek out community and University resources available to veterans pertaining to housing, legal aid, and medical and dental services. Veterans are also helped to find part-time employment, and prior to enrollment in the University to secure certification from the nearest Veterans' Administration Office. A testing service is available to veterans if assistance is needed in determining their fields of study.

University Library

Occupying a central place in the life of the campus, the primary purpose of the University Library is to provide quality resources and services in direct and continuing support of the varied academic and research programs of the University.

Among the diverse resources available in the Library are more than 1,250,000 volumes, 9,500 journals, 120,000 maps, and more than 900,000 microforms. To acquaint users with the Library and to facilitate the use of its resources, the Library has a well-qualified and friendly staff which includes subject specialists holding faculty rank who place a high priority on service to users. In addition, a brief slide/tape, *Introduction to the Library, is* available in the Non-Book Room (1st fl, SE), and self-paced printed and audio walking tours as well as floor plans and guides to locating different types of material are available near the second-floor information desk.

The philosophy of service which underlies the Library's operation is also reflected in the number of reference desks located throughout the building, in the coin-operated photocopy machines situated on every floor (5 cents per copy), in the 112 hours that the Library is open each week that classes are in session, and in the extended hours during final examination time at the end of the fall and spring semesters.

Students, particularly those who are new to the campus, are encouraged to visit the Library. A good place to begin the visit is the Information Desk on the second floor. The Library faculty and staff welcome the opportunity to be of service.

Campus Activities

An education at Oklahoma State University means more than solely attending classes and listening to lectures. While classroom activity is the principal medium of educational offering, other facets are important to the development of a well-rounded individual. Cocurricular activities are viewed as an integral part of the academic experience, serving to enhance the student's university years. The wide range of activities reflects the student's quest for expression and achievement.

What's Going On at OSU? Types of activities at OSU largely depend upon the needs and desires of the students. Events involving the entire University community include intercollegiate athletics, concerts, lectures, art exhibits, films, dances and special activity weeks or days. Students have an opportunity to see Big Eight Conference athletic events. International political figures appear in formal presentations and informal discussions with students and staff.' Popular and classical entertainment presented at OSU ranges from small rock groups to symphony orchestras.

Organizations Are Responsible for Activities. More than 300 chartered and recognized student groups exist to provide individuals the opportunity to become involved. Ranging from departmental, professional, service, and honorary, to special-interest groups, these organizations provide opportunities for leadership and program development, new friendships, and recognition for achievement.

Intramural teams provide opportunity for participatory and spectator sports, recreational clubs promote hobbies, and special-interest groups center on religion, group living and student government.

Both vocal and instrumental University musical organizations are associated with the Department of Music.

Special organizations and activities exist for international students as well as specific ethnic groups.

Students are involved in operation of the campus radio station. Student groups staff various campus publications including the *Daily O'Collegian* newspaper and the *Redskin* yearbook.

A list of all organizations appears in the *Student Handbook,* which may be obtained in the Student Activities Center.

Facilities for Activities. The Colvin Physical Education Center, one of the finest facilities in the nation, encompasses a wide variety of organized and informal activities for all University students. It houses the School of Health, Physical Education and Leisure, which includes the academic program, recreation, intramurals, sports clubs and women's athletics. Activities available include racquetball, indoor or outdoor swimming, gymnastics, fencing, dance, golf, table tennis, wrestling, weightlifting, basketball, volleyball, badminton and squash.

Other facilities available for student recreational use include outdoor tennis courts, archery range; golf driving range, jogging track, soccer-rugby-football-softball fields and Lake Carl Blackwell.

The Student Union Activities Board coordinates and presents a variety of appealing and stimulating programs in the Student Union. In addition, the Union houses restaurants, a hotel, bowling lanes, a post office, several shops and a variety of other facilities.

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 eighteen 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 Ministers.

Fraternity and sorority houses and residence halls conduct an active program of social, cultural and educational events.

Other centers of activity include Lewis Field for football; Gallagher Hall for basketball, wrestling and concerts; and the M.B. Seretean Center for the Performing Arts.

How to Get Involved. The following personnel can give you detailed information regarding organizations and activities:

General information regarding all organizations and activities: coordinator of student activities, Student Union.

Student Union activities: program adviser, Student Union Activities Board, Student Union, Room 030.

Residence hall activities: residence hall program coordinator, Student Union, Room 062.

Allied Arts: coordinator of student activities, Student Union, Room 040.

Musical organizations: (vocal and instrumental), director of OSU marching band, Seretean Center, Room 121.

International student activities: international student adviser, Student Union, Room 316.

Student publications: director of student publications, Paul Miller Journalism and Broadcasting Building, Room 206

Intramural athletics: director ofintramurals, Colvin Physical Education Center, Room 119.

Intercollegiate athletics: director of athletics, Gallagher Hall, Room 102.

Fraternities and sororities: program adviser, Student Union, Room 050.

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

The 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 is fully authorized to act) to take all steps which he deems advisable to protect the assumed and designated interests of the Oklahoma State University and to see that its rules, regulations and policies are enforced. He shall insure 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 he 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 obligation 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 Regents to furnish all possible assistance to the president when requested by•him.

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 ofstudent conduct and in matters of student discipline. In the discharge of his 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.*

Students' Rights to Privacy

As required by the Family Educational Rights And Privacy Act of 1974-Buckley Amendment, Oklahoma State University hereby acquaints students with their privacy rights.

Students of Oklahoma State University have the right to:

(1) Inspect and review information contained in their educational records.
(2) Challenge the contents of their educational records.
(3) Have a hearing if the outcome of their challenge is unsatisfactory.
(4) Submit an explanatory statement for inclusion in their educational record, if the outcome of the hearing is unsatisfactory.
(5) Prevent disclosure, with certain exceptions, of personally identifiable information fro n their educational records.
(6) Secure a copy of the institutional policy, which includes the location of all educational records.
(7) File complaints with the Department of Education alleging failures of OSU to comply with the Act.

Information that Oklahoma State University has declared to be directory information concerning each student:

(1) Name and local and permanent addresses.
(2) OSU identification number and Social Security number.
(3) Telephone number.
(4) Date and place of birth.
(5) Major field of study.
(6) Weight and height of students participating in officially recognized sports.
(7) Dates of attendance at OSU.
(8) Degrees and awards granted.
(9) Academic classification such as freshman, sophomore, junior, senior, etc.
(10) Sex.
(11) Class schedule.
(12) Educational institutions previously attended.
(13) Degree(s) held, date(s) granted, and institution(s) granting such degree(s).
(14) Dissertation or thesis title.
(15) Adviser and/or thesis adviser.
(16) Participation in officially recognized organizations, activities and sports.
(17) Parents' names and addresses.

During the first two weeks of the fall semester, students may file with the Office of the Registrar written requests not to release directory information pertaining to them. Directory information will be released by the registrar until receipt of such written requests from the students asking that the information not be released.

DEGREES OFFERED

Major	Bachelor's	Master's	Doctor's	Other	College
Accounting.	X	X			Bus/Grad
Aerospace Studies	X				Arts & Sciences
Agricultural Economics	X.	X	X		Agric/Grad
Agricultural Education	X	X	X		Agric/Grad
Agricultural Engineering	X	X	X	Prof.	Agric/Engr/Grad
Agricultural Communications	X				Agriculture
Agronomy	X	X			Agric/Grad
Crop Science					Graduate
Soil Science					Graduate
Animal Science	X				Agriculture
Animal Breeding			X		Graduate
Animal Nutrition			X		Graduate
Animal Science		X			Graduate
Dairy Science		X			Graduate
Poultry Science		X			Graduate
Applied Behavioral Studies		X.	X		Graduate
Architectural Engineering		X			Grad
Architectural Studies	X				Engineering
Architecture		X			Graduate
Art	X				Arts & Sciences
Biochemistry	X	X	X		Agric/A&S/Grad
Bioenvironmental Engineering		X		Prof.	Graduate
Biological Sciences	X				Arts & Sciences
Botany	X	X	X		A&S/Grad
Business Administration		X	X		Graduate
Business Education	X	X	X		Bus/Grad
Chemical Engineering	X	X	X	Prof.	Engr/Grad
Chemistry	X	X	X		A&S/Grad
Civil Engineering	X	X	X	Prof.	Engr/Grad
Clothing, Textiles and Merchandising	X	X			Home Ec/Grad
Computing and Information Sciences	X	X			Graduate
Construction Management Technology	X			Assoc.	Technology
Corrections		X			Graduate
Curriculum and Instruction		X	X	Spec.	Graduate
Distributive Education	X	X			Educ/Grad
Economics	X	X	X		Bus/A&S/Grad
Education					
Educational Administration		X	X	Spec.	Graduate
Elementary Education	X				Education
Higher Education		X	X	Spec.	Graduate
Secondary Education	X				Education
Special Education	X				Education
Student Personnel & Guidance		X	X	Spec.	Graduate
Electrical Engineering	X	X	X.	Prof.	Engr/Grad
Electrical Power Technology	X				Technology
Electronics Technology	X			Assoc.	Technology
English	X	X	X		A&S/Grad
Entomology	X	X	X		Agric/Grad
Environmental Science		X	X		Graduate
Executive Secretarial Administration	X				Business
Family Relations and Child Development		X	X		Home Ec/Grad
Finance	X				Business
Fire Protection and Safety Technology	X			Assoc.	Technology

Major	Bachelor's	Master's	Doctor's	Other	College
Food, Nutrition and Institution Administration	X	X			Home Ec/Grad
Food Science		X	X		Graduate
Foreign Language					
French	X				Arts & Sciences
German	X				Arts & Sciences
Spanish	X				Arts & Sciences
Forest Resources		X			Graduate
Forestry	X				Agriculture
General Agriculture	X				Agriculture
General Engineering	X	X	X	Prof.	Engr/Grad
General Technology	X				Technology
Geography	X	X			A&S/Grad
Geology	X	X			A&S/Grad
Health and Physical Education	X				Arts & Sciences
Health Education	X				Arts & Sciences
Health, Physical Education, and Recreation		X			Graduate
History	X	X	X		A&S/Grad
Home Economics			X		Graduate
Home Economics Education	X	X	X		Home Ec/Grad
Horticulture	X	X			Agric/Grad
Hotel and Restaurant Administration	X				Home Ec
Housing, Design and Consumer Resources	X	X			Home Ec/Grad
Humanities	X				Arts & Sciences
Industrial Arts Education	X	X			Educ/Grad
Industrial Engineering and Management	X	X	X	Prof.	Engr/Grad
Journalism	X				Arts & Sciences
Mass Communications		X			Graduate
Management	X				Business
Management Science and Computer Systems	X				Business
Marketing	X				Business
Mathematics	X	X	X		A&S/Grad
Mechanical and Aerospace Engineering	X	X	X	Prof.	Engr/Grad
Mechanical Design Technology	X			Assoc.	Technology
Mechanical Power Technology	X			Assoc.	Technology
Mechanized Agriculture	X				Agriculture
Medical Technology	X				Arts & Sciences
Microbiology	X	X	X		A&S/Grad
Military Science	X				Arts & Sciences
Music	X				Arts & Sciences
Natural Sciences	X	X			A&S/Grad
Occupational and Adult Education		X	X	Spec	Graduate
Organizational Administration	X				Business
Petroleum Technology	X			Assoc.	Technology
Philosophy	X	X			A&S/Grad
Physical Sciences	X				Arts & Sciences
Physics	X	X	X		A&S/Grad
Physiological Sciences		X	X		Graduate
Physiology	X				Arts & Sciences
Plant Pathology	X	X	X		Agric/Grad
Political Science	X	X			A&S/Grad
Pre-law	X				Arts & Sciences

Major	Bachelor's	Master's	Doctor's	Other	College
Pre-Medical Science	X				Arts & Sciences
Pre-Veterinary Science	X				Agric/A&S
Psychology	X	X	X		A&S/Grad
Radio-Television-Film	X				Arts & Sciences
Recreation	X				Arts & Sciences
Rural Adult Education		X			Graduate
Social Sciences	X				Arts & Sciences
Sociology	X	X	X		A&S/Grad
Speech	X	X			A&S/Grad
Speech Pathology	X				Arts & Sciences
Statistics		X	X		Graduate
Technical Education	X	X			Educ/Grad
Trade and Industrial Education	X	X			Educ/Grad
University Studies	X				All Colleges
Veterinary Medicine (DVM)			X		Vet Medicine
Veterinary Parasitology		X	X		Graduate
Veterinary Pathology		X	X		Graduate
Wildlife Ecology	X	X	X		A&S/Grad
Zoology	X	X	X		A&S/Grad
Sub-Totals	91	68	46	19	
Grand total		224			

Associate Degrees Offered through the Oklahoma City Technical Institute

Major

Accounting
Architectural Technology
Biomedical Electronics
Civil Technology
Computer Operations Management
Computer Programming-Accounting
Computer Programming-Scientific
Computer Programming-Systems Analysis
Construction Technology
Electronic Engineering Technology
Environmental Safety
Fire Protection Technology
General Engineering
Horticulture
Industrial Drafting Technology
Instrumentation Technology
Municipal Fire Protection
Nurse Science
Oil and Gas Field Management
Police Science
Surveying Technology
Technical Writing

University Academic Regulations

In addition to these University requirements, there are also college, school, and department regulations which must be met; for these see the degree requirement sheet for each major or the Graduate Catalog.

1. Residence Requirements. The last eighteen credit hours completed by a student immediately preceding his or her graduation must be taken in residence at Oklahoma State University. In addition to these eighteen credit-hours, the student must have earned a minimum of six more credit hours in residence at this institution making a total of not less than twenty-four semester credit hours earned in not less than two semesters or one semester and one summer, or three summer terms; in the College of Business Administration, the last 30 hours must be earned in residence. See Section 9 for college enrollment requirement. A minimum of one-half of the upper-division requirements in a student's major field must be earned in residence at Oklahoma State University.

2. Grade Point Requirement for Graduation. An overall grade-point average of "C" or better and the minimum grade-point average as required by the department in the major and minor fields will be required for graduation, except as noted below.

Students who do not have an overall grade-point average of "C" or better may satisfy the *University* grade-point *requirement* (not the major or minor requirement) by presenting 90 or more hours of approved work with a grade-point average of "C" or better and a total of grade points equal to twice the number of hours required for the specified degree.

3. Grade Point Calculating. In calculating grade-point averages for all purposes other than for graduation, the total number of grade points earned is divided by the total number of hours attempted; for graduation, the hours and points earned first in a repeated course will be ignored. The grade of"I," "W," "N," "P" or "NP" will not affect the overall grade-point average.

4. Transcript below "C" Average. A student who is accepted with a below "C" transcript will be placed on academic probation and none of the credits will be officially accepted and made a part of the academic record until:

a. the student has maintained a "C" grade-point average or better over all work attempted at Oklahoma State University, AND
b. these transferred credits plus the credits earned at Oklahoma State University will meet all course requirements for the degree that the student is seeking at Oklahoma State University.

5. Major Requirements. The specific courses that are required for a major are made known to the student through the degree requirement sheet. A minimum of one-half of the upper-division courses that are required for the major must be earned in residence at Oklahoma State University.

6. General Education Requirements. Each college of Oklahoma State University determines and publishes general education requirements for each of its own degree programs within minimum standards established by the University. Colleges may exceed the University minimum but must require at least (1) 39 credit hours, comprising 6 credit hours of English composition and 33 credit hours of breadth requirements, (2) an International Dimension requirement, and (3) a Scientific Investigation requirement.

The 33 credit hours of breadth requirements must include 6 credit hours of American history and government, and, in addition, at least 3 credit hours of designated general education courses in each of the following areas: Social and Behavioral Sciences; Humanities; Natural Sciences; and Abstract and Quantitative Thought. At least 15 of the 33 credit hours must be in disciplines not directly supportive of the student's major field of study.

The International Dimension requirement (the equivalent of at least 3 credit hours in courses designated as meeting the criteria) and the Scientific Investigation requirement (one course from those designated in this category) maybe satisfied in any part of a student's degree program.

A course in a breadth area not designated for general education purposes may be substituted for a designated course in the same breadth area when this is justified on educational grounds specific to an individual student. Such a substitution requires the recommendation of the student's academic adviser and dean and the approval of the Assistant Vice President for Academic Affairs.

Courses that can be used to fulfill general education requirements are identified by the following code letters which appear preceding the course titles:

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

7. History and Government Requirement. In conformity with Oklahoma law, the State Regents for Higher Education require that all students who matriculate in an Oklahoma institution of higher learning shall have three semester credit hours in American history and three semester credit hours in American government before they can be granted a degree. Students may meet this requirement by completing HIST 1103 or 1483 or 1493 and POLSC 1013.

8. English Requirement. The University requires a minimum of six semester credit hours in English composition for a baccalaureate degree. The six hours of English composition are ENGL 1113 and ENGL 1323. Students who earn an "A" or "B" in ENGL 1113, or who earn 3 hours of credit in English composition through advanced-standing examination, and who have the consent of their college, may substitute ENGL 3323 for ENGL 1323. Students who qualify for Honors English may substitute ENGL 1413 for ENGL 1323.

English Proficiency Examination. All candidates for a bachelor's degree must pass the University English Essay Proficiency Examination or satisfy one of the following conditions: (a) receive a grade of "A" or "B" in a terminal composition course: ENGL 1323, 1413 or 3323; or (b) receive advanced-standing credit for ENGL 1323; or (c) complete nine hours of English composition with a grade of "C" or better in each course.

Students are advised to take the English Essay Proficiency Examination before their senior year, but must have taken it prior to filing a diploma application. The examination is offered free of charge in October, February and June of each year. A make-up examination will be available, administered by the Bureau of Tests and Measurements, for those who cannot be tested at the scheduled time. (A fee may be charged for the make-up examination.) Registration for the examination is handled in the Office of Student Academic Services of each college. Students may take the English Essay Proficiency Examination only one time. Those who fail the examination can satisfy the requirement only by successful completion of ENGL 3010, a noncredit tutorial class for which a one-hour audit fee is charged. Students who must take ENGL 3010 are advised to complete the course prior to the semester of anticipated graduation to avoid the risk of delay in the awarding of the degree. Late enrollment is permissible in this course.

9. College Enrollment Requirement. A candidate for graduation must be enrolled in the college from which the candidate wishes to receive a degree for at least two semesters, or one semester and one summer term, or three summer terms, immediately preceding graduation.

10. All Work Must Be Completed. Degrees are conferred only at scheduled Commencement exercises. If a student completes requirements for a degree after a Commencement date, the degree will be granted at the next scheduled Commencement. The student may receive a certified statement of completion of graduation requirements at the Office of the Registrar. No student can receive a degree at Commencement exercises unless his or her name appears on the Commencement program.

11. Presence at Commencement Exercises. 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. The University will hold one Commencement 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 (whether they are currently enrolled or not), should contact the Office of the Registrar for approval to participate in Commencement.

12. Diploma Application. Each candidate for graduation shall file a diploma application in the Office of the Registrar within two weeks following enrollment in the semester or summer session in which the student wishes to be graduated. Any petition which the student wishes to present in connection with his or her candidacy for graduation should be submitted prior to enrollment for the final term.

13. Payment of Graduation Fees. The graduation fee is due at the same time that tuition is due. Information on procedures and deadlines is given to students at the time they complete their enrollment.

14. Second Bachelor's Degree. In addition to meeting all course requirements for the bachelor's degree in a particular field, a student who wishes to secure a second bachelor's degree from Oklahoma State University must complete a minimum of one year (30 semester credit hours) of additional work.

15. Substitution of Courses. In special cases students may be permitted to substitute a course of similar subject matter for a required course. Substitution cards must be signed by the adviser, the head of the student's major department, and the dean of the college.

16. Waiving of Required Courses.* A student finding it impossible to schedule a required course in his or her final semester may petition to have the course waived. No more than a total of 6 credit hours may be waived. For approval to be granted, waive cards must be signed by the adviser, the head of the student's major department, and the dean of the college.

*Waiving required courses does *not* mean altering the number of *required credit hours.* Also, the courses required in American history and American government and the University requirement in English cannot be waived.

17. Classification of Students. The following guides are followed in determining classification of students:

Freshman-Fewer than 28 semester credit hours.
Sophomore-28 semester credit hours.
Junior-60 semester credit hours.
Senior-94 semester credit hours.

18. Full-time Students. Students who enroll in 12 or more credit hours are classified as full-time students.

19. Irregular Students. Candidates for a degree who are permitted by the dean of the college to carry fewer than 12 hours are classified as "Irregular Students."

20. Special Students. Students who are not candidates for a degree at this institution are classified as "Special Students."

21. Reporting Final Grades. The Registrar will inform the faculty each semester of the procedures and dates for reporting final grades to the Office of the Registrar. With the approval of the department head, a faculty member may authorize any person employed in the department to deliver a grade report-except when there is a question concerning the enrollment or final grade of any student, in which case the faculty member must deliver the report personally, so that the question can be resolved immediately and officially. Faculty members are encouraged to make their reports as soon as the grades are determined.

The official grade report shall be signed by the person who actually awards the grades; if this is a graduate assistant, the senior professor in charge of the course shall countersign the report. The senior professor shall be responsible for submitting the grade.

22. Progress Reports. The faculty will be requested to report grades on the dates as printed in the official University Calendar for all freshmen.

23. Correcting Grades Reported in Error. An instructor who reports to the Office of the Registrar an incorrect grade 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 approval. In no case will a grade be lowered after the student has been graduated.

24. Minimum Class Size. The minimum number of enrollees required in order for a class to meet is' as follows: 20 students for lower-division classes, 12 students for upper-division classes, and 8 enrollees for graduate-level courses.

25. Class Enrollment Maxima. Just prior to the dates set for pre-enrollment each semester, the Office of the Registrar will furnish each department head with a list of all the sections of both theory and laboratory that the department is offering for the coming semester and request a list of the maximum numbers of students permitted to be enrolled in each section. These maxima can be increased or decreased only by the department head or dean. If a maximum. is increased, the additional space cannot be restricted to a particular individual, but it can be restricted to a certain group, such as graduating seniors in a particular major.

26. Maximum Credit Hour Load. All credit hours enrolled in above 19 shall be regarded as excessive and shall require a written petition to the Office of the Registrar signed by the student's adviser and dean. Exception: students in engineering may carry 20 credit hours without petitioning for excessive hours. The maximum credit hour load that can be approved for a semester, summer session or a short course can never exceed one and one-half times the number of weeks of instruction in the semester, summer session or short course.

27. Late Registration. No student will be permitted to enroll in a regular semester or summer session after the first week of classes. Any student enrolling after classes begin must pay a late enrollment fee.

28. Withdrawing from the University. A student who wishes to withdraw will initiate withdrawal in the student's dean's office. A student who withdraws prior to the beginning of the eleventh week of a regular semester and the sixth week of a summer se sion will not receive grades and the courses will not appear on the student's permanent record. It will not be necessary to secure the approval of instructors since no grades are required. A student may withdraw after the tenth week of a semester and after the fifth week of a summer session but prior to the beginning of" Pre-finals Week" with the approval of the instructor, adviser and dean. The course dropped will appear on the student's record with a grade of"W" or "F" as assigned by the instructor.

29. Dropping Courses. At any time during the first ten weeks of a regular semester, or during the first five weeks of a summer session, or during the proportionate period for block or short courses, a student may withdraw from a course and no record of the course will appear on the transcript. After the tenth week and before the beginning of"Pre-finals Week" in a regular semester, or after the fifth week and before the beginning of the seventh week in a summer session, or proportionate periods for block or short courses, a student may withdraw from a course and receive the grade of "W" (withdrawn passing) or "F" (withdrawn failing) as assigned by the instructor at the time of the withdrawal. The grade of "W" shall be recorded on the student's transcript but shall not be counted as "hours attempted" when the grade point average is calculated.

After the beginning of"Pre-finals Week"

in a regular semester, or after the beginning of the seventh week in a summer session, or proportionate periods for block or short courses, a student may not withdraw from a course and shall be assigned only the grade of "A," "B," "C," "D," or "F" or (when appropriate) "P" or "I" by the instructor at the end of the semester.

A student may not withdraw from any course in which a formal charge of academic dishonesty is pending against the student. If the student is absolved of the charge, he or she may withdraw from the course with no record appearing on the transcript. If the student is found guilty, the instructor may take appropriate disciplinary action, including assigning the grade "F" for the assignment or the course.

30. Adding Courses. A student may add a course only upon the approval of the student's adviser. No course may be added after the first day of the second week of classes in a regular semester and after the first week of classes in the summer session.

31. Grade Interpretation. Grades for work in both classes and laboratory at this institution are indicated by the following letters: A, B, C, D, F, I, P, NP, W and N.

Grade "A" (Superior). To obtain the grade of "A," a student must show that he or she possesses: (1) a thorough comprehension and retention of facts and principles of the subject; (2) ability to reproduce these facts and principles readily, accurately and concisely, orally and in writing; (3) the power to correlate the materials with other branches of the subject and with other subjects; (4) an individual reaction upon the material shown by the ability to apply the methods of the course to new and original problems and situations with reasonably sound results.

Grade "B" (Good). To obtain a grade of "B" the student must show the first two qualities which are required for the grade "A" without the third or fourth; that is, the student must show thorough comprehension and accurate retention, but does not show the power of correlation or original reaction. The grade "B" is also for the student, who, during a considerable part of the course, but not uniformly, has shown all the qualities of an "A" grade student. At times the student has been neglectful of prescribed tasks to a slight or moderate degree, due, not to illness, but to pressure ofother work, or to legitimate outside interests.

Grade "C" (Adequate). The work of the student receiving this grade frequently shows adequate comprehension and accurate reproduction but is moderately irregular.

Grade "D" (Minimum passing). This grade is for the student whose work is considerably below the average. The work is barely passing.

Grade "F" (Failing). Ordinarily failure. "F" is given to a student who does not show a satisfactory grasp of the subject and whose examinations and recitations are poor, or has been absent from all class activities.

Grade "I" (Incomplete). The grade of "I" represents incomplete work. It is given to the student whose work averages above passing but who has been unavoidably prevented from completing the work of the course; it is also given in courses of a continuing character. When reporting an "I" grade to the Office of the Registrar for courses of noncontinuing nature, the instructor shall record in detail on the back of the official class record that he or she files with the Office of the Registrar at the close of the term, the conditions, including appropriate time limits, for removing the "I." The maximum time allowed a student for removing an incomplete is three years unless the instructor who gave the "I" requests an extension.

Removal of "I" Grades*. It is the responsibility of the instructor to report the removal of the incomplete grade to the Office of the Registrar on the appropriate form furnished by the Office of the Registrar.

Students who receive an "I" grade in courses of a noncontinuing nature **have the responsibility for satisfying the requirements specified by the instructor at the time of the assignment of the "I" grade. The grade of "I" will remain on the student's record until appropriately removed.**

*The grade of"I" is not *removed* but rather is marked out with the new grade inserted beside the "I."

Grade "P" (Passing). The grade "P" is given to indicate passing in a transfer course in which no letter grade has been assigned, and in cases that have been approved for the Pass-No Pass Grading System at Oklahoma State University. In figuring grade-point averages both credit hours and points are ignored for courses with grades of"P." (See also Pass-No Pass Grading System, General Regulation #43).

Grade "NP" (No Pass). The grade "NP" is given to indicate not passing in a course taken on the Pass-No Pass Grading System. In figuring the grade-point averages, both credit hours and points are ignored for courses with grades of"NP." (See also Pass-No Pass Grading System, General Regulation #43).

Grade "W". A mark of "W" indicates that the instructor assigned the grade of "dropped passing."

Mark of "N". A mark of "N" indicates that at the time grades were due in the Office of the Registrar, a grade was not available because of the instructor's illness or other extenuating circumstances. An "N" is not a grade and may not be issued by an instructor. In figuring grade-point averages, both credit hours and points are ignored for a course with a mark of "N." An "N" will be changed to the grade earned within a reasonable amount of time.

32. **Grade Reports.** Reports of the final grades of all students are prepared and released each semester by the Office of the Registrar. These reports are made available to the student, the student's adviser, the student's dean, the Dean of Student Affairs and the student-counselors in the dormitories.

Progress reports for all freshmen are made available to the student, the student's adviser, the Dean of Student Affairs, student-counselors in the dormitories, and the student's dean.

33. **Official Transcripts.** All official transcripts of students' academic records at Oklahoma State University are prepared and released by the Office of the Registrar.

34. **Grade-Point System.** The following point system is used with grades as a gauge of scholastic standing and as a partial basis for graduation:

Grade "A" yields 4 grade points per hour
Grade "B" yields 3 grade points per hour
Grade "C" yields 2 grade points per hour
Grade "D" yields I grade point per hour
Grade(s) "F," "I" and "P" yield 0 grade points per hour

35. **Audit Card.** A student who does not wish to receive credit in a course may, with the approval of the instructor in the course concerned, obtain an audit card from the Office of the Registrar. A student who signs for an audit card promises that he or she will not use the audit card 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.

Any individual 65 years or older may secure an audit card at no charge.

36. **Numbering System.** All courses are numbered in terms of four digits. The first digit indicates the class year in which the subject ordinarily is taken; the last digit indicates the credit hours, and all four serve to denote the course. For example, a course numbered 1 123 should be interpreted as a freshman course carrying three hours of credit. Some course numbers end in 0, e.g., 2120. This means that the credit carried varies. A course number which begins with 0 indicates that the course carries no credit. When the last digit of a course number indicates the semester credit hours carried by the course, a student cannot take the course for more nor fewer than the designated credit hours.

37. **Scholastic Requirements for Continuing Enrollment in Undergraduate Colleges.**

a. **Enrollment in Good Standing.** A student who is not under suspension from the University is eligible to enroll in any of the undergraduate colleges except the College of Veterinary Medicine.

b. **Academic Probation.** A student will automatically be placed on academic probation when the grade-point average in the most recent semester of enrollment is less than 2.00. A student may be placed on academic probation at the close of a semester in which the student fails to make satisfactory progress toward an approved objective.

A student enrolling on probation should seek help from his or her adviser and/or personnel in the counseling center when deciding on an academic load and extracurricular activities. A student whose poor grades may have been caused by health problems should seek help of a University physician.

c. **Academic Suspension.** A student will be suspended when he or she earns less than a 2.00 grade-point average in the most recent semester of enrollment and

(1) the cumulative average for the last two semesters is less than 1.40
or
(2) the cumulative average for the last two semesters is less than 2.00 and the cumulative average for all hours attempted falls below the following:

Total hours attempted	Minimum grade-point average required
fewer than 36	1.40
36 through 54	1.50
55 through 73	1.60
74 through 90	1.70
91 through 108	1.80
over 108	2.00

A student who at any time demonstrates lack of appropriate concern for satisfactory progress toward an approved objective will, at the request of the dean of the college, be suspended from the University. A student who fails to meet the conditions of probation will be suspended.

d. **Reinstatement after Academic Suspension.** Any student who has been suspended from the University for academic reasons may apply for readmission not sooner than one year from the date of suspension. Such application for readmission will be considered by the dean of the college in which the student wishes to enroll on the merits of the individual case.

38. **Honor Roll.** Undergraduate students completing all courses (prior to the close of the semester) taken in any semester ag-

gregating not fewer than 12 semester credit hours, or six semester credit hours during a summer term, with an average grade of "B" (3.00) or higher, and having received no grade lower than "C", and in addition having the recommendation of their deans, are placed on the DEAN'S LIST OF DISTINGUISHED STUDENTS. Undergraduate students completing all courses taken in any semester aggregating not fewer than 12 semester credit hours or six semester credit hours during a summer term with all "A" grades are placed on the PRESIDENT'S LIST OF DISTINGUISHED STUDENTS. Semester credit hours earned with a grade of"P" will not affect the student's grade-point average and will not be counted as part of the required aggregate of semester credit hours.

39. **Okmulgee Branch.** Vocational training in industries, business and related fields is offered at the Okmulgee Branch of Oklahoma State University. Students satisfactorily completing the prescribed courses for an associate degree may be granted college credit for those courses at other state institutions to the extent that those courses are relevant 'to their bachelor's degree as determined by the receiving institution.

40. **Readmission.** (Not to be confused with Reinstatement). A student who has attended Oklahoma State University but did not attend the immediate past semester must file an application for readmission. If the student has attended another university since last attending Oklahoma State University he or she must file a transcript of all work taken at the university or universities and his or her admission status will be determined after an evaluation of the transferred work has been made.

41. **Associate Degree.** Students in the School of Technology who satisfactorily complete a prescribed program may apply for and receive a two-year associate degree.

42. **Requirements for an Honors Degree.** Individual colleges participating in the University Honors Program have specific requirements for the degree. Students should consult their academic dean for information.

43. **Pass-Fail and Pass-No Pass Grading Systems.** Since 1979 both Pass-Fail and Pass-No Pass grading systems have been operative.

Students completing certain specified courses, mostly oforientation or honors nature, will receive a final grade of only "P" or "F". Such courses are so designed in their descriptions.

The Pass--No Pass system is optional with the student, and is intended to encourage the development of an attitude in which the student is seen as a self-guided scholar rather than as a student competing for a grade. It is further intended to develop a more personal attitude toward study that will continue through the years.

The pass-no pass grade ("P" or "NP") refers only to the final grade recorded on the student's permanent record in the Office of the Registrar. The "P-NP" grade option is not identified on the official class roll, so that it is not known by the instructor that the student has chosen this option. This procedure allows a regular grade to be reported by the instructor but the appropriate "P-NP" grade to be recorded by the Office of the Registrar. The grades of "A," "B" and "C" will be recorded as a "P," the grades of "D" and "F" will be recorded as an "NP," the grade of"W" will be recorded as a "W," and the grade of"I" will be recorded as an "I." The "P-NP" grade will not affect the grade-point average of the student.

A student who chooses the Pass-No Pass Grading System must do so prior to the beginning of the second week of classes. Once the deadline has passed a student will not be permitted to change the choice of grading systems. However, a student will be permitted to drop the course within the same regulations governing drops for any course.

A. **Undergraduates.** The Pass-No Pass Grading System is restricted to 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 the prerequisites for enrollment in the course chosen for the pass-no pass grade.
d. do not need the course chosen for the pass-no pass grade for meeting any requirement for graduation or certification other than *a free elective.*

The responsibility for seeing that the student satisfies all prerequisites for enrolling in a course with the pass-no pass option lies with the student, the student's adviser, and the Registrar. The student who plans to transfer to another college or university should check with that institution to be sure that credit will be accepted in a course with the pass-no pass grade.

A student may take no more than four courses or 15 hours (whichever is greater) with a pass-no pass option.

B. **Graduate Students.** Graduate students may enroll to take a course pass-no pass. To enroll, the student must submit a letter specifying the course(s) and semester and have the consent of his or her major adviser and the Dean of the Graduate College. The request should accompany the enrollment packet.

44. **Dual Credit.** 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 in

residence at Oklahoma State University, must secure advance approval from his or her dean and the Academic Council Committee if he or she expects this university to accept those credits. Armed Forces personnel will be granted sixty 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.

45. **Residence Credits from Institutions of Equal Standing with Oklahoma State University.** Credits transferred from accredited senior colleges will be given full value in similar courses whenever possible. The amount of credit given for courses taken in other institutions may not exceed the amount given at Oklahoma State University for the same length of time of instruction. Students may not 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 their academic dean.

46. **Transfer or Residence Credits from a Junior College.** Credits will be accepted by transfer from a junior college to meet lower-division requirements only. This means that students will not receive credit by transfer from a junior college for more than 65 hours. A minimum of 60 semester hours must be earned in a senior college.

47. **Correspondence Credits.** Oklahoma State University will accept a maximum of eight semester credit hours earned through correspondence at another institution if that institution is fully accredited. Credits earned through extension plus any credits earned through correspondence and advanced-standing examinations cannot exceed one-fourth of the credits required for a bachelor's degree.

48. **Extension Credit.** Oklahoma State University will accept 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 credits earned through correspondence and advanced standing examinations can not exceed one-fourth of the credits required for a bachelor's degree.

49. **Advanced-Standing Examinations.** Oklahoma State University strongly supports the belief that students proficient in certain academic areas should be able to establish college credit through advanced-standing examinations. OSU is a national testing center for the College Level Examination Program (CLEP). National testing centers offer two kinds of examination: General Examination and Subject Examination. OSU grants college credit for only the Subject Examination.

Many academic departments at OSU " offer advanced-standing examinations in subject areas not offered by the CLEP. These examinations are given on campus on scheduled testing dates. Information pertaining to application forms, testing dates and fees may be obtained from the Office of Admissions.

Acceleration of Academic Program. A student whose travel, employment, extensive readings or other educational experiences appear to have given the student proficiency in a course that is offered at Oklahoma State University equivalent to the proficiency ordinarily attained by students that take the course in a regular class, and who meets the conditions listed below, may apply for an examination on the course.

Credit will be recorded with a grade of "P" if the student earns a "C" or better on the examination. In order to qualify for an advanced-standing examination, the student must:

a. be enrolled at Oklahoma State University.
b. need more than 15 semester credit hours (excluding the hours in which currently enrolled) toward meeting the requirements for a degree.
c. need the course to meet some requirement for a certificate or degree that is being sought at Oklahoma State University.
d. not have taken an examination over the course within the preceding six months.
e. have the recommendation of the Registrar and the approval of the head of the department in which the course is offered.
f. have paid the fee of $5 per credit hour. (This fee is not refunded even if the student receives no credit.)

The amount of advanced-standing credit which may be awarded shall not exceed one-half of the total semester hours required at the lower-division level, and not more than one-half of the total semester hours required at the upper-division level. In computing the total amount of credit which may be earned by advanced standing, hours taken through correspondence and extension methods shall be considered as having been earned through the advanced-standing mechanism.

50. **Validation Examinations.** A student who has earned credit in a course which Oklahoma State University refuses to accept because the institution at which the course was taken was not accredited, may apply for a validation examination. In order to qualify for a validation examination, a student must:

a. be enrolled at OSU at the time the student takes the examination.
b. present evidence to prove that the student has taken the course.
c. get approval of the Registrar, the dean and the head of the department in

which the course is offered to take the examination.

d. take the examination within the first eight weeks after entering OSU.

The student secures the forms for the examination at the Office of the Registrar. 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 the Registrar and credit is recorded with a grade of "P" if a "C" or better is earned on the examination.

51. **Payment of Tuition and Fees.** Students are given information at the time they complete their enrollment on the procedures and deadlines for payment of fees and tuition. Students who do not follow these procedures and make payment by the deadline will be suspended for the remainder of the semester or summer session.

52. Prerequisites. Where no prerequisites are listed for courses numbered 3000 or above, 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, or consent of the instructor.

53. Semester Credit Hour. As a general guideline, a semester credit hour represents a total of three hours (150 minutes) per week for a sixteen-week period of preparation and classroom and/or laboratory work conducted under the guidance of a qualified instructor, including examination days but exclusive of enrollment, orientation, and vacation days.

Traffic Regulations

Students who plan to drive a vehicle on the campus must register the vehicle with the University Police Department. No fee is charged for this registration. If a student desires to park a vehicle on the campus, he or she must purchase a parking permit in the Office of the Bursar.

College of Agriculture

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

Randall J. Jones, Ph.D., Associate *Dean for Resident Instruction*

Earl N. VanEaton, Ph.D., *Assistant Dean for Resident Instruction*

Department Heads

Agricultural Communications, *Charles Voyles, M.S.*

Agricultural Economics, *James E. Osborn, Ph.D.*

Agricultural Education, *H. Robert Terry, Ph.D.*

Agricultural Engineering, C. *Thomas Haan, Ph.D.*

Agriculture (General), *Earl N. VanEaton, Ph.D.*

Agronomy, *P. W. Santelmann, Ph.D.*

Animal Science, *Robert Totusek, Ph.D.*

Biochemistry, *Roger E. Koeppe, Ph.D.*

Entomology, *D. C. Peters, Ph.D.*

Forestry, J. *Edward Langwig, Ph.D.*

Horticulture, *Grant Vest, Ph.D.*

Plant Pathology, *William L. Klarman, Ph.D.*

Pre-Veterinary Science, *Earl N. VanEaton, Ph.D.*

The agricultural curriculum is designed to meet the needs ofstudents in a wide range of subject matter related to food and fiber production and associated industries. Courses of study are concerned with personal development as well as professional competence of students in their chosen fields.

Both general education and professional courses are available in 13 different major fields of study. Option programs that emphasize production, science, business or other specific areas of specialization are provided in the various departments.

The demand for agriculturists is emphasized by the rapid population increase around the world and the growing need for agricultural production to meet food and fiber requirements. This vast industry must have well-educated manpower to carry on work in research, education, business, industry, farming and ranching, international development, government and other areas that together represent more than 500 specific kinds of jobs.

Degrees. The Bachelor of Science degree in Agriculture is offered in the following major fields of study: agricultural economics, agricultural education, agricultural communications, agronomy, animal science, biochemistry, entomology, forestry, general agriculture, horticulture, mechanized agriculture, plant pathology and pre-veterinary science.

Graduate study is available in all departments in the College. In addition to the master's degree which may be obtained in the several departments, the Doctor of Philosophy degree may be earned in the following areas: agricultural economics, agricultural education (Ed.D.), agricultural engineering, animal breeding and nutrition, biochemistry, entomology, crop science, food science and soil science.

Requirements for Graduation. General University requirements for graduation are stated elsewhere in this *Catalog.* In addition, specific requirements must be met for the Bachelor of Science degree in Agriculture. A total of 130 semester credit hours must be completed satisfactorily in all departments except biochemistry and forestry. Biochemistry requires 124 credit hours while forestry has a 144 credit hour requirement for a B.S. degree. No credit will be allowed for MATH 1113 toward meeting the requirements for graduation. A student must have 90 or more semester credit hours of "C" grades or better, including a maximum of 10 hours of basic military science or physical education, and total grade points equal to twice the number of hours required for graduation. Also, a minimum of 40 semester credit hours and 100 grade points must be earned in courses numbered 3000 or above.

Transfer Students. Students who transfer from an accredited college or junior college must not have less than a "C" grade-point average. All transferred courses are recorded on the OSU transcript; however, transfer students from a junior college must complete at least one-half of the total credit hours

required for graduation in a given curriculum at this institution. Specific departmental requirements needed for graduation are determined by the department in which the student plans to earn his or her degree.

Pre-veterinary medicine curriculum. *(See the pre-veterinary option in the College of Arts and Sciences)* The program in pre-veterinary medicine as offered in the College of Agriculture includes all courses required before application can be made for admission to the College of Veterinary Medicine.

A minimum grade-point average of 2.80 with no grade below "C" is required in order to be eligible for admission to the College of Veterinary Medicine. In addition at least 60 semester credit hours must be completed which include the required courses listed below:

English composition & public speaking or technical writing (8 hours minimum). ENGL 1113 and 1323; ENGL 2333 or 3323.

Chemistry (17 hours minimum.)

1. General chemistry (8 hours minimum). CHEM 1314 and 1415 or 1215 and 1225
2. Organic chemistry (5 hours minimum). CHEM 3015 or 3053 and 3112
3. Biochemistry (4 hours minimum). BIOCH 3653 and 3721

Physics (8 hours minimum). PHYSC 1114 and 1214

Mathematics (3 hours minimum). MATH 1513 (or 1613 or 1715 or other advanced mathematics)

Biological science (14 hours minimum. Courses must cover zoology, botany, microbiology and genetics. Each course, except genetics, must include laboratory work.)

1. Principles of biology-BISC 1303, 1402 and 1602
2. Microbiology-MICRO 2124
3. Genetics-ANSI 3423 or BISC 3024

Although these course requirements, plus electives to equal 60 hours, may be completed within two years, most entering 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 this Catalog and the current *Veterinary Medicine at Oklahoma State University* brochure. Students are also encouraged to contact the pre-veterinary science adviser in the College of Agriculture.

Degree in Pre-veterinary Science. A Bachelor of Science degree in Agriculture with a major in pre-veterinary science may be obtained after the completion of one year in the College of Veterinary Medicine. General requirements

for graduation in the College of Agriculture must be met. Specific course requirements shall be fulfilled by completion of the pre-veterinary requirements, the courses listed below and the College of Veterinary Medicine's first year curriculum.

American history-3 semester credit hours. HIST 1103, 1483 or 1493
American government-3 semester credit hours. POLSC 1013
Agriculture orientation-1 semester credit hour. AG 1011
Animal science-7 semester credit hours. ANSI 1124, 2123 or 3543
Agricultural economics-4 semester credit hours. AGEC 1114

Agricultural Communications

ASSOCIATE PROFESSOR AND HEAD
Charles Voyles, M.S.

(Refer to *Journalism and Broadcasting* in the College *of* Arts *and Sciences* section of this Catalog for list of staff members.)

The modern agricultural complex ofproduction and industry is so diverse and specialized that communication between the segments, as well as with the general public, is vital to the function of the whole. Education in agriculture and journalism to effectively provide such communication is the curriculum objective of the agricultural communications and journalism program.

Students may develop strong emphasis in special-interest areas such as advertising, radio and television work, feature or newswriting and reporting, or research report writing, as well as develop a double-major program of study with specific departments of the College of Agriculture.

Career opportunities are excellent in all areas of modern agriculture for the graduate with a Bachelor of Science degree in Agriculture with a major in agricultural communications.

Agricultural Economics

PROFESSOR AND HEAD
J. E. Osborn, Ph.D.

REGENTS PROFESSOR
L. G. Tweeten, Ph.D.

PROFESSORS
D. D. Badger, Ph.D.
L. V. Blakley, Ph.D.
G. A. Doeksen, Ph.D.
J. R. Franzmann, Ph.D.
P. D. Hummer, Ph.D.
J. E. Ikerd, Ph.D.
D. D. Kletke, Ph.D.
R. D. Kranz, Ph.D.
H. P. Mapp, Ph.D.
C. D. Maynard, M.S.
T. R. Nelson, Ph.D.
R. E. Page, M.S.
J. S. Plaxico, Ph.D.
D. E. Ray, Ph.D.
D. F. Schreiner, Ph.D.
0. L. Walker, Ph.D.

ASSOCIATE PROFESSORS
B. J. Bullock, Ph.D.
R. A. Jobes, Ph.D.
J. R. Nelson, Ph.D.
R. L. Oehrtman, Ph.D.
J. N. Trapp, Ph.D.
C. Ward, Ph.D.
J. E. Williams, Ph.D.

ASSISTANT PROFESSORS
A. E. Baguet, Ph.D.
F. M. Epplin, Ph.D.
G. J. Knowles, M.S.
L. K. Lee, Ph.D.
W. K. Scearce, Ph.D.
T. F. Tice, Ph.D.
N. J. Updaw, Ph.D.

INSTRUCTORS
C. C. Micheel, M.S.
G. R. Sloggett, M.S.

Agricultural economics provides professional opportunities for students interested in solving problems in agricultural production and agribusiness, as well as solving problems in the broader areas of resource development, environmental planning, recreation and public policy.

Agricultural economics combines instruction in the agricultural sciences with education in the application of economic principles and tools to the science and art of private and public decision-making. Emphasis is placed on the management of agricultural production and marketing firms and upon decision-making and problem-sol'ing guides relevant to public policy decisions.

Careers of agricultural economists reflect the broad base of the educational program, particularly as related to management. Careers in production and marketing include self-employment as farmers or ranchers, and managers of agribusiness marketing firms such as processors, manufacturers and distributors of food products, chemicals and machinery. Other careers include employment by consulting firms, educational institutions and financial agencies in private and governmental research and service activities.

Major areas of course work in agricultural economics include farm management, agricultural marketing, agricultural financial management, resource conservation and development, agricultural prices, agricultural policy and land appraisal. Courses in economic theory, statistics, computer

sciences, mathematics and technical agriculture provide additional depth and breadth to the curriculum. An intensive advisement program and a broad range of elective courses permit the student to structure a program consistent with his personal interests, objectives and needs.

Nine degree options or specialties are available to students majoring in agricultural economics: farm and ranch management, marketing and business, general, science, pre-law, veterinary business management, and regional and community development with two additional options offering double majors in agricultural economics and accounting and in agricultural economics and computer science. Advanced work leading to the degree of Master of Science and Doctor of Philosophy in agricultural economics is also offered by the Department.

Agricultural Education

PROFESSOR AND HEAD
H. Robert Terry, Ph.D.

PROFESSORS
Charlie Burns, Ed.D.
James P. Key, Ed.D.
James D. Netherton, Ph.D.
Jack W. Pritchard, Ed.D.
Earl **N. VanEaton,** Ph.D.

ASSOCIATE PROFESSORS
Ray Parker, M.S.
William D. Strom, Ph.D.

ASSISTANT PROFESSORS
Paul Czarniecki, **Ed.D.**
Wes Holley, Ed.D.
Roy R. Lessly, M.S.
Merl E. Miller, MS.
Robert F. Reisbeck, Ed.D.
James D. White, Ed.D.

The program of studies offered by the department of Agricultural Education is designed to provide both comprehensive and specialized training in preparation for a career as an educator in the various fields of agriculture. **In** addition to the objective of preparation for certification as teachers, graduates are professionally well-prepared for work in cooperative extension and other federal and state educational programs and services, as well as international education endeavors. Graduates also may find employment as educational directors and consultants with agribusiness industrial firms and organizations. Study programs are designed for persons desiring to serve at secondary, post-secondary and adult levels. Studies may culminate in the B.S., M.S. or Ed.D. degrees.

The undergraduate program is designed to qualify the bachelor's degree recipient for the Oklahoma Standard Vocational Agriculture Teaching Certificate. This certificate is recognized as meeting requirements for certification in most other states. Students have opportunities for some

specialization within the total 58 semester credit hours of technical agriculture and mechanics required. Some students find it advantageous to elect a double major, thus meeting all graduation requirements in both agricultural education and another departmental major within the College of Agriculture, such as agricultural economics, animal science, agricultural mechanization and ornamental horticulture. The undergraduate program in agricultural education is structured to provide ample educational experience in general education, specialized or technical agriculture and professional education.

The graduate program offered in agricultural education not only serves directly as professional improvement for teachers of agriculture but also has flexibility, enabling extension workers, directors of selected governmental programs, and international agricultural workers to plan and pursue studies best suited to their individual needs. For those finishing the master's degree, completion of a research report or thesis is required as well as a minimum of 10 credit hours of course work in technical agriculture and/or agricultural mechanization, or other approved supportive areas.

The Doctor of Education degree with a major in agricultural education is conferred upon individuals successfully completing comprehensive studies in vocational-technical and career education with major emphasis upon application to agriculture. Recipients of the Ed.D. often continue their professional career in the areas of teacher education, curriculum development, administration, supervision and leadership development in vocational-technical and career education, as well as other leadership positions more specifically related to agriculture.

Agricultural Engineering

PROFESSOR AND HEAD
C. T. Haan, Ph.D., P.E.

PROFESSORS
D. G. Batchelder, M.S., P.E.
P. D. **Bloome,** Ph.D., P.E.
Wendell Bowers, M.S., P.E.
G. H. Brusewitz, Ph.D., P.E.
B. L. Clary, Ph.D., P.E.
F. R. Crow, M.S., P.E.
J. E. Garton, Ph.D., P.E.
Jay G. Porterfield, M.S., P.E.
L. O. Roth, Ph.D., P.E.
D. P. Schwab, M.S., P.E.

ASSOCIATE PROFESSORS
A. D. **Barefoot, M.S.,** P.E.
G. E. Cook, M.S.
W. R. Gwinn, Ph.D., P.E.
A. P. Lewis, M.S.
G. W. A. **Mahoney,** Ph.D., P.E.
C. E. Rice, Ph.D., P.E.
W. E. Taylor, M.S., P.E.
Richard W. Whitney, Ph.D., P.E.

ASSISTANT PROFESSORS
H. W. Downs, M.S.
Joseph **F.** Gerling, M.S.
R. L. Huhnke, Ph.D., P.E.
L. K. Jones, M.S., P.E.
D. E. Temple, M.S.

The Department of Agricultural Engineering is administered jointly by the College of Agriculture and the College of Engineering.

Mechanized Agriculture Curriculum

The agricultural mechanization curriculum is a four-year program leading to the Bachelor of Science degree in Agriculture. This curriculum is designed to provide the undergraduate with a broad general education in the social, biological and physical sciences, and mathematics. Degree candidates will receive technical training in specialized fields of greatest interest to them.

Course work emphasized at Oklahoma State University includes principles of modern mechanized agriculture, automation of farm operations, buildings for production and storage, management and utilization of water including irrigation and utilization of electrical energy. Related course work in fields such as economics, marketing, animal science, and agronomy give mechanized agriculture students the background for competitive positions in related industries.

Entrance requirements for aspirants to the Bachelor of Science degree in Agriculture through the mechanized agriculture curriculum are listed under the College of Agriculture in this *Catalog.*

Specific types of work in business and industry include: product development, product education, firm or association field representatives, farm service advisers, service, sales and editorial work.

Graduates in agricultural mechanization are employed by farm machinery companies, building material suppliers, irrigation equipment companies, manufacturers of materials-handling equipment, manufacturers of processing equipment, pump companies, electric power companies or cooperatives, and government agencies such as Farmers' Home Administration and Federal Land Bank.

A degree with a major in agricultural mechanization requires 130 credit hours. Course work is distributed approximately as follows: basic science and mathematics-20%; applied science and engineering-35%; business--20%, social science and communications-25%.

Agricultural Engineering Degree

Students interested in a degree in agricultural engineering may initially enroll in the College of Agriculture or College of Engineering. If they elect to enroll in the College of Agriculture, they should transfer to the College of Engineering by the end of their freshman year. Agricultural engineering students receive basic engineering and also some basic courses in the biological and agricultural sciences. Agricultural engineering courses apply mathematics, basic engineering and science to create and design new systems and equipment for agricultural production and processing. Social studies and humanities prepare students to work with people; these studies are important because the agricultural engineer early in his or her career assumes supervisory and management responsibilities. In the junior and senior years the

student elects engineering and science courses to specialize for career opportunities of his or her choice in one of the following.

Hydrology and water resources, related to agricultural development and production, includes flood control, irrigation, water supply development and drainage.

Design and development of machines and equipment is a field which includes design of power and controls systems, field machines, and equipment for handling agricultural products on farms and in factories.

Processing, handling and storage of agricultural products is a specialty including drying, grinding, crushing, temperature and humidity control, and systems for taking raw products of agriculture through the processes necessary to place them on the market. .

Environmental engineering for agricultural production includes confined systems requiring sophisticated controls, and open systems such as feedlots, waste management and pollution control resulting from animal and plant production and processing.

A wide variety of employment opportunities are available for agricultural engineers in industry and public service. Some of these opportunities include governmental agencies; irrigation and drainage companies; tractor and machinery manufacturers; manufacturers of agricultural chemicals; producers ofsteel, building and construction supplies; electric power companies; food processing and canning; and feed processing companies.

Other opportunities include university teaching, research and extension; positions as engineering editors, industrial consultants and positions in foreign service. The United States and most large companies have agricultural engineers in foreign countries.

For those students who wish to prepare themselves for advanced research and teaching, the Department of Agricultural Engineering offers an educational program leading to the degrees of Master of Science, Master of Engineering, and Doctor of Philosophy in agricultural engineering.

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

Agriculture (General)

PROFESSOR AND HEAD
Earl N. VanEaton, Ph.D.

The general agriculture program of study is designed to provide students the opportunity of obtaining a broad education in agriculture rather than the more specialized study typical of departmental programs.

Students select general agriculture as their major for one of two reasons:

1. Students undecided on a major may elect to take the general agriculture program as it provides the opportunity to investigate various majors and options. Courses taken in the general agriculture option apply to the B.S. degree programs in Agriculture, as well as degree programs in some other colleges. Transfers from one major to another may be made at any time. Career information and guidance is available from faculty advisers as well as the Agricultural Career Development Center.
2. Students wanting a broad-based degree program may do so through the general agriculture program. This option allows students to prepare themselves for careers that require a broad background of understanding of the modern agricultural complex.

The general agriculture curriculum allows students to select courses of special interest to them in relation to the work they plan to do. Basic courses in general education, the sciences and business are required along with over 40 credit hours of electives, in order to complete requirements for a Bachelor of Science degree in Agriculture.

Agronomy

PROFESSOR AND HEAD
P. W. Santelmann, Ph.D.

REGENTS PROFESSOR
B. B. Tucker, Ph.D.

PROFESSORS
D. J. Banks, Ph.D.
L. I. Croy, Ph.D.
L. H. Edwards, Ph.D.
Fenton Gray, Ph.D.
H.A.L. **Greer,** Ph.D.
W. W. Huffine, Ph.D.
F. **E.** LeGrand, Ph.D.
J. Q. Lynd, Ph.D.
W. **E.** McMurphy, Ph.D.
O. G. Merkle, Ph.D.
L. G. Morrill, Ph.D.
J. C. Murray, Ph.D.
L. W. **Reed,** Ph.D.
R. M. Reed, Ph.D.
L. M. Rommann, Ph.D.
D. A. Sander, Ph.D.
E. E. Sebesta, Ph.D.
E. L. Smith, Ph.D.
J. F. **Stone,** Ph.D.
J. F. Stritzke, Ph.D.
C. M. Taliaferro, Ph.D.
L. M. Verhalen, Ph.D.
D. E. Weibel, Ph.D.

ASSOCIATE PROFESSORS
R. M. Ahring, Ph.D.
C. E. Denman, M. S.
C. A. Dunn, Ph.D.
G. V. Johnson, Ph.D.
D. L. Ketring, Ph.D.
J. S. Kirby, Ph.D.
Don S. Murray, Ph.D.
D. L. Nofziger, Ph.D.
Jeff Powell, Ph.D.
P. L. Sims, Ph.D.
J. H. Stiegler, Ph.D.
B. B. Webb, Ph.D.
R. L. Westerman, Ph.D.

ASSISTANT PROFESSORS
J. L. **Caddel,** Ph.D.
R. J. Crabtree, Ph.D.
Roy A. Johnston, Ph.D.
J. A. **Kovar,** Ph.D.
Hartwill Pass, M.S.
T. F. Peeper, Ph.D.
W. L. Richardson, M.S.
F. O. Thetford, Ph.D.
N. B. Thomas, M.S.

Agronomy is the science of soil management and field crop production. Undergraduate options include general agronomy, business, science, range management, turf management, and plant protection. Each of these options provides a thorough preparation in the biological and physical sciences relating to its specialization.

Modern agricultural production requires a highly technical approach to problems such as soil and water conservation, prevention and abatement of agricultural sources of environmental pollution, and judicious use of agricultural chemicals. In the vast field of agribusiness, technical preparation in agronomy is essential in supplying agricultural producers with seed, fertilizers and pesticides and in dissemination of up-to-date information regarding their wise use. Processing, distribution and marketing of food, fiber, and feed crops require an integration of product technology with economics at all levels. Technological preparation and experience provide opportunities for managerial and executive leadership in all agronomically

related businesses. 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 cannot be ignored.

Each of the areas of study is 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.

Careers in agronomy include farm or ranch operation or management; land appraisal for banks or loan companies; technical sales and services for seed, fertilizer or agricultural chemical supply companies; federal employment in soil and range conservation, grain and seed warehousing and inspection, quarantine inspection, and related agencies; turf management for golf courses, parks, cemeteries, highway departments or airports; research positions as plant breeders, fertilizer chemists 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, agricultural chemicals, landscape and nursery materials, and other agricultural supplies and services.

Study for the **B.S.** degree, in addition to a standard agronomic academic program, provides a thorough grounding in the biological and physical sciences, with sufficient elective hours to permit flexibility. Master's and doctoral degrees leading to careers in teaching, research and extension are also available.

Animal Science

PROFESSOR AND HEAD
Robert Totusek, Ph.D.

PROFESSORS
Clifford Burton, Ed.D.
Linville J. Bush, Ph.D.
Richard R. Frahm, Ph.D.
Don R. Gill, Ph.D.
S. E. Gilliland, Ph.D
John J. Guenther, Ph.D.
Robert L. Henrickson, Ph.D.
Joe H. Hughes, Ph.D.
W. G. Luce, Ph.D.
Robert L. Noble, Ph.D.
Fredric N. Owens, Ph.D.
Curtis W. Richardson, Ph.D.
Elbert J. Turman, Ph.D.
Donald **G.** Wagner, Ph.D.
Lowell E. Walters, Ph.D.
Robert P. Wettemann, Ph.D.
Joe V. Whiteman, Ph.D.

ASSOCIATE PROFESSORS
Stephen L. Armbruster, Ph.D.
Joe **G.** Berry, Ph.D.
Mike B. Gould, Ph.D.
Gerald W. Horn, Ph.D.
J. R. Kropp, Ph.D.
Charles V. Maxwell, Ph.D.
Charles A. McPeake, Ph.D.
Jack D. Stout, Ed.D.
Robert VonGunten, M.S.

ASSISTANT PROFESSORS
David S. Buchanan, Ph.D.
Richard L. Hintz, Ph.D.
Keith Lusby, Ph.D.
Doyle **G.** Meadows, Ph.D.
Fred K. Ray, Ph.D.
Robert **G.** Teeter, Ph.D.

INSTRUCTOR
Glenden D. Adams, M.S.

The Department of Animal Science offers professional training at two levels: *undergraduate,* leading to the Bachelor of Science degree in Agriculture; and *graduate,* leading to the Master of Science degree or the Doctor of Philosophy degree in nutrition, animal breeding and 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, and the processing and marketing of meat, dairy and poultry products. To this end, the animal scientist is concerned with the application of the principles of the biological, physical and social sciences to the problems associated with livestock and poultry production or processing.

Students completing a degree with a major in animal science have a wide choice of challenging careers, a brief listing of which includes: ownership and/or management of farms, ranches, feedlots or other production units; livestock marketing; employment with state and federal agencies concerned with inspection, grading or regulation; sales and service positions with feed, chemical or pharmaceutical companies; services 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 doctor's degree can look forward to careers in teaching, research or extension with universities, the U.S.Department of Agriculture or private industry.

Undergraduate students may elect an option in the area of pre-veterinary medicine, production, business, science, food industry or a double major with

agricultural education to qualify to teach vocational agriculture. In addition, students have the opportunity to concentrate study on one of the animal commodity groups (dairy, poultry or meat animals). Internship programs providing six months of work experience are available in all options. Students may complete the pre-veterinary medicine requirements at the same time they are working toward a B.S. degree in animal science. Regardless of their major, all students follow a similar curriculum for the first two years which includes basic courses in the physical, biological and social sciences, plus a series of basic courses in the agricultural sciences.

Upper-class students complete a basic core of advanced science courses including nutrition, genetics, physiology, microbiology and chemistry. In addition, students complete a number of advanced animal science courses which are designed to apply business concepts and the basic sciences. Every opportunity is taken in teaching to utilize the excellent herds and flocks and processing plants owned or operated by the Department.

Biochemistry

PROFESSOR AND HEAD
Roger E. Koeppe, Ph.D.

PROFESSORS
Donald C. Abbott, Ph.D.
Robert K. Gholson, Ph.D.
Franklin R. Leach, Ph.D.
Earl D. Mitchell, Ph.D.
Eldon C. Nelson, Ph.D.
George V. Odell, Ph.D.
H. Olin Spivey, Ph.D.
George R. Waller, Ph.D.

ASSOCIATE PROFESSORS
Margaret K. **Essenberg,** Ph.D.
Richard C. Essenberg, Ph.D.
Ta-Hsiu Liao, Ph.D.
Ulrich K. Melcher, Ph.D.
Chang-An Yu, Ph.D.

ASSISTANT RESEARCHER
Linda Yu, Ph.D.

INSTRUCTOR
Judy A. Hall, M.S.

During the past 25 years biochemistry has become the central scientific discipline linking the chemical, physical and biological sciences, and has exerted a profound influence on the progress of medicine and agriculture. By applying concepts and methods of chemistry to the fundamental problems of biology, biochemists have made great progress in their effort to explain life in chemical terms.

Biochemists seek to solve problems concerned with living things, and as a result they must acquire some knowledge in the biological sciences. Since a biochemist's tools are the physical sciences, he or she must receive sound training in mathematics, physics and chemistry.

Challenging positions for well-trained biochemists are available in col-

leges 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 fundamental research on the chemistry of processes occurring in plants, animals, and various microorganisms, and with discovery, development, production and evaluation of drugs, antibiotics, vitamins, hormones, enzymes, insecticides, fungicides, herbicides, etc.

At the undergraduate level a major in biochemistry administered by the Department of Biochemistry is available through either the College ofAgriculture or the College of Arts and Sciences. An honors program is available in Arts and Sciences. The curriculum provides a broad background in the fields of chemistry and biological sciences and permits flexibility in meeting particular interests of the student. Courses in biochemistry are based on general, organic and analytical chemistry. The biochemistry curriculum provides students with sufficient training 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.

Because many of the opportunities in biochemistry require advanced training, a major part of the program in the Department of Biochemistry is concerned with graduate study. Graduate course work is offered in programs leading to the M.S. or Ph.D. degree in biochemistry. The graduate program is an integral part of extensive basic research activities in the Agricultural Experiment Station. These research activities provide opportunities for part-time employment of undergraduate majors in order to improve their professional competence.

Entomology

PROFESSOR AND HEAD
D. C. Peters, Ph.D.

PROFESSORS
Stanley Coppock, Ph.D.
W. **A.** Drew, Ph.D.
R. D. **Eikenbary,** Ph.D.
J. A. Hair, Ph.D.
R. **G.** Price, Ph.D.
J. R. Sauer, Ph.D.
K. J. Starks, Ph.D.
J. H. Young, Ph.D.

ASSOCIATE PROFESSORS
R. C. **Berberet,** Ph.D.
R. L. Burton, Ph.D.
H. **G.** Koch, Ph.D.
J. O. Moffett, Ph.D.
G. A. Mount, Ph.D.
O. N. Nesheim, Ph.D.
K. N. Pinkston, Ph.D.
R. L. Wilson, Ph.D.

ASSISTANT PROFESSOR
R. W. Barker, Ph.D.

Entomology is the science and study of insects and related organisms regarding their biology, structure, identification, physiology, economic sig-

nificance and population manipulation.

Education in entomology prepares the student for a career in industry, public service with state or federal agencies, or self-employment. A background in the basic physical and biological sciences is required before specialization in entomology can be initiated. The entomologist is qualified for a wide range of activities including research, teaching, quarantine and enforcement, insect control with insecticides or biological control agents, agriculture, pest control insecticide sales or distribution, military entomology and pest management consulting.

For those students who wish to prepare themselves better for entomology positions, the Department offers advanced work leading to the degrees of Master of Science and Doctor of Philosophy in entomology.

Forestry

PROFESSOR AND HEAD
J. Edward Langwig, Ph.D.

PROFESSORS
Ralph W. Altman, Ph.D.
Max R. Craighead, M.S.
David W. Robinson, Ed.D.
Edward E. Sturgeon, Ph.D.

ASSOCIATE PROFESSORS
Thomas C. Hennessey, Ph.D.
J. Greg Jones, Ph.D.
Robert P. Latham, Ph.D.
Charles G. Tauer, Ph.D.

ASSISTANT PROFESSOR
Henry W. Langston, Ph.D.

INSTRUCTOR
Thomas Kuzmic, M.S.

Forestry is the profession dealing with the management of forest lands to provide the most efficient utilization of our natural resources. The objective of this management may be the maximum production of sawtimber, poles, veneer or pulpwood, improved wildlife habitat, maximum water yield, higher quality forage for grazing or greater opportunities for recreation. In many cases, two or more of these objectives are combined to form a program of multiple-use management for a given area.

As a professional land manager, the forester must always be concerned with the overall quality of our environment and how this is related to the increasing demands of an expanding and more affluent society.

Graduates with a Bachelor of Science degree may be employed by federal agencies, including the U.S. Forest Service, Bureau of Land Management, the Fish and Wildlife Service, and the Bureau of Indian Affairs. In addition, state, county and municipal governments employ foresters in a variety of positions. Wood-using industries retain foresters for land man-

agement, timber acquisition and harvesting positions as well as in mill production and administrative work. Foresters work for associations promoting forest products and in many other public relations jobs. Some foresters are self-employed as consultants, specializing in timber and land appraisals, management plans and a variety of special services. Recipients of advanced degrees, especially the doctorate, may conduct research for the federal or state governments, universities or industrial organizations, or may enter the teaching profession.

The Department of Forestry offers a program leading to a Bachelor of Science degree in resource management. Requirements for graduation include the successful completion of an eight-week summer camp and a total of 144 credit hours of course work. The summer camp is scheduled to follow the sophomore year and includes lectures, laboratory exercises and field work in a forest setting. The camp is located in a different area each year, where extensive forest lands provide an opportunity to observe field forestry operations and the manufacturing of forest products and to practice basic forestry techniques.

Graduate programs that lead to the Master of Science degree in several specialized areas of forestry are offered.

Horticulture

PROFESSOR AND HEAD
H. Grant Vest, Ph.D.

PROFESSORS
J. Steve Ownby, M.S., M.L.A.
Richard N. Payne, Ph.D.
Glenn G. Taylor, Ph.D.
Carl E. Whitcomb, Ph.D.

ASSOCIATE PROFESSORS
Raymond E. Campbell, Ph.D.
Paul J. Mitchell, M.S.
James E. Motes, Ph.D.

ASSISTANT PROFESSORS
Stuart W. Akers, Ph.D.
Barbara S. Fails, Ph.D.
Johnny L. Johnson, Ph.D.
Joe M. Maxson, Ed.D.
Michael W. Smith, Ph.D.
Jerry R. Walkup, M.L.A.

Horticulture is the science of the culture and production of flowers, trees, shrubs, vegetables, fruits and nuts. Also included is the proper use and maintenance of plants in the landscape. Thus, horticulture is involved with the production of a significant part of our food supply and provides a major source of the beauty in and around our homes, cities, parks, highways and other public areas.

Today, horticulture requires highly trained and capable people to help meet the demands of society and to solve problems that will lead to a better quality of life. Students can prepare themselves for careers in horticulture business, production, teaching, extension, research landscape architecture and landscape construction.

Studies in horticulture cover a wide variety of plants and subjects. Factors such as nutrition, irrigation, genetics, propagation, control of flowering, fruit and seed production are considered in their relationship to culture, production, harvesting and storage in a biological, physical and social setting.

The training that the student obtains is related to the specific option or 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. Options a student may select within this major are as follows:

(1) *Horticulture.* This option provides training and experience in production of fruits, nuts, vegetables, nursery crops, flower crops and related areas such as genetics and physiology. Within this option a student may choose to major in general horticulture or have a special emphasis in floriculture production, floriculture retail business or nursery management.

(2) Landscape Design, Architecture and Construction. In addition to studying the horticultural aspects of plant materials, students study art, architecture, business, construction and engineering in order to design and construct landscapes that relate to physical, biological and aesthetic quality.

Plant Pathology

PROFESSOR AND HEAD
William L. Klarman, Ph.D.

PROFESSORS
George L. Barnes, Ph.D.
Francis J. Gough, Ph.D.
Charles C. Russell, Ph.D.
Roy V. Sturgeon, Jr., Ph.D.
Dallas F. Wadsworth, Ph.D.
Harry C. Young, Jr., Ph.D.

ASSOCIATE PROFESSORS
William M. Johnson, Ph.D.
Hassan. A. Melouk, Ph.D.
Ervin Williams, Jr., Ph.D.

ASSISTANT PROFESSORS
Kenneth E. Conway, Ph.D.
Lou S. Morrison, M.S.
Larry L. Singleton, Ph.D.

Plant pathology is the study of plant diseases, their cause and their control. It is estimated that there are more than 50,000 destructive plant diseases and only about 3,500 plant pathologists to wage war against these destroyers of plant life. As all animal life, including man, depends on green plants for a constantly renewable source of food, the prevention of plant diseases is basic to human survival.

By studying microorganisms, host plants and their relation to each other in a fluctuating environment, plant pathologists work toward controlling diseases to maintain a food supply for animal life. How well this succeeds determines to a great extent how well we eat and even whether we escape malnutrition and starvation.

To major in plant pathology, a student should have a strong interest in science and some background in botany, chemistry, and the agricultural fields of agronomy, horticulture or forestry. With the B.S. degree, plant pathologists qualify for technical positions with federal and state governments, in various agricultural production areas, with agricultural chemical industries, as extension specialists, etc.

Graduate study toward the M.S. and Ph.D. degrees is available for students whose undergraduate record will qualify them for graduate study. A well-rounded graduate curriculum is offered, and field, greenhouse and laboratory facilities are available for the research required for these degrees. The Departmental faculty members are all involved in research projects with the Oklahoma Agricultural Research Station and cooperate in projects with the Departments of Agronomy, Horticulture, Forestry and Entomology. Jointly with Agronomy the department operates a controlled environment research laboratory, in which climate-controlled growth chambers are available to all research project leaders and their students.

The Department maintains a plant disease diagnostic laboratory in which diseases of any type of plant are diagnosed and control measures suggested.

College of Arts and Sciences

Smith L. Holt, Ph.D., *Dean*
Neil J. Hackett, Ph.D., *Associate Dean (Acting)*
Richard *C.* Powell, Ph.D., *Associate Dean (Acting)*
Geoffrey Pill, D-es-L, *Director of Curricular Affairs and Honors Program*
Stanley D. *Green, M.M., Director of Extension*
Dan Wesley, Ed.D., *Director of Student Academic Services*

Heads of Departments and Directors of Schools

Aerospace Studies, *Colonel Richard A. Moore, M.A.*
Art, Richard A. Bivins, M.F.A. (Acting)
Botany, *Glenn W. Todd, Ph.D. (Acting)*
Chemistry, Neil Purdie, Ph.D. (Acting)
Computing and Information *Sciences, Donald D. Fisher, Ph.D. (Acting)*
English, *Gordon Weaver, Ph.D. (Acting)*
Foreign Languages, *John L. Schweitzer, M.A. (Acting)*
Geography, *Richard D. Hecock, Ph.D. (Acting)*
Geology, *Wayne A. Pettyjohn, Ph.D. (Acting)*
Health, Physical Education and Leisure
School Director: *George H. Oberle, P.E.D.*
Assistant Director: *Betty W. Abercrombie, Ed.D.*
Health, *Larry M. Bridges, Ph.D. (Acting)*
History, W. David Baird, Ph.D. *(Acting)*
Humanities, *Azim Nanji, Ph.D. (Acting)*
Journalism and Broadcasting
School Director: *Harry E. Heath Jr., Ph.D.*
Journalism, Advertising and Public Relations, *Marian D. Nelson, Ed.D. (Acting)*
Leisure *Sciences, E. Pauline Winter, M.A. (Acting)*
Mathematics, *Dennis E. Bertholf, Ph.D. (Acting)*

Microbiology, ***Edward*** *A.* ***Grula,*** *Ph.D. (Acting)*
Military *Science, Lt. Col. John A. Smith, M.A.*
Military Studies Departments:
Coordinator: *Smith L. Holt, Ph.D.*
Music, Andrew H. Harper, Ph.D. (Acting)
Philosophy, ***Neil*** *R. Leubke, Ph.D. (Acting)*
Physical Education, *John G.* ***Bayless, Ed.D.*** *(Acting)*
Physics, *Geoffrey P. Summers, D.Phil. (Acting)*
Physiological *Sciences,* ***Everett*** *C. Short, D.V.M., Ph.D.*
Political *Science, Harold V. Sare, M.A. (Acting)*
Radio-Television-Film, *Philip E. Paulin,* ***Ed.D.*** *(Acting)*
Religious Studies, *Robert F. Weir, Ph.D. (Acting)*
Sociology, ***Gene*** *Acuff, Ph.D. (Acting)*
Speech Communication, ***James*** *Hughey, Ph.D. (Acting)*
Speech and Language Pathology and Audiology, *Burchard* ***M.*** *Carr, Ph.D. (Acting)*
Statistics, *J. Leroy Folks, Ph.D. (Acting)*
Theatre
Zoology, *John W. Thornton, Ph.D. (Acting)*

The College of Arts and Sciences not only offers within inself a wide variety of programs in teaching, research and extension, but also underpins and reinforces all the other programs of the University as a whole.

Apart from strong programs in the basic 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. Its 31 academic units, of which 26 operate as departments and 5 are grouped in two schools (Health, Physical Education and Leisure; and Journalism and Broadcasting) offer more than 100 degree programs at the bachelor's level, and in conjunction with the Graduate College, 23 master's and 12 doctoral degrees.

Freshmen who are not yet certain of their career or educational goals can enroll without declaring a major in the College of Arts and Sciences and make satisfactory progress toward most degrees, without wasting time or credits, for as many as three (or even four) semesters before they select their major field of study. Under the careful advising of the Office of Student Academic Services, they can explore possible specializations or combinations of subjects as they complete necessary basic courses.

The Departments of Economics and Psychology, which belong administratively to the College of Business Administration and the College of Education respectively, offer B.A. and B.S. degrees through the College of Arts and Sciences. The Department of Biochemistry, which belongs administratively to the College of Agriculture, offers the B.S. through the College of Arts and Sciences.

For further details, students should contact the heads or academic advisers of the departments in which they are interested; or for general information, the College's Office of Student Academic Services.

Graduate Work

Master's degrees are offered in most undergraduate subjects, with doctor's degrees available in many. (For details, see departmental entries below or consult the *Graduate Catalog.)*

Baccalaureate Degrees Offered

Detailed requirements for all degree programs are set out in the book Undergraduate Programs and Requirements, available in all Oklahoma colleges. Separate sheets, stating the requirements for any particular degree, may be obtained by application to the department or college in which the degree is offered.

Bachelor of Arts (B.A.): art, chemistry, economics, English, French, geography, geology, German, history, humanities (with an option in religious studies), mathematics, music, philosophy, political science, psychology,

radio-tv-film (production and performance), social science, sociology (with an option in anthropology), Spanish, and speech (with options in communication consultancy and speech/theatre education.)

Bachelor of Science (B.S.): aerospace studies, biochemistry, biological sciences, botany, chemistry, computer science, economics, geography, geology, health education (with options in school health and community health), physical education with teaching certificate, journalism (advertising, news-editorial, photojournalism, public relations), mathematics (with option in statistics), medical technology, microbiology, military science, natural science, physical science, physics, physiology, political science (with options in public affairs, international public administration and criminal justice administration), pre-law (with para-legal option), premedical science, pre-veterinary science, psychology, radio-tv-film (news and public affairs and sales and management), recreation (with options in outdoor recreation, administration and management and therapeutic recreation), social science, sociology (with options in anthropology, corrections and pre-social work), speech (with options in communication consultancy, theatre, and speech/theatre education), speech pathology, wildlife ecology (with options in communication, management, research and enforcement) and zoology (ecology).

Bachelor of Fine Arts (B.F.A.): (graphic art, art education and studio art), and B.A. are offered in art.

Bachelor Of Music (S.M.): (vocal certificate, instrumental certificate, combined certificate and performance) and B.A. are offered in music.

Bachelor of University Studies (B.U.S.): for the mature student who has an academic objective which cannot be fulfilled by any of the regular degree programs, an individual plan of study may be devised with the approval of the student's advisers, dean and the Vice-President for Academic Affairs.

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. It is expected that *all* the hours for the second bachelor's degree will be devoted to any additional required courses in the area of concentration. The 30 additional hours are the minimum a student must take; 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 "2nd of two degrees," and showing how *all* the requirements of the second degree are to be satisfied. The plan should also state the major, date ofaward and total credit hours of the first degree; the plan should have circled the 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

students' last pre-enrollment.

Note: Students wishing to complete degrees in two different colleges at OSU should consult with the offices of student academic services of both. 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 student's own adviser or from the department in which the additional notation is sought. The student should, at the end of his or her senior year, ask the department head in the field of additional study to permit the request to the Director ofStudent Academic Services in the College of Arts and Sciences.

Honors Program

The College of Arts and Sciences serves students of all levels of ability. For those with a good academic record and some mental initiative, the College of Arts and Sciences faculty has developed an Honors Program. Freshmen with an ACT composite of 27 or above are invited to join the program when they first enroll. Others may join if they have an overall grade-point average of3.50. Students may earn awards for General Studies Honors, Departmental Honors or both. Those who earn both receive the bachelor's degree (with honors).

Honors credit may be earned in specially-designed sections or courses in various disciplines; or in honors seminars or independent study projects (listed under A&S 2000, 3000, 4000); or by an individual honors contract which can be taken in most of the courses offered by the College.

Details of the Honors Program can be obtained from any adviser or from the Director of the Honors Program, in the Dean's office.

Area Studies Certificates

While completing requirements for a degree, and usually without increasing the total number of credit hours required, students may also earn one or more of the following Area Studies Certificates.

(1) *International studies.* Area studies programs on Russia and Eastern Europe, Latin America, Africa and Asia are available. These 23-credit-hour programs (including 5 hours of a specific foreign language at the sophomore level) enable an undergraduate student to pursue an interdisciplinary and integrated curriculum leading to a certificate in a particular regional culture while majoring in a department of his or her choice, and thus acquire knowl-

edge of a regional civilization while developing disciplinary expertise. Area study can provide a background and basis for specialized graduate study and research within a discipline or it can prepare a student for professional service abroad.

A certificate in Ancient and Medieval Studies is also available.

(2) lAmerican Studies. An interdisciplinary program involving various aspects of American history and culture can lead to a certificate in American studies.

(3) Native American Studies. A certificate in Native American Studies may be earned through an interdisciplinary program in Native American history and culture.

Further irrformation on all Area Studies Certificates may be obtained from the Director of Curricular Affairs, College of Arts and Sciences.

High School Teaching Preparation

Students taking degrees in the College of Arts and Sciences may, by completing certain qualifying courses, receive state licensure for teaching in the secondary schools. Some programs, e.g. in physical education, cover grades K-12. Full details are given on separate teaching education sheets in the book *Undergraduate Programs and Requirements.*

Students who wish to qualify for teaching licensure should consult as early as possible with the adviser in their field of interest, and should apply for admission to teacher education in the Arts and Sciences Office of Student Academic Services (Life Sciences East Room 202), ifpossible before the end of their sophomore year.

It is usually possible to qualify for teaching licensure and the bachelor's degree within the 124 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 in a summer session or, in some cases, by correspondence.

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.

Students who satisfy requirements for teacher certification before January 1, 1982 will be certified under the regulations current until that date.

Preprofessional Degree Programs

Premedical Advisory Committee

Maxine Leftwich, M.A., *Chairman*

Pre-dentistry, Pre-medicine, Pre-osteopathy, Pre-veterinary Medicine. (See also *College of Agriculture,* Pre-veterinary options.) The prepro-

fessional curricula for medical doctors, dentists, veterinarians, optometrists and osteopaths 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 chemistry, biology and physics, 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 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 acceptable. Medical schools encourage a good background in the social sciences and humanities that contribute to the understanding of man in his environment, his attitudes and values, emotions, motivation, interpersonal relationships and heritage. All of these factors have an important bearing on 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 124 semester credit hours at OSU, or (2) in premedical science, which requires at least 94 semester credit hours at OSU plus 30 hours to be transferred from a medical, osteopathic, dental or veterinary school after successful completion of the first year.

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 pre-veterinary course requirements are listed under *pre-veterinary medicine curriculum* in the College of Agriculture.

All applicants for medical schools must take the Medical College Admissions Test (MCAT) and dental applicants must take the Dental Admission Test (DAT) prior to admission. The OSU College of Veterinary Medicinerequires the School and College Ability Test (SCAT) and the aptitude test of the Graduate Record Examination (GRE).

Medical Technology: See *Microbiology*.

Pre-law. Admission to law school may be obtained with *any* bachelor's degree and satisfactory completion of the Law School Admission Test.

Many law schools recommend that students include subjects such as the following among their electives: English composition, American government

and politics, basic accountinig, economics, English and American history. Verbal and analytical abilities are of particular importance.

Students who have no specific preference for an area of specialization may follow a program leading to a B.S. degree in pre-law, administered by the Department of Political Science.

All students, regardless of their major, are invited to confer with a pre-law adviser in Department of Political Science.

Public Administration. Students may receive a Bachelor of Arts degree in political science with a concentration in public administration.

Public Affairs. Students may receive a Bachelor of Science degree in political science with a concentration in public affairs. In addition to the College and Departmental lower-division requirements, the program includes a minimum of 24 credit hours of course work from political science and 18 hours from relatd social sciences selected in consultation with the public affairs adviser.

Pre-social Work. A special undergraduate curriculum in pre-social work is administered through the Department of Sociology. Interested students are invited to call at the Department office for an appointment with the social work adviser.

The program is designed for three groups of students: (1) those who plan to go directly into social welfare or related fields not requiring professional training; (2) those who plan to enter graduate schools of social work; and (3) those who expect to serve in community welfare programs as private citizens.

The curriculum in pre-social work is based upon the standards set up by the Council on Social Work Education, and includes both courses and field observation in social welfare agencies. It includes, in addition to sociology, foundation courses selected from related areas such as economics, family relations and child development, history, philosophy, physiology, political science and psychology.

Corrections.A bachelor's program in corrections, offered by the Department of Sociology, provides academic background for work in juvenile and adult corrections and is also good preparation for the graduate program in corrections.

Criminal Justice Administration. A criminal justice administration program offered by the Department of Political Science provides an option under public affairs strongly oriented toward the administration ofjustice and police science.

Preprofessional Non-degree Curricula

Preprofessional non-degree curricula include preparatory work for students planning careers in various health-related fields (see below), library science, the ministry, and social work.

Dental Hygiene, Nursing, Occupational Therapy, Optometry, Pharmacy, Physical Therapy, Physician's Associate, and Radiologic Technology, Corrective Therapy and Athletic Training. The College offers specialized and general education courses for admission to these fields. Students should acquaint themselves with the specific requirements of the professional school they plan to attend.

Library Science. Students who wish sound undergraduate preparation for admission to an accredited graduate library school should consult the adviser in the preprofessional program for librarians (Library, Room 510) concerning lower-division courses and the selection of an appropriate major field. Special aptitudes and interests are important in the selection of a specialization in librarianships. For general librarianship in public libraries, the humanities major is strongly advised, but specialists such as law or information-retrieval librarians are better served by undergraduate majors in social sciences or mathematics.

In the upper-division program, along with the required number of courses in the chosen Field of Concentration, students should take from 12 to 15 credit hours of basic library courses, including those usually required as prerequisites for the master's degree in library science. At least one modern foreign language is usually required, sometimes two, and a broad general background emphasizing the current literature of as many fields as possible is desirable. Students will receive individual attention to prepare them for the type of librarianship they prefer and for the graduate school of their choice.

Early admission to the preprofessional program will make it possible to avoid delay and to obtain a master's degree in as little time as two semesters.

Degree Requirements

Requirements given below apply to all degrees offered by the College of Arts and Sciences. Specific requirements for each degree program, which may exceed the minima prescribed by the College, are given in a separate book, *Undergraduate Programs and Requirements.* See also *University Academic Regulations* in this *Catalog.*

Responsibility and Assistance. The responsibility for satisfying all requirements for a degree, and for ensuring that a degree plan has been endorsed, rests with the student. Advisers help students to work out the most advantageous study plans. It is essential that students consult fully with their advisers and not restrict their visits to the pre-enrollment periods when only brief encounters are possible.

Total Semester Credit Hours and Grade-point Average. The minimum number of semester credit hours for graduation is 124. The minimum grade-point average is 2.00. The 2.00 average must be earned overall, in all courses in the major subject and in the Field of Concentration.

Particular degree programs may specify higher grade-point requirements or exceed the 124 **hours** total. Details are given **in** ***Undergraduate Programs and 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.* They total 43 credit hours for the B.S. degree and 52 hours for the B.A.

All degrees include a common core of 13 credit hours: ***One credit hour*** *of orientation,* A&S 1111. This is not required of transfer students who have earned 15 hours of college credit before enrolling in the College of Arts and Sciences. *Three credit* ***hours*** *of American history and three hours of American government,* required by state law. These must be satisfied by HIST 1103 or 1483 or 1493, and POLSC 1013. *Six* ***credit hours*** *of English composition,* a University requirement. This must be satisfied by English 1113 and 1323 (or 1413, Freshman English Honors). Students who obtain a grade of."A" or **"B"** in ENGL 1113 may substitute ENGL 3323 for ENGL 1323. (See also *English Proficiency Examination,* below.)

The remaining credit hours, 30 for the B.S. and 39 for the B.A., must be distributed as follows:

For the B.S.: 3 credit hours of social sciences, 8 hours of humanities, 16 hours of natural sciences, and 3 hours of abstract and quantitative thought.

For the B.A.: 6 credit hours of social sciences, 12 hours of humanities, 8 hours of natural sciences, 3 hours of abstract and quantitative thought, and 10 hours in one foreign language or proof of equivalent proficiency.

Note: The foreign language requirement is 10 credit hours in *one* foreign language. Five hours in one language and five in another do not satisfy the requirement. The ten hours represent the first year of work in the language in college and are roughly equivalent to two years of work in high school. The courses are normally 1115 and 1225. Proof of equivalent proficiency must be recorded on the student's transcript, by either advanced standing credit or completion of a second year course or above in the language. **FRNCH** and GRMN 3013, 3023, FRNCH 4113, RUSS 4113, 4223 do not satisfy this requirement.

Non-Western Requirement (B.A. and B.F.A. only). One 3-hr. course of Non-Western studies from: (Social Sciences) GEOG 3363; HIST 3403, 3413, 3423, 3433; POLSC 3213, 3223, 3253, 3313; (Humanities) ART 3633, 4643; ENGL 4453 (Twentieth Century Novel in India); HUMAN 3103, 3403, 3503, 4113; PHILO 3943; REL 3403, 3413, 3533; FLANG 3500 (second year work or above in Chinese or Japanese language or culture); A&S 3500 (African or Asian Area Studies Colloquium).

International Dimension (all degrees). Three hours of credit in courses which foster understanding of, or the ability to communicate with, peoples and

cultures of other countries. Courses satisfying this requirement are designated "I" in this *Catalog;* and a list is available from any adviser or from the Dean's office in Arts and Sciences.

Scientific Investigation Requirement (all degrees). One course including an investigative laboratory giving experience with scientific method. Courses satisfying this requirement are designated "L" in this *Catalog;* and a list is available from any adviser or from the Dean's office in 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, Departmental, Field of Concentration, or Electives requirements). No additional hours are required.

The English Essay Proficiency Requirement. All candidates for a degree must, unless they secure exemption, pass the University English Essay Proficiency Examination. See Academic Regulation No. 8.

Field of Concentration. At least 40 semester credit hours of advanced work as specified by the department, including courses in the major and in supporting fields, must be completed. These 40 hours of advanced work constitute the student's Field of Concentration.

Upper-division Credit: 40 hours minimum. A student must successfully complete at least 40 semester hours of upper-division credit, i.e. credit in courses at the 3000 or 4000 level.

(These 40 hours will normally, but not necessarily, be listed in *Undergraduate Programs and Requirements* under "Field of Concentration.")

Hours in One Subject: 40 hours maximum. If a student seeking a **B.A. or B.S.** degree takes more than 40 semester credit hours in one subject, including both lower-division and upper-division credit, the hours in excess of 40 will be added to the minimum total of 124 hours required by the College for a bachelor's degree. For example, if the Department of Physics were to require 46 hours of physics for a B.S. degree, the minimum requirement for a B.S. degree in physics would be 130 hours. If a candidate for a B.A. in French has 46 hours of credit in French on his or her college transcript, he or she must complete a total of 130 hours in order to graduate, instead of the stated total of 124.

This "40 hour maximum" applies to all courses taken in a subject, whether they are required or elective.

Endorsement of Student's Plan (Graduation Check). Immediately after their last pre-enrollment, before their last semester, students must 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.

Information for Students

Office of Student Academic Services. All students entering the College of Arts and Sciences are admitted through the Office of Student Academic Services. This Office is the center for students seeking (1) information about College and University requirements and (2) academic, educational and vocational counseling. The Office designates advisers for students who have decided on their major. It also counsels those students who have not yet decided what their major should be.

High School Preparation. Although no one pattern of course work is required in high school as preparation for enrollment in the College of Arts and Sciences, it is recommended that high school students have two and one-half years of mathematics, four years of English composition and literature, and two or more years of physical and/or biological sciences, such as chemistry, physics or biology. The study of a foreign language and world or European history is also advisable.

The "Undeclared¨ Student. Since the program of general studies in the College of Arts and Sciences may include course work for as many as three of the first four semesters in college, it is possible for freshmen to enroll without being certain of their major field of study and yet make satisfactory progress toward most degrees. Many students enroll initially as undeclared students so that they may explore possibilities for a major field of study as they complete their required basic courses. They are encouraged to seek information from advisers in any department.

Changing Major or Changing College. Students in good standing may change their major or their college whenever they please. It is wise to discuss any such change with the current and the receiving advisers. A student wishing to change major or college should see the receptionist in the Arts and Sciences Office of Student Academic Services.

Credit by Advanced-Standing Examination. Entering freshmen who believe that they can demonstrate sufficient mastery of a subject to earn advanced standing credit are encouraged to write the Office of the Registrar for a schedule of advanced-standing examinations. The most popular examinations are in foreign languages, English, mathematics, American history and government. Other examinations, however, can be arranged.

Student Loads. The normal student load is 15-17 semester credit hours. Loads of more than 19 semester credit hours are permitted only by special permission from the Director of Student Academic Services and, as a rule,

only to students with grade point averages of 3.00 or above. This credit-hour load includes courses taken in residence and through extension, correspondence study or other institutions.

Undergraduate Financial Assistance. Students who are interested in undergraduate scholarships and loans should inquire at the University Office of Financial Aids, and see also *Financial Assistance for Students* in this *Catalog.*

Student Participation in Arts and Sciences Government. The College believes that student experience and viewpoint add a needed dimension to the formulation of academic policies and encourages student involvement.

Arts and Sciences Student Council. The Council meets regularly throughout the year and provides a constant channel for students' recommendations to the faculty and administration of the College.

Advertising: See *(School of) journalism and Broadcasting*

Aerospace Studies: See *(Departments of)Military Studies*

Anthropology: See *Sociology*

Art

ASSOCIATE PROFESSOR AND ACTING HEAD
Richard A. Bivins, M.F.A.

PROFESSOR
Ronald P. duBois, M.A.

ASSOCIATE PROFESSORS
Larry C. Avrett, M.F.A.
Dean P. Bloodgood, M.F.A.
Ellen R. Murray Meissinger, M.F.A.

ASSISTANT PROFESSORS
Nicholas W. Bormann, M.F.A.
Robert E. Parks, M.F.A.
David M. Roberts, M.F.A.
B. J. Smith, M.F.A.
Nancy B. Wilkinson, M.A.

The Department of Art provides courses for the following types of student needs: (1) general educational background, (2) major concentrations in art, (3) teacher training, and (4) minor in art for other majors.

Two degrees are offered in art: Bachelor of Art (B.A.) requiring 40 credit hours in art and the Bachelor of Fine Arts (B.F.A.) requiring 60 credit hours in art. Students may choose one of three options in the B.F.A. program: studio art, graphic design and art education. Fields of concentration available in both degree programs are drawing and painting, printmaking, graphic design, ceramics, jewelry, metalsmithing and sculpture. Because of core curriculum Departmental requirements, the freshman and sophomore years are virtually the same for all majors in art.

Students who successfully complete the Teacher Education program, who meet the requirements for a Bachelor of Fine Arts degree, and who secure the University's recommendation, will be eligible for standard Oklahoma teacher's licensure. The curriculum in art education is offered in cooperation with the College of Education. Art majors must attain a grade-point average of 2.50 in art courses in order to qualify for licensure and graduation.

The Department of Art maintains an exhibition gallery, the Gardiner Art Gallery, with approximately 175 linear feet of exhibition space. Works by artists of national and international reputation, faculty and student works and cultural artifacts are shown.

Biochemistry: See *College of Agriculture*

Biological Sciences: See *Zoology*

Botany

PROFESSOR AND ACTING HEAD
Glenn W. Todd, Ph.D.

PROFESSORS
Eddie Basler, Ph.D.
Arthur G. Carroll, Ph.D.
Jerry J. Crockett, Ph.D.
George A. Gries, Ph.D.

ASSOCIATE PROFESSORS
Becky B. Johnson, Ph.D.
James K. McPherson, Ph.D.
James D. Ownby, Ph.D.
Paul E. Richardson, Ph.D..
Ronald J. Tyrl, **Ph.D.**

Botany is the science concerned with the study of plant life. Green plants are the constantly renewable source of food energy for all animals, including man, 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: agronomy, forestry, horticulture, plant pathology, range 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.

Facilities used in undergraduate teaching include well-equipped plant structure-function and ecology laboratories, constant-environment chambers, greenhouse facilities, a 160-acre "ecology preserve" and herbarium with over 125,000 plant specimens. Most of the faculty teach and do research in their

specialty areas of botany: plant ecology, physiology, taxonomy and anatomy. Graduate study toward the M.S. and Ph.D. degrees is available in these areas.

Chemistry

PROFESSOR AND ACTING HEAD
Neil Purdie, Ph.D.

REGENTS PROFESSORS
K. Darrell Berlin, Ph.D.
E. J. Eisenbraun, Ph.D.
Lionel M. Raft, Ph.D.

PROFESSORS
J. Paul Devlin, Ph.D.
I. Dwaine Eubanks, Ph.D.
George Gorin, Ph.D.
Smith L. Holt, Ph.D.
Gilbert J. Mains, Ph.D.
Tom **E. Moore,** Ph.D.
Horacio A. Mottola, Ph.D.
Donald L. Thompson, Ph.D.
(visiting)

ASSOCIATE PROFESSORS
C. M. Cunningham, Ph.D.
Warren T. Ford, Ph.D.
Robert D. Freeman, Ph.D.
Harry L. **Gearhart,** Ph.D.
Mark G. Rockley, Ph.D.
Louis P. Varga, Ph.D.

ASSISTANT PROFESSORS
John I. Gelder, Ph.D.
Elizabeth M. Holt, Ph.D.
Jeffrey S. McKennis, Ph.D.

INSTRUCTORS
S. Daryl Larson, Ph.D.
(adjunct)
Mabel R. Stephanic, B.S.

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 for all of us. He or she creates new agents to combat pests that destroy great portions of our food supplies and new drugs to fight diseases of many kinds. Chemists lead the fight against pollution of our environment that results from rapid multiplication of our population and of our use of energy. Chemists are at the forefront of the search for new energy sources and for ways to better use existing sources of energy.

A great curiosity concerning the physical world should be characteristic of one who is considering chemistry as a profession. The student should want to learn more about the changes of materials and to use his or her knowledge for the betterment of life. The student should have an interest too in physics and mathematics since their 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 three bachelor's degrees: (1) a B.S. degree that is accredited by the American Chemical Society; (2) a B.S. degree that requires less specialization; and (3) a B.A. degree. M.S. and Ph.D. degrees may be earned by those who wish graduate work in the areas of analytical, inorganic, organic or physical chemistry.

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.

Computing and Information Sciences

PROFESSOR AND ACTING HEAD
Donald D. Fisher, Ph.D.

PROFESSORS
Donald W. Grace, Ph.D.
George E. Hedrick, Ph.D.

ASSOCIATE PROFESSORS
T. Eugene Bailey, Ed.D.
John P. Chandler, Ph.D.
Michael J. Folk, Ph.D.
Robert D. Gumm, Ed.D. (adjunct)
J. Richard Phillips, Ph.D.
James R. Van Doren, Ph.D.

ASSISTANT PROFESSOR
Mahir Ali, Ph.D.

Computer science is concerned with theoretical and practical methods of storing, processing and communicating information by means of computers. Professional computer scientists who currently work with computers 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 agriculture. Computer science offers opportunities to both specialists and generalists.

The computer field has grown over the past 30 years from an experimental discipline to a position of prominence. Areas such as computer architecture, software design, scientific applications and commercial applications all require a thorough understanding of the principles of computer science. In addition, most technical and managerial positions require some knowledge of computing in order to apply computers to decision-making processes.

Both undergraduate and graduate courses are offered by the Department. An undergraduate degree is available through the Bachelor of Science (B.S.) degree program and graduate degrees through the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.). A student working on the M.S. degree may elect to specialize in (1) programming languages and systems; (2) scientific

computation; (3) information systems; (4) computer organization; or (5) the student may elect a more general option that includes graduate level study in conjunction with another department.

The Ph.D. degree is offered by the Department of Computing and Information Sciences to students who desire to make original contributions to the field of computer science. After completing the Ph.D. degree, about half of the graduates assume positions in the computing industry and about half take teaching and research positions in universities.

Exceptional computing facilities are available on the University's large IBM 370/168 and departmental computers. Students are encouraged to obtain first-hand experience in operating and using these computers.

Economics: see *College of Business Administration*

English

PROFESSOR AND ACTING HEAD
Gordon Weaver, Ph.D.

PROFESSORS
David S. Berkeley, Ph.D.
Jane Marie Luecke, Ph.D.
John Milstead, Ph.D.
Mary H. Rohrberger, Ph.D.
Samuel H. Woods, Jr., Ph.D.

ASSOCIATE PROFESSORS
Jack D. Campbell, M.A.
William H. Pixton, Ph.D.
Peter C. Rollins, Ph.D.
Thomas L. Warren, Ph.D.

ASSISTANT PROFESSORS
Terry R. Hummer, Ph.D.
Leonard J. Leff, Ph.D.
Margaret F. Nelson, Ph.D.
0. Bruce Southard, Ph.D.
Jeffrey B. Walker, Ph.D.
Edward P. Walkiewicz, Ph.D.

INSTRUCTORS
Mary E. Arrington, M.S.
Jimmie J. Cook, M.A.
Agnes Davis, Ph.D.
Helen L. Kientzle, M.A.
Mary L. Sare, M.S.

The Department of English offers basic service courses in composition and literature for all students in the University; required courses for teacher licensure and other professional programs requiring linguistic and literary competence; and advanced courses in linguistics, creative writing, technical and business writing, film and literature and literature leading to B.A., M.A. and Ph.D. degrees in English.

Generally, a student with an ACT composite score of 24 or above and an ACT English score of 22 or above need not anticipate any difficulty as an English major. The student should also have at least a "B" grade-point average in high school English courses and a real desire to extend writing skills, reading range and command of language and literature.

Knowledge of language and literature qualifies a student for positions in

college and high school teaching, in business, in government and in professional writing. Yet the capable student need not have in mind a specific career when becoming an English major; many opportunities will appear in the progress toward a terminal degree. Any career is open to the English major that is open to most students with a liberal arts degree. Many English majors are in preprofessional work preparing for careers in law, medicine, the Armed Forces or the ministry. Publishing, advertising and social work offer a further variety of possibilities. Training in composition will develop an ability "to go right to the point"; and training in literature, by making a student familiar with diverse types of ideas, as well as individuals, will give a view-and review-of personal opinions and judgments clearly and consciously. The English major who chooses teaching as a career will be involved in the development of the most inexhaustible and the most valuable basic resource of our nation, its young people, at the secondary, college and university levels.

The English major, whether in liberal arts or secondary teaching, will have about 45 credit hours of lower- and upper-division English, 41 hours of lower-division general studies and 44 hours of elective or professional courses for the B.A. degree. For positions of more responsibility, either in liberal arts careers or in college and university teaching, the M.A. degree includes 30-32 hours beyond the B.A. degree; the Ph.D. degree, 60 hours beyond the M.A. degree.

Foreign Languages

ASSOCIATE PROFESSOR AND ACTING HEAD
John L. Schweitzer, M.A.

PROFESSOR
Geoffrey Pill, D-es-L

ASSOCIATE PROFESSORS
Jonathan C. Bookout, M.A.
John J. Deveny, Ph.D.
Robert L. Maurizzi, M.A.
James D. Wells, M.A.
Harry S. Wohlert, Ed.D.

ASSISTANT PROFESSORS
Cida S. Chase, Ph.D.
Santiago Garcia, Ph.D.
Paul Y. Lin, Ph.D.
Dorothy Schrader, Ph.D.

INSTRUCTORS
Dora **M. Deveny,** M.S.Ed.
Hildegund Wohlert, M.A.

The Department of Foreign Languages offers French, Spanish and German as major fields ofstudy. Chinese, Japanese, Latin and Russian are offered regularly, and Greek and other languages may be scheduled whenever the demand justifies.

In all languages offered by the Department, elementary courses are available for students who wish to begin their language program in college. Special intensive courses in Spanish, French (10 credit hours in 8 weeks) and German (6 hours in 8 weeks) are offered in summer session. Students with high

school or equivalent experience in language will be placed at levels commensurate with their individual proficiency. A major in a foreign language may be supported by study of another language or work in other fields. Many language majors choose to qualify themselves for an area studies certificate. A freshman with a good high school background in language can usually pursue two languages to the level of a major.

The study of foreign languages is a vital and humanizing part of a general education. In a rapidly changing world of shrinking geographical horizons, it offers insight into other cultures, 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 which require a good liberal arts degree: in government, industry and commerce. Job opportunities are greatly enhanced for those who combine foreign language study with a major or minor in other disciplines. Moreover, there is a continuing demand for foreign language teachers in secondary education and bilingual education in minority schools. Bachelor of Art candidates may qualify for secondary teaching licensure without increasing the number of hours required for graduation.

Courses are available in French and German for students who require only a reading knowledge of the language. A degree of Master of Science, major in curriculum and instruction, with a specialization in French, Spanish or German is available for prospective teachers of foreign languages in elementary and secondary education during regular and summer semesters. In addition to the language courses in Russian, there are courses in Russian literature in translation. A course in Chinese and Japanese languages and culture is also taught in English.

Geography

PROFESSOR AND ACTING HEAD
Richard D. Hecock, Ph.D.

PROFESSORS
Robert C. Fite, Ph.D.
Keith D. Harries, Ph.D.
Robert E. Norris, Ph.D.
John **F. Rooney,** Ph.D.

ASSOCIATE **PROFESSORS**
George O. Carney, Ph.D.
Jerry D. Croft, Ed.D.
James H. **Stine, M.S.**
Stephen W. Tweedie, Ph.D.
John D. Vitek, Ph.D.

ASSISTANT PROFESSORS
Stephen J. **Stadler,** Ph.D.
Stephen J. Walsh, Ph.D.

Geography is concerned with the surface of the earth and its immediate atmosphere. Geographers study the similarities, the differences, and interac-

tions among places. Geographers are interested in economic, social, political and environmental qualities of places, and they are interested in how these characteristics are interrelated.

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?

Since the physical environment is important in many explanations of spatial behavior and spatial patterns, geographers have traditionally concerned themselves with man-environment relationships: 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 is closer to everyday practical life than geography. The Department of Geography offers six options. Students may specialize in urban and regional planning, business or economic geography, environmental studies, area studies, geographic education or geographical techniques. 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 should be interested in their own surroundings and in other places. They should also possess a curiosity for maps, the basic tool of the field. Students of geography will become familiar with remote sensing, computer graphics 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 of Geography offers the B.A. and B.S. degrees. Advanced programs leading to the Master of Science and Doctor of Education are also available. The Department participates in the environmental science degree programs offered through the Graduate College.

The Department possesses a modern cartographic laboratory with access to the University's computer-mapping facilities. Strong support for the economic-business and urban-regional planning geography program is pro-

vided by the College of Business Administration and the School of Architecture. Resources management and physical geography options are supplemented by offerings in agricultural economics, forestry, geology, soils and biology.

Geology

PROFESSOR AND ACTING HEAD
Wayne A. Pettyjohn, Ph.D.

PROFESSORS
Douglas C. Kent, Ph.D.
John E. Stone, Ph.D.

ASSOCIATE PROFESSORS
Zuhair Al-Shaib, Ph.D.
R. Nowell **Donovan,** Ph.D.
Gary F. Stewart, Ph.D.

ASSISTANT PROFESSORS
Stephen Culver, Ph.D.
Nathan Green, Ph.D.
Stephen Phipps, Ph.D.
Donald Videgar, Ph.D.

Geology is the science of the earth. As such, it utilizes the other physical and biological sciences, mathematics and engineering. In many ways it is a common meeting ground for these other disciplines. Within the field of geology there are many different areas of specialization: economic geology, petroleum geology, ground-water geology, paleontology, etc. However, to specialize in any one area normally requires some graduate study.

To achieve success in geology a student must become reasonably proficient in the information acquired from basic courses in physics, chemistry, mathematics, and, to a lesser degree, statistics and computer science. Some additional work beyond the basic courses is expected in at least one of these areas of study.

Geologists are employed extensively in applied and pure research and in teaching. Applied research includes the exploration for development of petroleum, metallic and nonmetallic mineral deposits and ground water. The geologist is uniquely prepared to pursue and direct environmental studies. Pure research careers may be found with private employers, governmental 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 more training and a broader background. In general, careers as teachers at the college and university level and in pure research are open only to those with graduate training.

The Department of Geology at OSU offers a broadly-based rather than a specialized undergraduate program. The program leads to a B.S. degree in geology which will prepare the student for employment with industry or for graduate study. The Department also offers graduate work leading to the M.S.

degree, with specialization in applied fields such as petroleum geology, hydrogeology, economic geology and environmental geology, as well as in the classical areas of paleontology, stratigraphy, geomorphology, structural geology and sedimentology.

The School of Health, Physical Education and Leisure

George H. Oberle, *Director*
Mary Frye, Assistant *Director*
Betty W. Abercrombie, *Assistant Director and Coordinator of Graduate Studies*
C. F. Schelsky, *Assistant Director*
Larry M. Bridges, ***Acting Chairman, Department of Health***
E. Pauline Winter, ***Chairman, Department of Leisure***
John G. Bayless, ***Chairman, Department of Physical Education***
Kent Bunker, *Coordinator of* ***Intramurals***
James H. Roger, ***Coordinator*** *of Outreach*
Ada Van Whitley, *Coordinator of Recreation*
Aix B. Harrison, *Coordinator of* Research
Kirk Wimberley, ***Coordinator*** *of* Sports *Activities*

PROFESSORS
Betty W. Abercrombie, Ed.D.
John G. Bayless, Ed.D.
Aix B. Harrison, Ph.D.
George H. Oberle, P.E.D.
James H. Rogers, Ph.D.
Richard Young, Ph.D.

ASSOCIATE PROFESSORS
Scout'Lee Gunn, Ed.D.
Myr-Lou Rollins, M.A.
E. Pauline Winter, M.A.

ASSISTANT PROFESSORS
Larry M. Bridges, Ph.D.
Kent Bunker, M.R.Ed. (adjunct)
Fred DeLacerda, Ph.D.
Betty M. Edgley, Ed.D.
Mary Frye, Ed.D
Bob J. Goss, M.S.
Lance C. Lamport, Ph.D.
Charles F. Schelsky, M.S.
Mary Ann Thompson, Ed.D.
Ada Van Whitley, M.S.
Oren D. Wikoff, Ph.D.
Melvin G. Wright, Ed.D.

INSTRUCTORS
Danny Ballard, M.Ed.
Deborah M. Barker, M.S.
Joyce Seward, M.S.

ADJUNCT INSTRUCTORS
Larry J. Bilhartz, M.S.
Ike Groce, B.S.
Bert Jacobson, M.S.
Paul Martin, B.S.
Margaret Rebenen, B.S.
Dorsey Rierdon, B.S.
Bill Wallace, B.S.
Kirk Wimberley, M.R.Ed.

LECTURER
Steve King, B.S.

ACADEMIC COUNSELOR
Jane Mitchell, M.S.

The School of HPEL is a multi-faceted organizational unit encompassing three academic departments: health, physical education and leisure and three leisure service programs: recreation, entramurals and sports activities. The

programs of the School provide a complex of curricular and cocurricular endeavors emphasizing the dual role of meeting the continuous need for enriching and broadening the scope of the individual, and at the same time, preparing the individual professionally for useful service to mankind.

Specific information for each academic department will be found under the headings of *Health, Leisure, and Physical Education.*

Graduate Programs. For students wishing to receive advanced preparation in the fields of health, physical education or recreation and leisure services, the School of HPEL offers graduate studies leading to the M.S. degree with specialization in health, physical education or leisure, and in cooperation with the department of educational administration and higher education, offers an Ed.D. degree with a specialization in health, physical education and recreation. Students completing advanced degree work in health and/or physical education will be prepared to fill such positions as teachers, supervisors, directors and administrators in school, college and university programs of health and/or physical education to work in community and/or health agencies, and to conduct research. Students completing advanced work in the field of recreation and leisure services may fill such positions as supervisors, directors or administrators in a wide variety ofleisure-service job opportunities. For more details on graduate plans and requirements, consult the *Graduate Catalog.* Both graduate degrees with specialization in leisure offer options in administration and management, therapeutic recreation, outdoor recreation and leisure counseling.

The Leisure Services Programs

The Leisure Services Programs are designed to provide equipment, space and professional assistance in helping University students and staff members and their families pursue individual recreation interests. Located in the Colvin Center are facilities for 32 activities including racquetball, gymnastics, basketball and swimming. In addition, areas for soccer, football, rugby, softball, archery, golf driving, 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 noncredit instructional programs each term to students, faculty, staff and their dependents. Specialty services include poolside dances and movies, International Olympics, married student recreation, freshmen programming, and extension services for visiting groups. Instructional programs for adults include yoga, social dance, noon fitness, evening fitness, beginning karate, advanced karate, tennis, racquetball, swimming, scuba, water exercises, exercise to music, aerobic dance, weight training, massage and belly dancing. Instructional programs for dependents include beginning gymnastics, intermediate gymnastics, beginning swimming, intermediate

swimming, karate, basketball, soccer, private swimming (3 years and up) rhythmic gymnastics, (3-4 years) . Children's programs are offered prior to the dependents program each Saturday morning. The recreational and educational programs are free of charge for children, as well as for their parents.

Intramurals. The *intramurals programs* at Oklahoma State University is an important part of student life on campus. The goal is to offer a wide variety of sports experience 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 (23 different activities), with participation in co-recreational activities.

Sports. The *sports activities 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 sports activities program provides the adviser for this council. Membership in all sports clubs in 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, Crew, Cycling, Fencing, Judo, Orienteering, Backpacking, Racquetbal, Rugby, Sailing, SCUBA, Skydiving, Soccer, Squash, Volleyball, Waterskiing and Weightlifting.

Another thrust of the program is the OSU Outdoor Adventure Program. Organized trips are led by professional staff and trained students alike. The student's choice of activity will lead top of 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 explorer the individual, other people and the surroundings.

Health

ASSISTANT PROFESSOR AND CHAIRMAN
Larry **M. Bridges,** Ph.D.

The Department of Health offers a selection of three tracks for the prospective students desiring to work in the health education field. Track one emphasizes school health education which prepares the student to teach health in a public or private school system. Track two, community health education, is a nonteaching track that provides students with a broad-based introduction to community and public health agency opportunities. Track three is an undergraduate minor program in health education for students, preferably with a teaching licensure major. The Department of Health also

offers courses which can contribute to a student's general education, as well as supporting degree requirements for selected disciplines across the campus.

See: *School of Health, Physical Education and Leisure*

Leisure

ASSOCIATE PROFESSOR AND CHAIRMAN
E. Pauline Winter, M.A.

The Department of Leisure provides professional preparation for recreation and leisure services and offers a wide variety of general studies courses which may be selected by students to meet their particular needs and interests related to fitness and the wise use of leisure time.

The Bachelor of Science degree in recreation earned in the Department of Leisure is designed to give students a broad, basic foundation in professional preparation for careers in recreation and leisure services. Three areas of specialization are provided for developing greater competencies in administration and management, therapeutic recreation and outdoor recreation. The curriculum prepares students to direct recreation program services for Armed Forces, camps, outdoor recreation areas, churches, colleges, unions, governmental park and recreation agencies, industry, commercial agencies, schools, youth-servicing agencies, and institutions serving special populations such as the ill, disabled, handicapped, aged and incarcerated.

The purpose of the general studies courses in the Department of Leisure is to assist individuals in the development of capabilities which will enable them to understand and accept themselves, thus aiding in the attainment of their potentialities. Courses are designed to provide individuals with the knowledge, skills, appreciation and understanding of the importance of activity and physical fitness for everyday living in both working and leisure time pursuits; to assist the individual in gaining the abilities which are essential to the development of a satisfactory level of performance in such leisure time activities as sports, dance and aquatics, and to gain a basic understanding of the body and its functions.

See: *School of Health, Physical Education and Leisure*

Physical Education

PROFESSOR AND CHAIRMAN
John **G. Bayless, Ed.D.**

The department of physical education includes a curriculum designed to

prepare well-qualified teachers of physical education for elementary and secondary schools; to offer services to school systems in a continuous effort to improve the total educational program; and to provide support courses for other teaching certification programs. Upon receiving the B.S. in health and physical education, the graduate will be qualified for state licensure to teach these subjects in grades K-12. Minor tracks offered through the Department include athletic coaching, elementary physical education, secondary physical education, dance and special physical education.

See: *School of Health, Physical Education and Leisure*

History

PROFESSOR AND ACTING HEAD
W. David Baird, Ph.D.

OPPENHEIM PROFESSOR
LeRoy H. Fischer, Ph.D.

PROFESSORS
Theodore L. Agnew, Ph.D.
Bernard W. Eissenstat, Ph.D.
Douglas Hale, Ph.D.
H. James Henderson, Ph.D.
Norbert R. Mahnken, Ph.D.
Alexander M. Ospovat, Ph.D.

ASSOCIATE **PROFESSORS**
Neil J. Hackett, Ph.D.
George F. Jewsbury, Ph.D.
James M. Smallwood, Ph.D.
Michael M. Smith, Ph.D.
Robert M. Spaulding, Ph.D.
Joseph A. Stout, Ph.D.
John A. Sylvester, Ph.D.

ASSISTANT PROFESSORS
John P. Bischoff, Ph.D.
Glenna C. Matthews, Ph.D.
Richard C. Rohrs, Ph.D.

History is the record, explanation and interpretation of the totality of man's activities. The study ofhistory is unique in its concern for the time factor in man's development. History enhances the individual's knowledge ofhimself 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 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 studies 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 Program.

Graduate work leading to M.A. and Ph.D. degrees is offered in the following fields: American history; to 1865, American history since 1865, ancient history, medieval history, early modern European history, modern European history, English history, Latin American history, East Asian history, Russian history, history of science, state and regional history.

Humanities

ASSOCIATE PROFESSOR AND ACTING HEAD
Azim Nanji, Ph.D.

PROFESSORS
Lionel A. Arnold, Ph.D.
Richard C. Bush, Ph.D.
Hyla **S.** Converse, Ph.D.
Douglas D. Hale, Ph.D.
John Susky, Ph.D.
Kyle **M. Yates.** Th.D.

ASSOCIATE PROFESSORS
Kenneth D. Cox, Ph.D.
Neil J. Hackett, Ph.D.
Edward **G.** Lawry, Ph.D.
William McMurtry, Ph.D.
Nelson F. Moon, M.A.
Robert F. Weir, Ph.D.

ASSISTANT PROFESSORS
John R. Bosworth, M.A.
Robert **Bumstead,** Ph.D.
Joseph Byrnes, Ph.D.
Joanna Dewey, Ph.D.
Kenneth Dollarhide, Ph.D.
Helga Harriman, Ph.D.
David L. Levine, Ph.D.
Nancy B. Wilkinson, M.A.

The central concern of the humanities is the disciplined study, in a historical context, of ideas, values and the arts and their interrelationships. The subject matter of the humanities is drawn from works of literature, philosophy, religion and the arts.

Students who wish to concentrate in one area, and who desire at the same time a varied, interdisciplinary education, should find the humanities major attractive for the B.A. degree.

The cultural knowledge acquired, the ability to relate values to professional life and a global understanding of human experience prepare the humanities major for a variety of careers in business, education, government service and various nonprofit institutions. This program also provides the broadest possible base for future graduate school specialization for careers in the professions as well as university teaching, theology and librarianship. With the addition of courses leading to teacher licensure, normally requiring an extra semester and summer session, the humanities graduate may be

employed to teach humanities in some high schools.

Areas of emphasis in the humanities program are Western, African, Native American and Asian cultures, religions and philosophy; library science, cultural history, art history and appreciation; foreign languages; English literature; and area studies programs (Russia and East Europe, Medieval Studies, Latin America, Asia, Africa and America) in which, in addition to the B.A. degree, an area studies certificate may be earned. Qualified students will find that an interdisciplinary selection of courses in these areas will provide an excellent cultural understanding and a broad base for future work and study.

School of Journalism and Broadcasting

Advertising, Journalism, Mass Communication, Radio-TV-Film

PROFESSORS
Harry E. Heath Jr., Ph.D., *Director*
Marian D. Nelson, Ed.D., *Chairman, Journalism and Advertising*
Walter J. Ward, Ph.D.

ASSOCIATE PROFESSORS
Marshall E. Allen, M.A.
James Files, M.S.
Frederick L. Kolch, M.A.
Philip E. Paulin., *Chairman, Radio-Television-Film*
James W. Rhea, Ph.D.
William R. Steng, Ed.D.

ASSISTANT PROFESSORS
Michael O. Buchholz, Ph.D.
Michael J. Bugeja, M.S.
Paul R. Couey, M.A.
Jack G. Harrison, M.A.
John B. Thomas, M.S.
Robert Wegener, M.S.
Sheila Wisherd, M.S.

INSTRUCTORS
Craig C. Beeby, B.S.
William E. Crane, B.A.
L. Don Hoover, B.A.
William R. Jackson, M.A.

At Oklahoma State University, the professional areas of mass •communication are grouped in the School ofJournalism and Broadcasting (SJB) . These areas seek to complement each other with a minimum of duplication.

A modern democratic society cannot live by its ideals if its mass media practitioners are merely competent technicians who worry less about *what is* reported to the people than *how* it is reported. Citizens must have accurate information about social, political and economic problems as well as knowledge of actions taken by government agencies at all levels. From village council to Supreme Court, there can be no exception from the rule that public business is the public's business.

To speak to people through radio, television or the printed page requires a knowledge of the people to whom one wishes to speak and an understanding of the world in which they live. Therefore, the curricula of the School of Journalism and Broadcasting are designed to offer more than training in communication techniques. Three-quarters of the **SJB** student's time at the University is devoted to a liberal education in the arts and sciences. At the same time, the student gains competence in his or her chosen field through professional courses in the School.

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 future media leadership through the preparation of high school and college educators and their participation in professional communication associations;
(5) To emphasize high standards of ethics and responsibility in mass communication.

Mass Communication. Some courses in the School of Journalism and Broadcasting are designed to cross media lines, because students need basic knowledge of the full range of mass-communication problems and procedures. Teachers for such courses may be drawn from any of the SJB media specialties.

Graduate Study. The M.S. degree in mass communication and the Ed.D. degree in higher education-mass communication are offered in the School's graduate program. The Ed.D. degree is offered in cooperation with the College of Education.

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 Newswriting I (JM 2113). 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. Proficiency in typewriting can be demonstrated by a high school grade of "C" or better in typewriting or by passing a School typewriting test.

Advertising

Ideas ranging from the introduction of new products and services to public service messages are communicated to mass audiences through adver-

tising. Advertising also provides the economic base for mass media-newspapers, radio and television, magazines-thus freeing them from the political control found in many countries.

Upon a strong liberal arts foundation, majors in advertising build educational experiences which 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 Oklahoma State University advertising curriculum is accredited by the American Council on Education for Journalism. This means it has the approval of both education and professional-advertising leaders.

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.

Options offered in journalism:

News-editorial-This program prepared students for writing and editing positions on newspapers, magazines, trade journals, in book editing and publishing, etc.

Photojournalism-C*areers* filled by these graduates include newspaper, magazine and industrial photography, television newsfilm, and public relations graphics.

Teaching licensure-T his program, which may be taken in either the College of Arts and Sciences or the College of Education, prepares students to teach journalism at the high school level.

Technical journalism-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 Agriculture and Home Economics.

Community journalism. This option, 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 spread 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 Chairman of Journalism and Advertising.

Journalism majors assist in the publishing of a campus newspaper, *The Daily O'Collegian,* and in the newsrooms of radio stations KOSU, located in the School. 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 JM 2113, 2123 and 3113 is done on the O'Collegian or other publications.

The news-editorial curriculum is accredited by the American Council on Education for Jounalism, and this approval is endorsed by the American Newspaper Publishers Association, American Society of Newspaper Editors, Southern Newspaper Publishers Association and other highly regarded media groups. The journalism program is affiliated with the Southwestern Journalism Congress, Society of Professional Journalists and Association for Education in Journalism.

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 both advertising and news-editorial curriculum, as do the public information departments of government, business and industry. The public relations program is affiliated with the Society of Association Publications, International Association of Business Communicators, the American Advertising Federation and the Public Relations Society of America.

Radio-TV-Film

The programs in radio-television-film are designed to prepare students for meaningful careers in various aspects of broadcasting. They offer both men and women a chance to develop abilities in fields as diverse an announcing, production, copywriting, news, documentary, sports, sales and management.

The undergraduate degree is offered in these professional options:

Production and performance-For those students who wish to hold on-the-air jobs in broadcasting or who desire to prepare for positions as directors and producers of radio and television programs.

News and public affairs-For those students who wish to write, edit and produce news, discussion and documentary programs for broadcasting stations, networks and cable companies.

Sales and management-For those students who wish to write, sell and produce commercial messages, and to move into management and/or ownership positions on radio and television stations.

The extensive facilities of the University's color-equipped Educational Television Services, and two full-time radio stations, KOSU and KVRO, plus a newly equipped electronic news-gathering laboratory (ENG), make it possible for majors to acquire experience along with their professional studies. Radio-television-film is affiliated with the National Association of Educational Broadcasters, National Association of FM Broadcasters, University Film Association, Radio Advertising Bureau, Oklahoma Broadcasters Association, National Association of Broadcasters, Radio-Television News Directors Association, Broadcast Education Association and National Public Radio.

Mass Communication: See *(School of) journalism and Broadcasting*

Mathematics

ASSOCIATE PROFESSOR AND ACTING HEAD
Dennis E. Bertholf, Ph.D.

PROFESSORS
Jeanne L. Agnew, Ph.D.
Douglas B. Aichele, Ed.D.
Hermann G. Burchard, Ph.D.
Paul F. Duvall, Ph.D.
Benny D. Evans, Ph.D.
Gerald K. Goff, Ed.D.
John Jewett, Ph.D.
John M. Jobe, Ph.D.
Jerry A. Johnson, Ph.D.
Marvin Keener, Ph.D.
Ignacy I. Kotlarski, Ph.D.
Hiroshi Uehara, Ph.D.

ASSOCIATE PROFESSORS
James R. Choike, Ph.D.
Donald C. Coram, Ph.D.
John E. Hoffman, M.A.
James W. Maxwell, Ph.D.
John E. Wolfe, Ph.D.

ASSISTANT PROFESSORS
Dale Alspach, Ph.D.
Murray M. Blose, M.S.
Joel Haack, Ph.D.
Alec Matheson, Ph.D.
Robert Myers, Ph.D.
Wayne Powell, Ph.D.
Sherwin Skar, Ph.D.
Charles E. Svendson, Ph.D.
Garrett Sylvester, 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 and work in industry and government. In industry mathematicians usually work in research, although they have become increasingly involved in management. The firms employing the largest number of mathematicians are in the aerospace, computer, electronics and communications 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, modern algebra and 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. In particular, 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. The Department of Mathematics offers programs leading to the degrees of Master of Science and Doctor of Philosophy. In addition, the Department cooperates with the College of Education in offering a Doctor of Education degree in preparation for teaching mathematics in college.

Medical Technology: See *Microbiology*

Microbiology

PROFESSOR AND ACTING HEAD
E. A. **Grula, Ph.D.**

PROFESSOR
Norman N. Durham, Ph.D.

ASSOCIATE PROFESSORS
Mary M. Grula, Ph.D.
Lavon P. Richardson, Ed.D.

ASSISTANT PROFESSORS
Mark R. Sanborn, Ph.D.
John Smith, Ph.D.
Helen Vishniac, Ph.D.

Microbiology is the area of biological science which is particularly concerned with the study of microbial life and the relation of microbes (fungi, bacteria and viruses) to humans, animals, plants and the physical environment. As such it includes both practical, applied knowledge and research, and basic theoretical research. In the former category are such activities as 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 man, 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. On a more basic level, microbes are studied as living entities that are capable of living in a 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 study of reactions which occur in higher organisms. As subjects for research in biochemical and molecular genetics, microbes have contributed most of our present knowledge of genetics at the molecular level.

Students interested in a career 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 essential.

Microbiologists work in federal and state departments of public health, in the fermentation industry, in laboratories of pharmaceutical companies, in hospitals and medical schools, and in research laboratories of universities, health centers, research foundations and private companies. Graduate study is advisable for most positions involving research and is essential for positions in colleges and universities which combine teaching and research.

The microbiology curriculum prepares students for careers in any of the fields described above. Courses are designed to provide comprehensive training in the skills required for working with microbes and a broad knowledge of all aspects of microbial life. Students are expected to choose courses from the Departments of Chemistry, Zoology, Botany and Physiological and from the physical sciences which are most useful for their particular area of interest.

Graduate study leading to the M.S. and Ph.D. degrees is supported by complete laboratory facilities for research in virology, microbial physiology, microbial genetics, microbial anatomy and immunology.

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 training (internship) in an approved school of medical technology.

Clinical laboratory training. For the B.S. degree and certification, the students will, after three years of university work, complete one year of clinical laboratory training (internship) in a school of medical technology accredited by the National Accrediting Agency for Clinical Laboratory Sciences and currently affiliated with Oklahoma State University. Schools of medical technology at the following hospitals are currently affiliated:

Baptist Memorial Hospital, Oklahoma City, OK
Comanche County Memorial Hospital, Lawton, OK
Hillcrest Medical Center, Tulsa, OK
Jane Phillips Hospital, Bartlesville, OK
Mercy Hospital, Oklahoma City, OK
Muskogee General Hospital, Muskogee, OK
Presbyterian Hospital, Oklahoma City, OK
Sparks Regional Medical Center, Ft. Smith, Ark.
St. Anthony's Hospital, Oklahoma City, OK
St. Francis Hospital, Tulsa, OK
St. John's Medical Center, Tulsa, OK
St. Mary's Hospital, Enid, OK
Valley View Hospital, Ada, OK

Students entering their twelve months of internship training must enroll in BISC 4200 for 12 credit hours during the equivalent fall and spring semesters and for 6 hours during the equivalent summer session. BISC 4200 will be graded on a Pass-Fail system. A grade of"I" may be given for the first two semesters of internship. The final grade of "Pass" or "Fail" will be awarded upon receipt of the final official transcript from the school of medical technology by the University medical technology coordinator. 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 clinical laboratory training internship. 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 either biochemistry or quantitative analysis; immunology and 10 additional credit hours of upper-division microbiology (physiology can be included in this 10 hours).

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 2.50 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 admissions to internship. Students should apply directly to one or more schools of medical technology about 12-15 months prior to the beginning date for internship. Approximately 50% 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 training 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.

Military Science: **See** *(Department of) Military Studies*

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 ofArts 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 plus $100.00 per month subsistence

allowance. Applications for 4-year scholarships may be obtained through local high school principals or advisers and the ROTC departments. Information concerning 1-year (Army only), 2- and 3- year scholarships (male and female) may be obtained by direct contact with the ROTC departments located on campus in Thatcher Hall. (Telephone 624-4131 for Army and 624-4255 for Air Force.)

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 124 semester credit hours. It combines ROTC training with the College's general education 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
Col. Richard A. Moore, M.A.

ASSISTANT PROFESSORS
Maj. J. D. Messenger, M.S.
Cpt. D. L. McHatton, M.S.

STAFF
TSgt. D. R. Riggs
SSgt. J. K. Page
SSgt. T. L. **Milligan**

The Air Force ROTC basic program consists of one classroom hour and one leadership laboratory period per week for one credit hour per semester during the freshman and sophomore years. The advanced AF-ROTC program (junior and senior years) is open on a competitive basis to any student having two years of enrollment remaining. The advanced courses each include three classroom hours per week and one hour of leadership laboratory for three semester hours of credit. Class work and laboratory involvement are designed to prepare the student for his or her future role as a manager and a leader in the U.S. Air Force. No military obligation is incurred for nonscholarship students enrolling in the lower-division aerospace studies courses.

Students (male and female) completing the Air Force ROTC programs are commissioned as reserve officers. Candidates for flight training incur an active service duty commitment of five or six years, commencing with completion of flight training. Nonflying officers have a four-year commitment. During their initial active duty, officers compete for the opportunity to attain career status.

For those physically qualified and accepted as pilot candidates, AEROS 4554 is offered at no cost to the student. This course covers the ground school requirements for the FAA Private Pilot Examination, and also provides twenty-five hours of flight training at the Stillwater Airport.

Military Science

PROFESSOR OF MILITARY SCIENCE AND HEAD
Lt. Col. John A. Smith, M.A.

ASSISTANT **PROFESSORS**
Cpt. Donald Baldridge, **B.S.**
Cpt. Robert Bryant, M.A.
Maj. Charles R. Gibson, M.A.
Maj. Thomas McCoy, B.S.

STAFF
SFC Blair **G.** Anthony
MSG Robert Cowan
SFC Calvin Fields
SGM Domingo Lozano

Students participating in Army ROTC obtain knowledge in various skills such as leadership, personnel management, land navigation, orienteering, rappelling and tactics while pursuing their normal course of studies leading to a desired degree. Upon graduation, ROTC students concurrently are commissioned as second lieutenants. Since service obligations vary, prospective students should contact the Professor of Military Science for details.

Army ROTC consists of a basic course and an advanced course. The basic course amounts to a total of eight hours of academic work taken during the freshman and sophomore years. Elementary skills such as basic leadership, land navigation, marksmanship, orienteering tactics, war gaming and rappelling are emphasized. Participation in the basic course involves absolutely no military service obligation.

The advanced course consists of eleven hours of academic wbrk taken during the junior and senior years. Additionally, participation in a six-week summer camp is mandatory. The advanced course emphasizes intermediate skills in leadership, tactics, physical conditioning, personnel management and American military history. Advanced students are intimately involved in planning, coordinating and supervising various activities such as orienteering meets, rappelling outings and field training exercises.

Music

PROFESSOR AND ACTING HEAD
Andrew H. Harper, Ph.D.

PROFESSORS
Hoover P. Fisher, D.M.E.
Stanley D. **Green,** M.M.
Hiram H. Henry, M.M.E.
Victor A. Wolfram, M.S.

ASSOCIATE PROFESSORS
Marion F. Abbott, M.M.
John H. Enis, M.M.
Paul H. Friesen, M.A.
William M. McMurtry, Ph.D.
Paul A. Montemurro, M.A.
Wayne E. Muller, M.E.
Ronald Stoffel, M.M.
Sunny Van Eaton, M.A.

ASSISTANT PROFESSORS
Karen Carter, M.S.
Deanna Dalrymple, M.M.
Glenn W. Dowlen, M.M.
Gerald Frank, S.M.M.
Carol Jean **Planthaber,** M.M.
Gwen Powell, B.M.
Evan Tonsing, M.M.

To concentrate successfully in college music, a student should have demonstrated a strong interest in music during high school days and a talent for performance, in vocal or instrumental music, supported by individual lessons and fundamental music theory study.

The Department offers two undergraduate degrees to meet students' varying goals in music: (1) the general Bachelor of Arts degree with one third of the hours in music and (2) the Bachelor of Music degree. Within the Bachelor of Music degree, students may elect one of four options: performance, vocal certification, instrumental certification or combined vocal/instrumental certification. Instruction for these degrees includes general studies courses, music courses, and, where appropriate, professional education courses. Music courses may be selected from theory, literature and history, individual and class lessons, arranging and composition, conducting, education methods and student teaching, instrumental and choral ensembles and opera scenes. The Bachelor of University Studies allows interested music students to major in music and earn a second major in an outside field.

Professional instruction is provided for students preparing to become teachers of music in public schools, colleges and private studios, and for students preparing for performance careers, including church positions. Many students completing an undergraduate degree in music at OSU continue their education and earn advanced degrees in music.

Instruction is provided for general University students who wish to expand their knowledge about music and improve their performing abilities. Interdisciplinary musical needs of students in other degree programs are served through instruction in elementary education, humanities courses and courses designed for the nonmusic major.

Music on campus yields an enriching flow of faculty and student recitals and concerts by the student bands, orchestra, choral groups and opera for campus and community enjoyment. Courses and musical activities are also offered through the College of Arts and Sciences Extension Office.

The Department of Music is fully accredited by the National Association of Schools of Music. Students desiring to major in music should contact the Head of the Department to arrange for an entrance audition and interview.

Philosophy

PROFESSOR AND ACTING HEAD
Neil R. Luebke, Ph.D.

PROFESSOR
John E. Susky, Ed.D.

ASSOCIATE PROFESSORS
Richard W. Eggerman, Ph.D.
Edward G. Lawry, Ph.D.
Robert T. Radford, Ph.D.
Walter G. Scott, Ph.D.

ASSISTANT PROFESSORS
John R. Bosworth, M.A.
David L. Levine, Ph.D.

Philosophy may be considered in two ways, either as an intellectual activity to be practiced or as a subject matter to be studied. As an activity, philosophy seeks to analyze, evaluate, and often reformulate the ideas, principles and arguments by which we understand and explain our experience and by which we direct and justify our behavior. No area of experience or behavior-aesthetic, political, religious, scientific or moral-is immune to philosophical consideration. Moreover, the writings produced by great philosophers are worthy of study not only as models of thought but also 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 may be regarded as being in 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 area courses. Some offerings combine the latter two characteristics. No undergraduate course is intended only for majors. Juniors and seniors often find that an upper-division philosophy course related to their area of concentration can supply needed breadth and depth to their studies.

Students may pursue work in philosophy as part of their general education, as a support to their major area ofconcentration, as a minor, as a major or second major leading to a B.A. degree or in connection with a graduate program. The department offers an M.A. degree in philosophy and cooperates in other degree programs on the doctoral level. Persons interested in graduate

work in philosophy should consult the *Graduate Catalog.* 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. 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.

Physics

ASSOCIATE PROFESSOR AND ACTING HEAD
G. P. Summers, D. Phil.

PROFESSORS
E. E. Kohnke, Ph.D.
E. E. Lafon, Ph.D.
J. N. Lange, Ph.D.
William J. Leivo, Ph.D.
J. J. Martin, Ph.D.
H. A. Pohl, Ph.D.
R. C. Powell, Ph.D.
D. L. Rutledge, Ed.D.
Leon W. Schroeder, Ph.D.
W. A. Sibley, Ph.D.
N.V.V.J. Swamy, Ph.D.
P. A. Westhaus, Ph.D.
T. M. Wilson, Ph.D.

ASSOCIATE PROFESSORS
George S. Dixon, Ph.D.
Larry E. Halliburton, Ph.D.
Mark A. Samuel, Ph.D.
H. L. Scott, Ph.D.

ASSISTANT PROFESSORS
Bruce J. Ackerson, Ph.D.
D. Dykstra, Ph.D.
L. I. Fleishman, Ph.D.
H. J. Harmon, Ph.D.

Physics is the study of the fundamental behavior of nature and as such presents a broad range of stimulation for the student. Whether one is dealing with interactions of fundamental particles, the origin of the universe or the propagation of sound waves, the same critical skills of observation and evaluation are required. These skills are developed in both the experimental and the theoretical contexts to provide the student with a broad background which is valuable in pursuing a career in either applied or pure physics. The versatility required in industrial research makes the broad spectrum background of a physics program particularly desirable to avoid technological obsolescence.

The physics program provides a common basis of physics, mathematics and other sciences for the first two undergraduate years. The physics major continues beyond that in an individually tailored program in the department's options program. The final two years are designed to suit the student who

anticipates graduate research, as well as the student who will seek employment after his or her undergraduate degree. The choices offered to undergraduates are in the form of physics options which reflect their career goals. For example, options exist in pure physics, material science, biophysics, engineering physics, chemical physics and geophysics. Many of these options include selected courses in engineering, computer sciences and biological sciences. With this sort of versatility the student can choose (in consultation with his adviser) a program which will suit his evolving career goals in the latter part of his or her undergraduate program. 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.

Physiological Sciences

PROFESSOR AND HEAD
Everett C. Short, D.V.M., Ph.D.

REGENTS PROFESSOR
Duane R. Peterson, D. V. M., M. S.

PROFESSORS
Calvin **G.** Beames, Jr., Ph.D.
James E. Breazile, D.V.M., Ph.D.
William C. Edwards, D.V.M., M.S. (adjunct)
Jonathan D. Friend, D.V.M., M.S.
W. Stanley Newcomer, Ph.D.
Duane R. Peterson, D.V.M., M.S.

ASSOCIATE PROFESSORS
George E. Burrows, D.V.M., Ph.D.
Duane L. Garner, Ph.D.
Jerry **G.** Hurst, Ph.D.
Charlotte L. Ownby, Ph.D.
Theodore E. Staley, D.V.M., M.S.

ASSISTANT PROFESSORS
James T. **Blankenmeyer,** Ph.D.
Lester L. Rolf, Jr., Ph.D.
Anne C. Rusoff, Ph.D.

RESIDENT
Gregor L. Morgan, M.V.Sc.

The Department of Physiological Sciences offers a variety of courses and programs dealing with the structures and bodily functions of animals, emphasizing the human and domesticated species. The undergraduate curriculum in physiology serves students in the Colleges of Agriculture, Arts and Sciences, Education, and Home Economics. In the professional veterinaray curriculum students learn anatomy, physiology, pharmacology and toxicology. In the graduate curriculum students pursue advanced studies in the several disciplines represented in the Department. Instruction consists of theory, practical laboratories and tutorials in experimental investigations.

Of the sciences represented in this Department, *anatomy* deals with the

structural and functional relationships of the parts of animals as viewed mascroscopically and microscopically; *physiology,* with the functional dynamics of animals both as a whole and as a set of systems; ***pharmacology,*** with the nature and properties of drugs as they interract with the animal body; and *toxicology* with the noxious effect of foreign substances upon the animal body.

Political Science

PROFESSOR AND ACTING HEAD
Harold V. Sare, M.A.

PROFESSORS
Raymond N. Habiby, Ph.D.
Bertil L. Hanson, Ph.D.
James L. **Lawler, M.P.I.A., Ph.D.**
Clifford A. L. Rich, Ph.D.
Robert L. Spurrier, Jr., Ph.D.

ASSOCIATE **PROFESSORS**
Robert Darcy, Ph.D.
Charles M. Evans, Ph.D.
Franz A. von Sauer, Ph.D.
Joseph W. Westphal, Ph.D.

ASSISTANT PROFESSORS
Anthony E. Brown, M.P.A.
Mark Daniels, Ph.D.
James A. Davis, Ph.D.
John Swain, M.A.

INSTRUCTOR
Danny Adkison, M.A.

Political science is the study of politics and government at the local, state, national and international levels. It is concerned with the pursuit of public power by organized groups and with the articulation of power and influence into governmental institutions, laws and public policies.

Political science seeks to reveal the patterns of behavior of political participants, to discern the decision-making process in government, and to explain the organization and functioning of political and governmental institutions.

Political science is also concerned with the appraisal of public policy alternatives and the assessment of government's role in society. Intergovernmental relations are of vital interest to political scientists.

The principal fields of study in political science are political theory, public law, comparative politics, international relations, public administration and American political behavior. Students may receive the Bachelor of Arts degree in political science with a concentration in any of the fields of study. The Bachelor of Science degree in political science is conferred with a concentraton in public affairs. Also, the B.S. degree in pre-law is conferred by this Department.

Political science graduates have a variety of career opportunities-administrative positions with international, federal, state and local government agencies, teaching positions in college and high school, research work,

management and public relations, journalism, politics, preparation for law school and other jobs requiring a liberal arts background.

The Department of Political Science offers graduate work leading to the M.A. degree with a concentration in one of the following six fields: theory, public law, comparative politics, international relations, public administration and American political behavior. The public administration program emphasizes career development in urban, county and state government.

Psychology: See *College of Education*

Public Relations: See *(School of) journalism and Broadcasting*

Radio-TV-Film: See *(School of) journalism and Broadcasting*

Religious Studies

ASSOCIATE PROFESSOR AND ACTING HEAD
Robert F. Weir, Ph.D.

PROFESSORS
Richard C. Bush, Ph.D.
Hyla **S. Converse,** Ph.D.
Kyle **M.** Yates, Jr., Th.D.

ASSOCIATE PROFESSOR
Azim A. Nanji, Ph.D.

ASSISTANT PROFESSORS
J. Robert **Bumstead, D. Phil.**
Joseph Byrnes, Ph.D.
Joanna Dewey, Ph.D.
Kenneth Dollarhide, 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. The courses offered are varied enough for concentrated work 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 indoctrinate or to force a particular view upon the student. Emphasis is always 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 professional programs. The wide variety of course offerings makes possible quality preparation for further work in seminaries and graduate

schools. The training and experience of the faculty in varied academic traditions both in this country and abroad make possible the broadest type of counseling on advanced programs leading to careers in religion.

An option in religious studies is available for the humanities major. Interdisciplinary approaches provide for study in the field of religion either as preparation for further advanced work, as specific preparation for teaching, or as an attempt to understand the phenomenon of religion in its complexity.

The curriculum is not designed exclusively or even primarily for those seeking careers in religion. It meets the need of all who desire a well-rounded education which explores and appreciates the human search for deeper meaning to finite life in terms of relationship to the infinite.

Social Sciences

CHAIRMAN AND ADVISER
Richard D. Hecock, Ph.D.

This is an interdicsiplinary program supervised by a faculty committee composed of representatives of the several social science departments. The **B.A.** and B.S. degree programs in social sciences are designed to acquaint students with several social science fields. Students must take a statistics course to prepare them for more advanced work. Upper-division requirements specify study of methodologies utilized by the various social sciences, including economics, anthropology, sociology, history, psychology, geography and political science. In addition upper-division students select theme areas (contemporary issues, regions, international affairs, advanced methodology, policy, planning and management) in which they must take courses drawn from the various social science disciplines.

Students may want to work toward teaching licensure or earn area studies certificates (American Studies, International Studies or Native American Studies) in association with the social sciences degree programs. These programs require some hours beyond those required for the social sciences degree.

Students obtaining a social sciences degree may do so in order to prepare themselves for graduate work in one of the social science disciplines, for professional schools (law, planning, business and education) or for interdisciplinary social science graduate programs. Social sciences degree recipients often move directly into careers in education, business or government. The degree is also intended for those who are interested in obtaining an interdisciplinary undergraduate degree which is oriented towards understanding social processes and problems.

Sociology

PROFESSOR AND ACTING HEAD
Gene Acuff, Ph.D.

PROFESSORS
Donald Allen, Ph.D.
Ivan Chapman, Ph.D.
Richard Dodder, Ph.D.
Charles Edgley, Ph.D.
James Howard, Ph.D.
Larry Perkins, Ph.D.
Harjit Sandhu, Ph.D.
Dan Wesley, Ed.D.

ASSOCIATE **PROFESSORS**
George Arquitt, Ph.D.
Donald Brown, Ph.D.
Jack Bynum, Ph.D.
Werner Gruninger, Ph.D.
Larry Hynson, Ph.D.
Kenneth Kiser, Ph.D.
Richard Teague, Ph.D.

ASSISTANT PROFESSORS
Donald Tennant, Ph.D.
Edgar Webster, Ph.D.

INSTRUCTOR
Marjorie Schweitzer

LECTURER
Sara Brown, M.S.W.

ADVISER
Carol Olson, M.S.

Sociology is the study of people as they live their lives in society. The emphasis is on understanding why people act as they do in particular society, community or social group.

Many different points of view are represented in the faculty listed above. Some believe that a scientific explanation is central to understanding people in society; others believe than human values and subjective understandings should be the major emphasis in sociology. In all cases, there is an agreement that sociology is an exciting field of study.

The subject matter of sociology can be divided into three areas: (1) courses that help the student understand the social influences on people; (2) subject matter that introduces the student to some of career oppportunities in sociology upon graduation from college; and (3) courses that provide technical skill in understanding and doing the work of a socialogist. Topics covered by the above include anthropology, corrections, social problems and deviance, methods-statistics, social organization, social psychology and theory. A full-time adviser is available to assist undergraduate students in the selection of courses and to answer their many questions related to career planning. Faculty members are also available to assist and to advise graduate students.

B.A. and B.S. degrees are offered in sociology. The B.S. degree includes applied sociology options in corrections, pre-social work and gerontology. At the graduate level, a master's and a doctoral degree program are available.

Anthropology: Offerings in anthropology provide students with a basic introduction to the ideas and principles found in the four subdisciplines of anthropology: physical anthropology, archeology, anthropological linguistics and ethnology.

Regular course offerings include an emphasis on North American Indian cultures and archeology, womens' roles in different cultures and aging from a cross-cultural perspective. Other courses deal with anthropological method and theory, and anthropology of development, anthropology of a particular region such as Southwestern Indian cultures, Plains Indian cultures and European peasant societies.

Students wishing to emphasize anthropology in their studies may take a B.A. or a B.S. degree in sociology with an option in anthropology.

Speech Communication

PROFESSOR AND ACTING HEAD
James Hughey, Ph.D.

PROFESSOR
Fred Tewell, Ph.D.

ASSOCIATE PROFESSORS
Paul Harper, Ph.D.
Lamar Reinsch, Ph.D.

ASSISTANT PROFESSOR
Mike Stano, Ph.D.

INSTRUCTOR
Bena Harper, M.A.

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.

Speech and Language Pathology and Audiology

PROFESSOR AND ACTING HEAD
Burchard M. Carr, Ph.D.

ASSOCIATE PROFESSORS
Fred Kolch, M.A.
Nancy Monroe, Ph.D.
Cheryl Scott, Ph.D.

ASSISTANT **PROFESSOR**
Gary J. Beeby, M.A.

INSTRUCTORS
Suzanne Adams, M.S.
Carol Headrick, M.C.D.
Jan Marks, M.S.
Susan Richardson, M.S.

The Department of Speech and Language Pathology and Audiology prepares students through the master's level to serve handicapped individuals of all ages who exhibit speech, language and/or hearing defects. 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 and clinical practicum experiences in the nature, symptoms and treatment of those who possess various kinds of communication disorders.

The master's level program is designed to provide students with intensive exposure to academic course work and to a wide variety of challenging clinical activities. This includes a full time, off-campus clinical internship 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 the 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 of the American Speech-Language-Hearing Association and licensure by the state in speech pathology. In addition, almost all students elect to earn the state teaching certificate or licensure.

Statistics

PROFESSOR AND ACTING HEAD
J. Leroy Folks, Ph.D.

PROFESSORS
Lyle Broemeling, Ph.D.
P. Larry Claypool, Ph.D.
Ignacy I. Kotlarski, Ph.D.
Robert D. Morrison, Ph.D.
David L. **Weeks,** Ph.D.

ASSOCIATE **PROFESSORS**
Richard Dodder, Ph.D.
Donald Holbert, Ph.D.
Ronald W. McNew, Ph.D.
William D. Warde, Ph.D.

ASSISTANT **PROFESSORS**
Robert Darcy, Ph.D.
Nitis **Mukhopadhyay,** Ph.D.
William S. Stewart, 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 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.

The Statistical Laboratory operates within the Department to provide statistical consulting to researchers-both faculty and student-across the campus.

Theatre

ASSOCIATE PROFESSORS
Kenneth Cox, Ph.D.
Jerry Davis, Ph.D.
Martha Sharp, M.A., M.F.A.

ASSISTANT PROFESSORS
Virginia Caplinger, M.A.
Billye Sue Harmon, M.A., M.F.A.

The program in theatre provides the student with courses in all areas of the theatre. The degree is broadly based with both an academic and artistic approach to the curriculum.

A season of six to eight productions provides practical experience in theatre performance for professionals, teachers and those planning graduate work in theatre and related fields.

Zoology

PROFESSOR AND ACTING HEAD
John W. Thornton, Ph.D.

PROFESSORS
L. Herbert Bruneau, Ph.D.
Troy C. Dorris, Ph.D.
Bryan P. Glass, Ph.D.
Rudolph J. Miller, Ph.D.
Dale W. Toetz, Ph.D.
Jerry Wilhm, Ph.D.

ASSOCIATE PROFESSORS
John S. Barclay, Ph.D.
Sterling L. Burks, Ph.D.
Calvin C. Cunningham, Ed.D.
Milton R. Curd,, Ph.D.
Anthony Echelle, Ph.D.
Eugene Maughan, Ph.D. (adjunct)
Helen Miller, Ph.D.
Frank Schitoskey, Ph.D. (adjunct)
James H. Shaw, Ph.D.

ASSISTANT PROFESSORS
John A. Bantle, Ph.D.
John **Bissonette,** Ph.D. (adjunct)
Tracy S. Carter, Ph.D. (adjunct)
Michael Clady, Ph.D. (adjunct)
Margaret S. Ewing, Ph.D. (visiting)
Stanley F. Fox, Ph.D.
James Harmon, Ph.D.
Scott Shalaway, Ph.D. (visiting)
Larry Talent, Ph.D.

The Department of zoology offers degree programs in zoology, wildlife ecology and biological sciences.

Zoology is the study of animals. Courses in zoology provide a background for many applied and professional careers. Efforts are made in all zoology courses to stimulate interest in the various areas of the discipline, to increase powers of observation and to instill an appreciation of all living things.

Environmental and evolutionary biology receive major emphases in the zoology curriculum. Because of the extreme importance of water, many of the efforts of the Department have been directed toward studying aquatic environments and a more efficient use of our fresh-water animal resources.

The B.S. degree curriculum in zoology is designed to provide a good education and a background of basic biology and specialization in that area of zoology in which the student wishes to develop his or her career. To become a zoologist the student must have a good foundation in the related fields of chemistry, physics, mathematics and statistics, and botany. The zoology curriculum includes animal behavior, aquatic ecology, cell biology, ecology, evolution, fishery biology, genetics and natural history.

The Department offers graduate programs leading to the M.S. and the Ph.D. in zoology, with major concentration and emphasis in aquatic ecology and vertebrate zoology.

Wildlife Ecology

The wildlife ecology program involves comprehensive study in the conservation of renewable natural resources, emphasizing an optimum balance between wild animal populations and habitat requirements. Courses in the wildlife program fulfill the requirements for many other applied and professional careers.

Undergraduates majoring in wildlife ecology may choose from four options: management, research, communications and fisheries. The management option emphasizes applied wildlife ecology, while the research option offers the best preparation for graduate study. Under the communication option, biological training is combined with course work in journalism, social sciences and the uses of electronic media. All four options lead to a B.S. degree in wildlife ecology.

Assisting in graduate training are the Oklahoma Cooperative Wildlife Research Unit and the Oklahoma Cooperative Fishery Research Unit. Cooperatively funded by the Oklahoma Department of Wildlife Conservation, the U.S. Fish and Wildlife Service, the Wildlife Management Institute and Oklahoma State University, these units conduct research and demonstration and disseminate information obtained through such research. The units function in cooperation with the department of the biological sciences unit leaders, and assistant leaders hold academic rank and serve as members of the department's faculties.

Both the M.S. and the Ph.D. degrees are offered specifically in wildlife ecology.

Biological Sciences

Calvin M. Cunningham, Ed.D. *Adviser*

A B.S. degree in biological sciences is available for students wishing to obtain a broad disciplinary program encompassing all of the life sciences. By

including appropriate course work in his or her program, a student can obtain licensure to teach in the secondary schools. Requirements for admission to dental, medical and other health-related professional schools can be met through the biomedical option of the biological sciences degree.

College of Business Administration

Robert L. Sandmeyer, Ph.D., *Dean*

John T. Bale, Jr., Ed.D. Associate *Dean*

Richard D. Gustely, Ph.D., *Director* ***of Business and Economic Research***

James G. Hromas, M.B.A., *Director of Extension*

Walter L. Starks, Ed.D., *Director of Student Services*

Department Heads

Accounting, *Wilton T. Anderson, Ed.D., C.P.A.*

Administrative Services and Business Education, *Dennis L. Mott, Ed.D.*

Economics and Finance, *Gerald M. Lage, Ph.D.*

Management, *Wayne A. Meinhart, Ph.D.*

Marketing, *Stephen J. Miller, Ph.D.*

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.

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 and public speaking will be quite valuable.

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 in the American economy, which includes study in the basic areas of accounting, economics, business law, finance, management, marketing, production and statistics; and (3) to provide students with the opportunity for specialized study in selected major areas of business.

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.

Degree Programs

Bachelor of Science Degree. The Bachelor of Science degree in Business Administration is offered by the five departments of the College. Departmental majors are listed below.

Accounting, with a major in accounting.

Administrative services and business education, with majors in business education, executive secretarial administration, and organizational administration with an information processing option.

Economics and finance, with a major in economics and a major in finance with an option in insurance.

Management, with majors in management with options in international management and personnel management; management science and computer systems; and organizational administration with an option in public administration.

Marketing, with a major in marketing, and a major in organizational administration with a business administration option, jointly administered by the Department of Administrative Services and Business Education and the Department of Management.

A two-year certificate program, with a stenographic or a clerical procedures option, is available in the Department of Administrative Services and Business Education.

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, business education, business education for industry or economics. For further information see the *Graduate Catalog.*

Doctor of Education Degree. The Doctor of Education degree with a major in business education is offered through the Department of Administrative Services and Business Education. For further information see the *Graduate Catalog.*

Doctor of Philosophy Degree. Graduate work toward the Doctor of Philosophy degree with a major in economics is offered in the Department of Economics and Finance. Graduate work toward the Doctor of Philosophy degree with a major in business administration is also offered in the Departments of Accounting, Economics and Finance, Management, and Marketing. For further information see the *Graduate Catalog.*

Placement Service. Representatives of more than 125 business and industrial concerns and governmental agencies annually interview graduating seniors of the College of Business Administration. A unique function of the **CBA's** placement service is the preparation of a book of personal data sheets of graduating seniors which is provided to prospective employing organizations throughout the country.

Student Advisement and Enrollment Procedure. Freshmen will plan their study in conference with a staff adviser in the Dean's office.

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 Student Services, are available to all students for counseling on special problems.

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 55-59 semester credit hours are required. The student also may select a minimum of one to five 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.

During the freshman and sophomore years the student will complete courses in each of the following areas:

Behavioral and social sciences: American history, 3 semester credit hours; American government, 3 hours; and 6 hours elected from at least two of the following fields: anthropology, geography (except physical geography courses), history, political science, psychology and sociology.

Communications: English composition, 6 semester credit hours, and introduction to public speaking, 3 hours.

Humanities and fine arts: 6 semester credit hours elected from at least two of the following fields (nor more than two courses per field): art, humanities, literature, music, philosophy, religion and theatre. One course should include an international dimension.

Natural science and mathematics: To meet the varying needs of specific majors for mathematical training, three options of study have been developed:

(1) *General option:* 6 hours mathematics (college algebra and elementary calculus) and 3-4 hours natural science.

(2) *Science* ***option:*** 3 hours mathematics (college algebra) and 7-8 hours natural science. (Natural science includes: biological science, chemistry, geology, microbiology, astronomy, physical geography, physics, and zoology.)

Either of the two options in natural science and mathematics may be elected by students majoring in organizational administration (information processing option), economics, and executive secretarial administration; only option 1 by accounting, organizational administration (business administration option and public administration option), finance, management, and marketing majors; and only option 2 by business education majors.

Business foundation courses: accounting, 6 semester credit hours; computer science, 3 hours; economics, 6 hours; and statistics, 3 hours.

General electives: In addition, the student may elect courses from any area except lower-division aerospace studies and military science and HPELS

activity courses to complete the 60 hours of lower-division requirements. (Business education and distributive education majors must take an additional two hours from any HPEL activity or aerospace studies and military science courses.)

Generally, credits earned during the freshman and sophomore years in another institution may not be substituted for junior and senior course requirements in the majors in the College of Business Administration.

Accounting

PROFESSOR AND HEAD
Wilton T. Anderson, Ed.D., CPA

REGENTS PROFESSOR
Milton F. Usry, Ph.D., CPA

PROFESSORS
James R. Boatsmen, Ph.D., CPA
Lanny G. Chasteen, Ph.D., CPA
Michael F. Foran, Ph.D., CPA
William M. Ulrich, M.S., CPA (visiting)

ASSOCIATE PROFESSORS
Dale E. Armstrong, Ph.D., CPA
Patrick B. Dorr, Ph.D., CPA
C. Dwayne Dowell, Ph.D., CPA
Lawrence H. Hammer, D.B.A., CPA
Don R. Hansen, Ph.D.
William S. Houston, Ph.D., CPA

ASSISTANT **PROFESSORS**
Janet I. Kimbrell, Ph.D., CPA
Gary K. Meek, Ph.D., CPA
Maryanne M. Mowen, Ph.D.
Charles R. Ransom, Ph.D., CPA
Kevin D. Stocks, Ph.D., CPA
James G. Swearingen, Ph.D., CPA
John H. Wilguess, Ph.D., C.P.A.

The School of Accounting offers three degree programs in accounting: (1) B.S. in Business Administration with a concentration in accounting, (2) M.S. in acconting, and (3) Ph.D. in business administration with accounting as the major field.

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 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 to mankind.

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 write 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.

The objective of the Ph.D. in accounting is to prepare graduates for careers in university teaching and/or accounting research. Specialization in an accounting area is available. Through the selection of minor fields a candidate's program can be developed to suit his or her particular interests.

Administrative Services and Business Education

PROFESSOR AND HEAD
Dennis L. Mott, Ed.D.

REGENTS SERVICE PROFESSOR
Lloyd L. Garrison, Ed.D.

PROFESSORS
John T. **Bale,** Jr., Ed.D.
Herbert M. Jelley, Ed.D.
Glenn E. Laughlin, S.J.D.
Phillip V. Lewis, Ed.D.
Clayton B. Millington, Ph.D.
Arnola C. Ownby, Ed.D.

ASSOCIATE PROFESSORS
Hal W. Ellis, J.D.
Joe W. Fowler, J.D.
Jimmy G. Koeninger, Ph.D.
G. Daryl Nord, Ph.D.

ASSISTANT PROFESSORS
Richard A. Aukerman, Ph.D.
Marvin E. Barth, Ph.D.
E. Moses Frye, J.D.
James F. Jackman, J.D.
Dennis I. Knox, M.S.
Jeanine N. Rhea, Ed.D.
Walter L. Starks, Ed.D.

INSTRUCTOR
Janice B. London, M.S.

The Department offers a number of related but somewhat diverse major fields of study; namely, organizational administration, executive secretarial administration and business teacher education.

A business administration, public administration or information processing option is available in the organizational administration major. Teacher

education programs are provided for those planning to teach in the various business education areas, either in federally reimbursed or non-federally reimbursed programs. Two-year certificate programs are also available in the office administration area, with either stenographic or clerical procedures emphasis. The certificate programs are in addition to the four-year executive secretarial administration major.

All the major programs include general education or foundation course work in behavioral and social sciences, communications, humanities and fine arts, natural science and mathematics, as well as business foundation courses in accounting, computer science or data processing, economics, law, finance, statistics, management and marketing.

Organizational Administration

The organizational administration major provides options in three areas, business administration, public administration and information processing. The business administration option is jointly administered by this Department and the Department of Management, which also administers the public administration option. The business administration option gives students a broad, comprehensive type of business education preparing them to enter employment in a wide range of administrative positions, usually in business or government. The scope of their educational experiences enables these graduates to assume management operations positions in a small business or to join the staff of a large corporation.

The area of concentration in the business administration option, which provides for a high degree of student choice, includes course work beyond the business core in the areas of economics, accounting, marketing, finance, management, communications, and data processing or administrative systems, plus other business and business-related courses selected by the student in consultation with a major adviser.

The public administration option is similar in design; however, the emphasis is upon work leading toward positions in the public sector of our economy. A more complete description of this program is provided in the Department of Management section in this *Catalog.*

The information processing option provides students with the opportunity to take course work in business data processing concepts, computer programming for business, management problems in information processing systems, data communication systems, management information systems, auditing, financial accounting, accounting information systems and communications. The field of information processing is dynamic and growing with many new employment opportunities being created constantly in both business and government.

Executive Secretarial Administration

Graduates of the executive secretarial administration program are prepared to assume major administrative and supervisory duties in the office and function as a part of the executive/administrative team. These employees may aspire to such positions as executive secretary, office supervisor, administrative services manager and information systems analyst.

The major concentration for executive secretarial administration students includes study in written communications, records management , administrative systems, secretarial procedures, office appliances, office problems in typewriting, principles of office management, personnel management and advanced dictation-transcription.

Certificate Programs. Recipients of the stenographic or clerical procedures certificate are qualified for responsible stenographic or clerical positions. Employment opportunities in a variety of jobs in business offices and Civil Service have been excellent and future opportunities appear ever brighter.

In the certificate programs, about half of the course work is in general basic areas of study with the remainder in specialized courses. The emphasis in the stenographic option is on shorthand and transcription, while in the clerical procedures option, emphasis is placed on accounting and data processing.

Business Education

Few careers offer as much excitement and challenge as does teaching. Secondary schools, area vocational-technical schools and junior colleges provide most of the employment opportunities for teacher education graduates. Employment with business or government organizations in an educational capacity is also a popular employment opportunity.

Two types of standard teaching certificate or licensure programs are offered in the business areas. One program qualifies a person to teach the usual range of business subjects, e.g., bookkeeping-accounting, business law, economics, management, typewriting, business organization, office machines, and shorthand and transcription. The other plan qualifies a person to teach the subjects mentioned above with the exception of shorthand and transcription (and may include preparation for teaching courses in data processing).

Graduate Study

For those students who wish to undertake advanced study, the Department offers work leading to the Master of Science degree and the Doctor of Education degree. The Master of Science degree may be earned with a major in business education. Options are available in the business education program to provide for an emphasis in economic education and training and develop-

ment for business. The latter option is designed for students interested in preparing for positions supervising or directing training and educational services in business and industry.

The Doctor of Education degree may be earned in business education, where emphasis may be given to economic education. The Department also offers the special graduate work necessary for certification in vocational business and office education in accordance with provisions of the Vocational Education Act of 1963, as amended, 1976.

Economics and Finance

PROFESSOR AND HEAD
Gerald M. Lage, Ph.D.

REGENTS PROFESSOR
Richard H. Leftwich, Ph.D.

PROFESSORS
Winfield P. Betty, Ph.D.
Richard D. Gustely, Ph.D.
Joseph M. Jadlow, Jr., Ph.D.
Dale K. Osborne, Ph.D.
Richard W. Poole, Ph.D.
Robert L. Sandmeyer, Ph.D.
Ansel M. Sharp, Ph.D.
John C. Shearer, Ph.D.
Frank G. Steindl, Ph.D.
Larkin B. Warner, Ph.D.

ASSOCIATE PROFESSORS
Michael J. Applegate, Ph.D.
Michael R. Edgmand, Ph.D.
James F. Jackson, Jr., Ph.D.
Pauline W. Kopecky, Ph.D.
Ronald L. Moomaw, Ph.D.
Kent W. Olson, Ph.D.
John D. Rea, Ph.D.
W. Gary Simpson, Ph.D.

ASSISTANT PROFESSORS
Orley M. Amos, Jr., Ph.D.
Harry A. Comesky, Ph.D.
Robert C. DauffenBach, Ph.D.
Edward O. Price, III, Ph.D.
Joseph Shaanan, 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 of 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 in students of the economic aspects of man's activities, coupled with thorough training in the fundamental tools ofeconomic 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. It provides an excellent background for the study of law. It qualifies competent students to undertake the graduate work necessary for professional positions in economic research and college or university teaching.

OSU offers a balanced program of graduate as well as undergraduate training in economics, leading to both Master of Science and Doctor of Philosophy degrees. Although all students at the graduate level are expected to become proficient in a common core of analysis, ample opportunities exist for specialization in such fields as monetary economics, public finance, international economics, economic development, urban and regional economics, econometrics, labor and manpower economics, and industrial organization.

Finance

The major in finance is intended to prepare students for positions with organizations which require a special understanding offinancial problems and financial systems. Students who major in finance are employed by financial institutions such as banks; the finance, accounting, or systems departments of business corporations; and other organizations which have need of financial expertise. An option in insurance is offered for those who wish to have a concentration in that field. Examples of topics covered in the finance program include financial management, program budgeting and planning models, cost-benefit analysis, investment theory, securities markets and financial institutions.

Management

PROFESSOR AND HEAD
Wayne A. Meinhart, Ph.D.

PROFESSOR
Mitchell O. Locks, Ph.D.

ASSOCIATE PROFESSORS
Walter Balke, Ph.D.
H. Kirk Downey, Ph.D.
Charles R. Greer, Ph.D.
Michael A. Hitt, Ph.D.
R. Dennis Middlemist, Ph.D.
Billy M. Thornton, Ph.D.
J. Scott Turner, Ph.D.

ASSISTANT PROFESSORS
Steven H. Barr, Ph.D.
Jack Fiorito, Ph.D.
Marci Fusilier, Ph.D.
R. Duane Ireland, D.B.A.
Ramesh Sharda, Ph.D.
W. Palmer Sineath, Ph.D.
Jack Sullivan, Ph.D.

The majority of accomplishments in contemporary society are created through the modern organization. Whether our goals are to realize success in business or solve the pressing problems of our civilization, we must effectively manage organizational systems 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 creating 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, computing and information sciences, 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.

Organizational Administration

The major in organizational administration is designed to give a broad, comprehensive study of relevant topics rather than a more specialized education. Students who prefer flexibility and a broad scope to the study of business administration will find this an ideal program. In addition, it is increasingly apparent that the theory and tools of analysis applicable to business administration are found valuable in nonprofit organizations. Therefore, there is an option in business administration (jointly administered by this Department and the Department of Administrative Services and Business Education) and an option in public administration. Each program has been designed to involve the student in the problems of business or public administrators and to provide the background relevant to the solution of these problems. There is

also an information processing option that is described in the Department of Administrative Services and Business Education section of this *Catalog.*

Management

The major in management is designed to prepare students for leadership careers with business or nonprofit organizations as managers. It emphasizes the study of management systems and problems. Students with interests in international management may elect a special option under the management major. 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.

Personnel Management

The option in personnel management is designed to prepare students for careers in personnel. Anything that concerns the work force ofan organization is the concern of the personnel manager. This includes forecasting the demand for personnel, attracting potential employees, orienting them and then developing the careers of those employed. For those who enjoy working with people, a career in personnel management offers many opportunities and the chance for personal growth and development.

Management Science and Computer Systems

The major in management science and computer systems is designed to prepare students for careers as staff specialists or managers in complex businesses or nonprofit organizations. 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 in Business Administration

For those students who wish to prepare themselves better for professional positions, the Departments of Management, Marketing and Economics and Finance offer advanced work leading to the degrees of Master of Business

Administration (M.B.A.) and Doctor of Philosophy in business administration, with majors in finance, management, management science or marketing.

Marketing

PROFESSOR AND HEAD
Stephen J. Miller, Ph.D.

PROFESSORS
B. Curtis Hamm, Ph.D.
William **G.** Zikmund, D.B.A.

ASSOCIATE PROFESSORS
James W. Gentry, Ph.D.
William M. Kincaid, Ph.D.
L. Lee Manzer, Ph.D.

ASSISTANT PROFESSORS
Raymond P. Fisk, Ph.D.
William E. Kilbourne, Ph.D.
John C. Mowen, Ph.D.
Gerrit P. Van Neder-pelt, Ph.D.
Clifford E. Young, 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 and other such fields to support a particular career choice within the marketing field.

Graduate Programs in Business Administration

For those students who wish to prepare themselves better for professional positions, the Departments of Management, Marketing and Economics and Finance offer advanced work leading to the degrees of Master of Business Administration (M.B.A.) and Doctor of Philosophy in business administration, with majors in finance, management, management science or marketing.

College of Education

Donald W. Robinson, Ph.D., *Dean and Director of Teacher Education*

Rolland A. Bowers, Ed.D., Associate *Dean*

Kenneth L. King, Ed.D., Associate *Director of* Teacher *Education*

Randall Koetting, Ph.D., *Coordinator of Clinical Experiences*

Thomas J. Smith, Ed.D., *Director of Education Extension*

Kenneth H. McKinley, Ph.D., *Director of Education Research and Projects* and Associate *Director of Education Extension*

Frank E. McFarland, Ed.D., *Director of Student Services*

Heads of Departments and Director of School

Applied Behavioral Studies, *Billy F. Elsom, Ed.D.*

Curriculum and Instruction, *Douglas B. Aichele, Ed.D.*

Educational Administration and Higher Education, *Thomas A. Karman, Ph.D.*

Psychology, James L. *Phillips, Ph.D.*

SCHOOL OF OCCUPATIONAL AND ADULT EDUCATION, *Cecil W. Dugger, Ed.D., Acting Director*

Aviation Education, *Bruce D. Hoover, M.S.*

System Design and Computer Services, H. Gene *Smith, Ed.D.*

The College of Education administratively houses the Departments of Applied Behavioral. Studies, Curriculum and Instruction, Educational Administration and Higher Education, psychology, and the School of Occupational and Adult Education.

The College of Education 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 learning. There are a variety of degrees withinthe College at the bachelor's, master's, specialist and doctoral levels (see the *Degrees Offered* section of this Catalog).

The College also provides academic preparation for a wide range of specialties, as listed below:

I. Professional School Service Personnel

Administrator (school superintendent)
Administrator (secondary school principal)
Administrator (elementary school principal)
Administrator (occupational and vocational education)
Audiovisual specialist
Librarian (public school)
School counselor
School psychologist
School psychometrist

II. Instruction

Secondary School *Certificate (7-12)*
Driver and safety education
Foreign language
Industrial arts
Language arts
Mathematics
Science
Social studies
Journalism
Speech
Trade and industrial education

Elementary ***School*** *Certificate (K-8)*
Elementary education

Elementary secondary School Certificate (K-12)
Art
Physical Education

Reading Specialist
Special Education (mental retardation, physical handicaps, learning disability)

III. Other Specialties - *Noncertification Areas*

College teaching
Community education coordinator-educational research and evaluation
Higher education administration (junior college, 4-year college, university)
Supervisor/curriculum coordinator
General clinical psychology
Child clinical psychology
Experimental psychology
Social psychology
Mental health specialist
Vocational rehabilitation counselor education
Adult continuing education
Curriculum and teaching
Human resources development
Occupational education administration
Occupational education research
Technical education

There are increasing opportunities in business, industry and in state and federal agencies for persons with unique preparation in the several education specialties who do not desire to teach in the schools. Programs which do not lead to teacher licensure certification for students interested in these types of careers are available under certain of the authorized degree programs of the College or are individually developed with the approval of the dean under the Bachelor of University Studies program. Persons interested in a nonteaching major in education should contact the College of Education Director of Student Services for further information.

Students wishing to prepare for careers as teachers are advised to complete the required speech proficiency examination early in their first semester in school. Details are available through the College of Education Office of Student Services.

Applied Behavioral Studies

PROFESSOR AND HEAD
Bill F. **Elsom,** Ed.D.

PROFESSORS
Judith **E. Dobson,** Ph.D.
Ronda) Gamble, Ph.D.
John D. Hampton, Ph.D.
Frank E. McFarland, Ed.D.
James M. Seals, Ph.D.
Paul G. Warden, Ph.D.

ASSOCIATE PROFESSORS
John M. Dillard, Ph.D.
Joseph Pearl, Ph.D.
Barbara Peel, Ph.D.

ASSISTANT **PROFESSORS**
Kay **S.** Bull, Ph.D.
Noma Jo Campbell, Ed.D.
Alfred F. Carlozzi, Ed.D.
Charles R. Davis, Ph.D. (visiting)
Stephen E. Grissom, Ph.D.
Imogene Land, Ed.D.
Evangie McGlon, Ph.D.
John W. Otey, Ph.D.
Lorrin F. Walker, Ph.D. (visiting)

INSTRUCTORS
Karen Lamport, M.S.
Susan Richardson, M.S.

The Department of Applied Behavioral Studies in the College of Education serves the University Teacher Education program and offers degree programs for both the undergraduate and graduate levels. Areas included in this Department are special education, student personnel and counseling, educational psychology and educational research and evaluation. A primary mission of the Department is to provide practical application of behavioral studies to the human welfare level.

The academic preparation program in the special education area includes special techniques and arrangements to facilitate the education of exceptional individuals. This program offers prospective teachers a Bachelor of Science in Special Education and includes course preparation and practical experience leading to state certification. The area of emphasis at the undergraduate level is mental retardation. At the master's level, students may pursue sub-area emphases in learning disabilities, emotionally disturbed, physically handicapped, mental retardation, gifted/talented and general special education. Doctoral level emphasis in special education is available through the Ph.D. in applied behavioral studies.

The student personnel and counseling area offers a comprehensive graduate program for the preparation of counselors for all levels of education, as well as a program in student personnel administration. Counselors are specifically prepared for the elementary, the secondary or the higher education level. A master's degree may incorporate the requirements for certification as a school counselor or may stress higher education counseling or community counseling which does not lead to certification. Both the Specialist in Education degree for experienced counselors and the Doctor of Education degrees are available.

Preparation in student personnel administration may lead to a master's, education specialist or doctoral degree. The master's degree is intended for persons who wish to serve in various entry level career positions associated with student life on college campuses. The advanced graduate degree stresses the preparation of persons for student personnel administrative positions in junior colleges, colleges/universities or public school settings. The advanced degree with emphasis in student personnel administration provides the student an opportunity to complete support work in administration and/or higher education.

Specialization in counseling psychology is available at the doctoral level. The program is designed to prepare students for counseling, consulting and training roles in various settings such as university counseling centers, guidance centers and other agencies dealing with human services. Counseling psychology is an emphasis area of the Ph.D. in applied behavioral studies.

Educational psychology is a professional field of applied behavioral studies. The role of the educational psychologist is to bring together basic behavioral research to serve the practice of education. Although educational psychology is part of the science of psychology, generally an effective scientist-practitioner must draw from all behavioral studies to meet the needs of society today.

To prepare individuals for this role, several programs are available at the master's and doctoral levels. The master's program in school psychometry may include state certification requirements. The school psychologist program requires an additional thirty hours beyond the master's degree. State certification is available through the school psychologist program. The general educational psychology master's degree is designed to assist individuals to apply behavioral science principles in the practice of education. Educational psychology, as an area of emphasis in the Ph.D. in applied behavioral studies, has several sub-area specializations. Doctoral students may specialize in instructional learning systems, school psychology or research and measurement. Areas of emphasis in special education and counseling psychology are also available through the Ph.D. in applied behavioral studies.

Curriculum and Instruction

PROFESSOR AND HEAD
Douglas B. Aichele, Ed.D.

PROFESSORS
Bernard R. Belden, Ph.D.
Russell L. Dobson, Ed.D.
Thomas D. Johnsten, Ed.D.
Kenneth L. King, Ed.D.
Terence J. Mills, Ed.D.
Leon L. Munson, Ed.D.
Gene L. Post, Ed.D.
Darrel D. Ray, **Ed.D.**
Roscoe Rouse, Ph.D.
William E. Segall, Ed.D.
Daniel Selakovich, Ed.D.
Vernon E. Troxel, Ed.D.
Kenneth E. Wiggins, Ed.D.

ASSOCIATE PROFESSORS
Carolyn Bauer-Croft, Ed.D.
Kathryn S. Castle, Ed.D.
Anne K. Hoyt, M.S.L.S.
Fred L. Kolch, M.A.
Elizabeth M. McCorkle, Ed.D.
Audrey E. Oaks, Ed.D.
Milton D. Rhoads, Ed.D.
Charles L. Smith, Ed.D.

ASSISTANT **PROFESSORS**
Isabel K. Baker, Ed.D. (visiting)
Cida **S. Chase,** Ph.D.
Helen N. Cheek, Ed.D.
J. Randall Koetting, Ph.D. (visiting)
Steven K. Marks, Ed.D. (visiting)
Sharon P. Muir, Ph.D.
Bruce A. Petty, Ph.D.
Mel **G.** Wright, Ed.D.
David Yellin, Ph.D.

INSTRUCTOR
Danny J. Ballard, M.S.

The Department of Curriculum and Instruction offers bachelor's, master's, specialist 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 concentration include preparation of elementary and secondary teachers, reading specialists, library science/media specialists, and teachers and supervisors/curriculum coordinators in elementary education and secondary education for the college and university levels and for state departments of education. All Departmental programs are fully accredited by the National Council for Accreditation of Teacher Education (NCATE). Undergraduate and all certificate students must satisfy all admission and retention requirements in Teacher Education for satisfactory completion of any program.

Completion of the Bachelor of Science degree in Elementary Education qualifies the student for standard elementary Oklahoma certification or licensure (K-8). This program of study includes course work in general education, in a field ofspecialization course work and in professional education motivated by substantial field-based practicum experiences.

The Bachelor of Science degree in Secondary Education is available in the following discipline areas: foreign language, journalism, language arts, mathematics, science, social studies and speech. Completion of this program emphasizing one of these areas qualifies the student for standard secondary (7-12) Oklahoma certification or licensure. Students emphasizing art, health

and physical education, or library science receive a degree in secondary education as well as qualify for elementary/secondary (K-12) Oklahoma certification or licensure. Each of these secondary degree programs includes general education courses, extensive specialization course work in the discipline area and professional education courses motivated by substantial field-based practicum experiences.

Programs leading to Oklahoma certification as a reading specialist, an audiovisual specialist and a driver and safety education teacher are also available through the Department.

In addition to these degree/certification offerings, the Department sponsors the Reading and Mathematics Learning Clinic jointly with the College of Education Extension Office. This clinic provides a valuable service to the community as well as opportunities for research and practicum experiences for graduate students and faculty.

The graduate degree programs offered through the Department are the Master of Science, Specialist in Education and Doctor of Education. The degree programs are designed to prepare persons in elementary or secondary education and to enter public or private elementary and secondary schools as curriculum directors, department heads, directors of learning resource centers, 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/or researchers in the discipline-related areas of education.

Library Science. Undergraduate and graduate degree programs emphasizing library science are offered by the Department of Curriculum and Instruction. Library science instruction is provided in a number of areas:

(1) A major or a minor is offered students who wish to qualify for the standard school librarian's certificate (library media specialist) upon graduation with a bachelor's or master's degree, or to have librarianship as a second field.

(2) A year-round program of library science courses is provided for in-service teacher-librarians seeking to meet their schools' state and regional requirements of approval and accreditation in library media.

(3) Appropriate service courses are offered in cooperation with the programs in elementary and secondary teacher education, and in support of the University's general education programs.

(4) Advisement in planning an undergraduate program, including library science courses, leading to graduate library school and/or graduate educational media study is given to students interested in a career in librarianship for work in academic, special, public or school libraries.

(5) Some courses which are designed to deepen understanding of libraries' learning resources centers and to develop skills in the proper use of

these facilities may be selected by both undergraduate and graduate students not pursuing a school librarian certificate program.

Educational Administration and Higher Education

PROFESSOR AND HEAD
Thomas A. Karman, Ph.D.

UNIVERSITY PROFESSOR AND PAST PRESIDENT
Robert B. Kamm, Ph.D.

PROFESSORS
Ronald S. Beer, Ph.D.
Rolland A. Bowers, Ed.D.
Donald W. Robinson, Ph.D.
Thomas J. Smith, Ed.D.
Kenneth St. Clair, Ed.D.

ASSOCIATE PROFESSORS
William B. Adrian, Jr., Ph.D.
Carl R. Anderson, Ed.D.
Wilbur D. Johnson, Ed.D.
Kenneth H. McKinley, Ph.D.

ASSISTANT PROFESSORS
Patrick B. Forsyth, Ed.D.
E. Moses Frye, J.D.
Waynne B. James, Ph.D.
S. Kenneth Stern, Ed.D.
Jacob D. Zucker, Ph.D.

The Department of Educational Administration and Higher education (EAHED) at Oklahoma State University offers graduate programs in educational administration, in college teaching at either two- or four-year institutions, and in administration in higher education, including two-year colleges, four-year colleges and universities. In addition, certificate programs are offered for principals of elementary and secondary schools and for superintendents of public schools; training programs are also offered 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; (3) extensive consideration of administrative functions and problems unique to particular educational levels; and (4) the preparation of leaders who can establish, develop, and maintain programs of community education. Degree programs

are available at the master's, the educational specialist, and the doctoral 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 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 construction; and (4) the principles and procedures underlying effective college and university instruction.

Since doctoral dissertations vary in nature to reflect the unique patterns of interests, qualifications and career goals of the candidates, such undertakings may create new knowledge or apply existing knowledge to the improvement of instruction or administrative practice. The subject matter of the dissertation may be related either to an academic discipline or to professional education.

While certificate programs for public school personnel do not necessarily culminate in a degree, candidates are encouraged to apply for degree programs early in their certificate program. All certificate programs meet or exceed minimum state requirements.

Psychology

PROFESSOR AND HEAD
James L. Phillips, Ph.D.

PROFESSORS
Larry T. Brown, Ph.D.
H. Stephen Caldwell, Ph.D.
Donald K. Fromme, Ph.D.
Arthur E. Harriman, Ph.D.
William E. Jaynes, Ph.D.
Julia McHale, Ph.D.
Clayton A. Morgan, Ed.D.
William W. Rambo, Ph.D.
Donald W. Robinson, Ph.D.
Kenneth D. Sandvold, Ph.D.
Robert F. Stanners, Ph.D.
Robert J. Weber, Ph.D.

ASSOCIATE PROFESSORS
Vickie Green, Ph.D.
Bob Helm, Ph.D.
Larry Hochhaus, Ph.D.
Mark K. MacNeil, Ph.D.
Phillip J. Murphy, Ph.D.
Robert S. Schlottmann, Ph.D.
Bill C. Scott, Ph.D.

ASSISTANT PROFESSORS
Frances L. Everett, Ph.D.
James Price, Ph.D.
Brent H. Snow, Ph.D.

ADVISER
Iris Eby, M.S.

Undergraduate study in psychology provides a background which may be of value to students as far as personal, social and vocational problems are concerned. Many students are better able to understand and deal with their own responses and those of others as a result of such training. Moreover, the course of study involves some of the major social problems of our time and suggests some ways of coping with these problems. Students are also given information which will be helpful in securing and holding a position or which may lead to graduate education.

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 Associate Director of Teacher Education.

Employment in the professional field of psychology almost always requires a graduate degree. Psychologists with advanced degrees have relatively exclusive claim to some semiprofessional and professional positions. The Department offers entry to those positions through the M.S. and Ph.D. degrees. Faculty interests and typical programs ofgraduate study lie primarily in the areas of experimental, social and clinical psychology. However, offerings in other departments can be used to develop graduate programs in human factors, biological pyschology, organizational psychology, community psychology, developmental psychology, and quantitative psychology. Moreover, applied M.S. programs are available in mental health and vocational rehabilitation counseling.

The School of Occupational and Adult Education

Aviation Education, Distributive Education, Industrial Arts Education, Trade and Industrial Education, Technical and Adult Education.

Cecil W. Dugger, Ed.D., ***Acting Director***
Bruce D. Hoover, B.S., ***Manager, Aviation Education***
J. B. Morton, Ed.D., ***Manager,*** **Occupational** ***Information*** **Services**
H. Gene Smith, Ed.D., ***Manager, Systems Design and Computer*** **Services**

PROFESSOR
Lloyd L. Wiggins, Ed.D.

ASSOCIATE PROFESSORS
John L. Baird, Ed.D.
Cecil W. Dogger, Ed.D.
Clyde B. Knight, Ed.D.
J. B. Morton, Ed.D.
Harold J. Polk, Ed.D.
John B. Tate, Ed.D.
Richard Tinnell, Ed.D.

ASSISTANT PROFESSORS
Jerry G. Davis, Ph.D.
Waynne B. James, Ph.D.
H. Gene Smith, Ed.D.
Martin Strand, Ed.D.
Linda Vincent, Ed.D.

INSTRUCTORS
Roger Gingerich
Mickey Glaunert
Bruce Hoover, M.S.
John Malcoyannis
Mike E. McGuffey, B.S.
William Thomas, B.A.
Jim Vandergrift, B.S.

The School of Occupational and Adult Education consists of an array of programs for the preparation and professional development of educational personnel. Program clientele include personnel, in or preparing for, positions in the common schools and higher education as well as those in business and industry who are responsible for human resources development. The School is an integral part of the University's College of Education and, in cooperation with other units within the College and the University, maintains a viable on-campus resident program of instruction and research, an extensive service and extension effort and a widely recognized international assistance program.

The mission of the School of Occupational and Adult Education is: (1) to prepare individuals for careers as instructional, administrative and support personnel in the broad field of occupational and adult education; (2) to conduct research and disseminate research findings to appropriate personnel and groups; and (3) to provide services to the educational community.

To support such a mission, the School of Occupational and Adult Education must be, and is, a many-faceted organization. It includes the teacher education programs of distributive education, industrial arts education, trade

and industrial education, and technical education, each of which offers a bachelor's and master's degree. The School also includes the service unit of aviation education, and the Occupational Information Services Unit and Systems Design and Computer Services Unit. The latter two units provide instructional and professional services for both students and faculty in the School and the College and for the vocational education community throughout the state.

Aviation education serves students and faculty throughout the University by providing elective aviation courses and training leading to various types of pilot certification. The program prepares individuals to qualify as private pilots, aerobatic pilots, commercial pilots and flight instructors, and also provides training for the instrument rating as well as refresher training for licensed pilots.

Distributive education majors enjoy the best of two worlds-education and business. Upon graduation from college, the student will have two options available. The graduate may select the option to teach in a distributive education at the high school or junior college level. The graduate may decide to enter the business world as a management trainee, a buyer, a department manager, a broker, or in a host of other occupations found in retailing, wholesaling or service-selling business enterprises. The demand for qualified distributive education teachers across the country far exceeds the supply. The recent emphasis on career education has dramatized the need for vocational educators in all fields.

Industrial arts education majors prepare for approved certificate for licensure programs in career exploration and orientation as well as for teaching avocational crafts in junior and senior high schools. Trade and industrial education majors prepare for vocational education certification programs in specialized fields, primarily at the secondary school level. Technical education majors prepare for post-high school instructional programs, for employment at the technician/middle-manpower levels in industry, and for employee training and development programs in complex organizations.

The School also offers comprehensive programs leading to the master's, educational specialist and doctoral degrees in industrial arts education and occupational and adult education. These programs provide areas of concentration in occupational education administration, adult and continuing education, curriculum and teaching, occupational education research and human resources development. Several graduate-level courses are offered each semester in support of these programs.

Aviation Education. The aviation education program offers both flight instruction courses and aviation theory courses with academic credit. The Department is administered in the College of Education; however, it serves students. from all colleges of the University in meeting their flight training needs.

The program consists of basic and advanced aviation theory courses and flight training which prepare individuals to qualify for certificates as private pilots, commercial pilots, flight instructors and/or instrument flight instructors, as well as for instrument ratings. The courses in aviation theory are conducted on the campus; the laboratory portion of flight instruction is conducted at Stillwater Municipal Airport. The flight program is approved by the Federal Aviation Administration.

Training and experience in aviation can be valuable in many ways. The prospective teacher can utilize the training as a background for teaching aviation and aerospace education in elementary or secondary schools. The student majoring in business or engineering can enhance his or her employment opportunities in many areas of the aviation industry. Individuals majoring in agriculture will find the training very beneficial because of extensive use of aircraft in many phases of the agricultural industry.

The private pilot can utilize the airplane for business and/or pleasure. In jobs where executive travel is required, the ability to pilot an airplane can definitely increase one's potential. The commercial pilot can choose a career in various kinds of challenging and rewarding piloting jobs which include:

(1) The flight instructor who teaches students in all phases offlight training;

(2) The corporate pilot who flies aircraft owned by business and industrial firms, transporting company executives on cross-country flights to branch plants and business conferences;

(3) The air taxi or charter pilot who flies fare-paying passengers "anywhere, any time" but usually for short trips over varying routes in single-engine and light twin-engine airplanes;

(4) The agricultural pilot who flies specially designed aircraft to dust or spray herbicides, insecticides and fertilizers on crops, orchards, fields and swamps;

(5) The airline pilot who flies large aircraft for scheduled and non-scheduled airlines.

The program cooperates with other departments on campus in offering courses applicable to the Bachelor of University Studies program for students planning a career in the aviation industry.

Distributive Education. The degree program at Oklahoma State University includes 60 credit hours of lower-division and general education requirements. A distributive education major also will take 12 hours of core requirements in business administration, including a course in marketing, management, business law and business finance. An additional 21 hours of specialization includes such courses as promotional strategy, consumer and market behavior, administrative communication, marketing research, advertising copy and layout, and merchandise display essentials. Thus, a distributive education

major will enroll in 33 credit hours of marketing and related courses. In addition, the distributive education student will take professional education courses such as principles and philosophy of distributive education, methods of teaching distributive education, student teaching in distributive education, psychology of adolescence, and economic and general business education.

The student majoring in distributive education may receive a standard teaching certificate or licensure upon completion of his or her bachelor's degree program.

The demand for qualified vocational distributive education teachers across the country exceed the supply. Distributive educators earn above-average salaries because of the nature of the training program and the emphasis being placed in society on the importance of vocational preparation. The recent emphasis on career education has indeed dramatized the need for vocational educators in all fields.

Emphasis upon vocational training in the field of marketing has received greater emphasis in recent years because of the importance of the marketing function to the economic growth of our country. If the marketing function fails to achieve maximum efficiency, our nation will fall short of reaching full economic potential.

Industrial Arts Education. Teaching in the industrial arts is a fascinating career which permits one to help others to prepare for living in today's technological society. It is currently one of the areas that is experiencing a severe shortage of certified teachers in public schools. Industrial arts education teachers are concerned with providing exploratory experiences related to many different industrial occupations which assist the secondary student to make tentative occupational choices and/or develop satisfactory•avocational interests and skills.

The industrial arts education curriculum is designed to prepare teachers for industrial arts classes in the public schools, grades 7-12. It offers courses leading to the bachelor's and master's degrees in industrial arts education culminating in a certificate or licensure to teach in the secondary schools of Oklahoma. The program also meets the certification requirements of many other states.

The program is divided into general education, professional education and specialized industrial arts education. Specialized education is designed to develop teaching competency for middle-school and high school exploratory programs in each of the three areas listed below, plus additional specialization in at least one of the areas. The areas include:

(1) ***Industrial communication:*** **drafting,** photography, graphics or printing and technical writing.
(2) *Materials and processes:* wood, metal and plastics technologies.
(3) *Power and energy:* electricity/electronics, internal combustion engines and other forms of power generation and transmission.

In developing technical competencies for an area of additional specialization or supporting areas, the student may select from courses taught in engineering technology.

The Bachelor of Science degree in Industrial Arts Education requires completion of 126 semester credit hours.

Trade and Industrial Education. The trade and industrial curriculum is designed to prepare teachers, supervisors and coordinators for vocational trade and industrial education classes. Programs leading to the bachelor's and master's degrees are offered for those who wish to qualify for teaching under the approved state plan for vocational education.

The bachelor's degree program in trade and industrial education has the following requirements: 50 semester credit hours of general education; 26 hours of professional education; 50 hours of an area of specialization (teaching field). The total minimum semester hours for graduation is 126.

Freshman and sophomore course work normally involves the general education area, while junior and senior course work usually is selected from the professional education area and from the area of specialization.

General education courses are taken from the following subject areas: communication (both oral and written); social sciences; natural sciences (both biological and physical); humanities and/or art, drama, literature, music and religion; psychology; physical education, and mathematics and/or foreign languages and/or practical arts.

The student's area of specialization is selected from the industrial fields of air-conditioning, heating and refrigeration, auto mechanics, bricklaying, cabinetmaking, carpentry, commercial art, cosmetology, diesel engines, drafting, electricity, electronics, machine shop, printing and other industrial fields. The specific field is determined by the trade proficiency and teaching aspirations of the student. Since trade competency normally is required for admittance to the program, students are accepted into this field of study only by consent of the program faculty. The required trade competency may be acquired by completing a vocational trade program in an approved high school or junior college, or by apprenticeship training, by actual experience in the field of specialization or a combination of these.

Students completing the degree program will be qualified to teach in the vocational department of high schools and area vocational schools, or to be employed in industry.

Technical and Adult Education. The technical education curriculum is designed to prepare instructional personnel for technical programs of community junior colleges, technical institutes and industry. Graduates from this program also accept technical employment of various types in business, industry and government.

The Bachelor of Science degree in Technical Education is designed primarily for graduates of technical programs in technical institutes and community junior colleges. Qualified students from preprofessional programs also are accepted into the program with advanced standing. In addition, students desiring to prepare for careers in this field may enter the program directly from high school and complete their technical specialization at OSU.

Each undergraduate is assigned a faculty adviser who assists in planning a program of study which requires 126 semester credit hours. The degree plan normally will include 36 credit hours of technical specialty courses, 12 hours of advanced technical courses, 23 hours of professional education, 50 hours of general education, and 5 hours of upper-division electives.

The program offers advanced work leading to the Master of Science degree in technical education and coordinates with other departments in planning study programs leading to the Doctor of Education degree.

Undergraduate students desiring to prepare to teach occupational adult education can develop an area of emphasis through the various degree programs offered within the School of Occupational and Adult Education. Graduate programs leading to a master's degree, educational specialist degree or Doctor of Education degree in occupational and adult education with specialization in adult and continuing education, occupational education administration, teacher education, curriculum and teaching or human resources development can be developed to meet the individual interests of students.

Occupational Information Services. The Occupational Information Services Unit conducts research and provides services for students and faculty within the School as well as for occupational education programs and agencies throughout the state. The Unit also assists various state agencies and other groups in manpower planning and manpower needs analysis.

Systems Design and Computer Services. The Systems Design and Computer Services Unit provides services for both students and faculty within the School as well as for occupational-vocational and adult education throughout the state. The Unit assists in the development of management information systems and in the programming ofgraduate student and faculty research data for computer analysis.

Teacher Education Programs

Donald W. Robinson, Ph.D., *Director of* ***Teacher Education and Dean of*** **the** ***College of Education***
Kenneth L. King, Ed.D., *Associate Director of* ***Teacher Education***
J. Randall Koetting, Ph.D., *Coordinator of Clinical* ***Experiences***

OFFICERS OF TEACHER EDUCATION COUNCIL

Donald W. Robinson, Ph.D., *Chairperson*
Bill F. Elsom, Ed.D., ***Vice-Chairperson***
Frances Stromberg, Ph.D., ***Vice-Chairperson Elect***
Kenneth L. King, Ed.D., Secretary

Elementary Education Faculty Group
Bernard Belden, Ph.D., ***Chairperson***

General Education Faculty Group
George Jewsbury, Ph.D., ***Chairperson***

Professional Certificate Program Faculty Group
Bruce A. Petty, Ph.D., Chairperson

Secondary Education Faculty Group
Leon Munson, Ed.D., *Chairperson*

Vocational Education Faculty Group
Linda Vincent, Ed.D., *Chairperson*

Oklahoma State University offers programs approved by the State Department of Education for the preparation of teachers and professional school service personnel. Upon completion of an approved program, and upon the recommendation of the University, the candidate will be eligible for licensure or certification to teach as an "entry-year teacher."

All candidates completing an approved program or applying for initial licensure after February 1, 1982, will be subject to all rules and regulations specified by Oklahoma House Bill 1706. Accordingly candidates will be recommended by the University for licensure. A candidate will then serve at least one and in some cases two years as an entry-year teacher under the guidance of an Entry-year Assistance Committee consisting of a teacher consultant, the building principal or vice-principal, and a higher education instructor. Upon completion of the entry-year teaching experience (180 days) the candidate *may* be recommended either for certification by the Entry-Year Assistance Committee or for an additional year of teaching under the guidance of a new Entry-year Assistance Committee. If the candidate does not complete the second year as an entry-year teacher satisfactorily, the Entry-Year Assistance Committee will recommend noncertification for the candidate.

Programs are offered at various levels, but all require the earning of at least a bachelor's degree for recommendation for standard certification. 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 a number of areas. In addition, there are programs at the

graduate level which lead to certification but which may or may not lead to graduate degrees.

General regulations for teacher certification in Oklahoma may be found in the *Teacher Education, Certification, and Assignment Handbook,* published by the State Department of Education.

In addition to state approval, programs of teacher education at Oklahoma State University have the approval of the National Council for Accreditation of Teacher Education (NCATE), the national agency responsible for accrediting high-quality programs throughout the United States. Students who complete NCATE-approved programs will find certification in other states easier to secure, and employment opportunities increased, as the result of this endorsement of teacher education programs offered at this University.

In general, undergraduate programs of teacher preparation consists of three parts: general education of approximately fifty semester credit hours; professional education, the amount of which varies with the curriculum selected, but with a minimum requirement of 26 hours; and a subject matter specialization or major of 30 to 60 hours, depending upon the field of specialization.

All teacher education programs are coordinated by the director of teacher education. Undergraduate teacher education programs are offered in the Colleges of Agriculture, Arts and Sciences, Business Administration and Home Economics, as well as in the College of Education. The student may choose the college in which the degree is to be earned; however, the student must meet the requirements of the University program of teacher education as well as the degree requirements of his or her particular college. Each undergraduate student who desires to enter a program of teacher education must make formal application to do so and must meet the admission standards specified below.

The requirements for the degree being pursued 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 (regarded as no more than two years beyond the normal four-year bachelor's degree requirements) will be held responsible only for the requirements at the time of matriculation, *plus any changes that are made, so long as these changes neither result in semester credit* ***hours*** *being added nor delay graduation.* Elective hours may need to be replaced by new program requirements.

Policies for admission to teacher education have been adopted by the University in order to ensure that Oklahoma State University students in teacher education are academically qualified. Check points during the student's progress in the curriculum have been established so that the University can be assured that students who complete a curriculum will be worthy of the University's recommendation for licensure/certification.

Criteria for Admission to Undergraduate Teacher Education Programs. The criteria for admission to undergraduate teacher education programs are based on University-wide policies recommended to the director of teachers education by the Council on Teacher Education. Requirements are applicable to all teacher certification programs of the colleges preparing teachers.

At Oklahoma State University, a student intending to become a teacher may enroll in one of the several colleges offering teacher education programs. The students is not considered a fully qualified participant in a teacher education program until he or she has been formally admitted to teacher education. The admission program involves screening rocedures designed to demonstrate that potential teachers are proficient in the oral and written use of the English language, have achieved reasonable mastery of their work in general education as determined by the Sequential Testing of Educational Progress test (STEP) battery, and have successfully completed early laboratory and clinical experiences with young learners. Furthermore, a minimum grade-point average will be required for admission to the teacher education program.

Following the completion of the *Declaration of Intent* form, provisional admission and subsequent full admission to teacher education, a student may proceed with course work in professional teacher education including the professional sequence of courses as determined on the student's approved program. Enrollment in the professional sequence requires meeting all appropriate criteria for student teaching.

Provisional Admission to Undergraduate Teacher Education. Prior to the completion of 40 credit hours, the student must complete the *Declaration of Intent for Admission to Teacher Education.* This form can be obtained in the College Offices of Student Services if the student is enrolled in the College of Arts and Sciences or the College of Education. This form is obtained in the office of the department head if the student is enrolled in the teacher education program in the College of Agriculture, the College of Business Administration or the College of Home Economics. The completion of the *Declaration of Intent* form, along with the entire STEP battery, the Speech Proficiency Examination, and the English Essay Proficiency Examination, is to be accomplished while enrolled in the appropriate entry-level course in teacher education (to be determined in each program area). This course includes essential information regarding admission and retention measures associated with the teacher education process. Successful completion of the items listed above will result in provisional admission to teacher education. Under provisional admission to teacher education, students may enroll in the *pre-professional sequence.* The pre-professional sequence consists of course work in approved programs in the following areas of professional education:

(1) Foundations of education
(2) Laboratory and clinical experiences
(3) Exceptional child
(4) Human development

The student must apply for and be granted *full* admission to teacher education prior to enrolling in course work in the *professional sequence,* which consists of:

(5) Sociological foundations
(6) Learning theory
(7) Instructional media
(8) Student teaching methods
(9) Student teaching internship

A student enrolled in any course in the professional sequence will not be allowed to continue in the course if full admission to teacher education has not been earned. Certain vocational programs may vary from this requirement owing to state guidelines. Students should apply for full admission to teacher education as soon as possible. This usually occurs at the end of the second semester of the sophomore year.

Full Admission to Undergraduate Teacher Education. The student files an application for admission to teacher education in the same way that the *Declaration of Intent for Admission to Teacher Education* was filed.

Criteria for Full Admission to Undergraduate Teacher Education. A minimum cumulative grade-point average of 2.50 is required. The total grade-point average is based on no fewer than 40 credit hours of courses, which are expected to include lower-division general education requirements as specified on the student's program.

STEP Test Battery. The student must score at the 50th percentile or above in each area in order to be judged adequate on the STEP battery:* English expression (grammar), mathematics, science and social studies. A lower percentile score will necessitate enrollment in an additional course in the subject area(s). The student must earn a grade of "C" or better in the additional course work to remove the deficiency. *The appropriate course must be determined by the adviser in conference with the student.*

*The effective date for implementation for the 50th percentile requirement on STEP results for all Teacher Education majors is January, 1982.

Overall Grade-Point Average 3.00 or Above. Students not achieving the 50th percentile or above on each area of the STEP battery may be exempt from the requirement of taking additional course work in the area of the STEP deficiency by earning a cumulative grade-point average of 3.00 or above with no grade less than "C" in each area of the STEP battery previously specified. As previously stated, proficiency in speech and in English essay must be demonstrated.

Proficiency in English essay must be demonostrated by successful completion of the English Essay Proficiency Examination administered by the Department of English once each term. If the score on the English Essay Proficiency Examination is unsatisfactory, a student may qualify by earning a grade of "B" or above in ENGL 1323, English composition (or comparable course), or by completing eight hours of English composition with an average grade of "C" or better.

Speech proficiency must be demonstrated through a test administered by personnel of the Speech and Hearing Clinic.

Transfer students who have earned at least 40 credit hours of course work from other institutions must make application for admission to teacher education as well as take the STEP test battery, Speech Proficiency Examination, and English Essay Proficiency Examination. All of these must be completed as soon as possible during the student'sfirst semester at OSU so that the student may be considered for full admission to teacher education. *All students, including transfer students, must meet the criteria for admission to teacher education established by Oklahoma State University.*

Retention in Undergraduate Teacher Education. For continued acceptability and recommendation for licensure/certification, the student, in addition to meeting *all requirements* for admission to undergraduate teacher education, must have successfully completed all pre-student teaching clinical experiences, have an overall grade-point average of at least 2.50, and have grade-point averages of at least 2.50 in professional education courses and in the area of teaching specialization *with no grade lower than "C" in either area.*

Admission to Student Teaching. *Application for student teaching* must be made during the semester *prior* to the time of student teaching. *Students must be admitted to teacher education before they are eligible for admission to student teaching.* The application forms are distributed at a meeting called by the Coordinator of Clinical Experiences and through the Office of Teacher Education. Students are notified of this meeting through consultation with advisers, through the *O'Collegian,* signs on bulletin boards across campus and in residence halls, and by announcements made in teacher education classes. Students must submit applications for student teaching to the Office of Teacher Educataion prior to specified dates in November and March. 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 Clinical Experiences has received confirmation from the cooperating schools.

Criteria for student teaching for all majors in teacher education are:

(1) An overall grade-point average of at least 2.50.

(2) A grade-point average of at lelast 2.50 in courses listed on the current approved program for licensure/certification in the areas of professional education and specialization. No grade lower than a "C" will be

accepted in either of these areas.

(3) In determining grade-point averages, only the last grade is considered **for repeated courses (exact repeats and *not* substitutions).**

Out-of-Area/Out-of-State *Placements.* Any student requesting an out-of-area/out-of-state placement 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 to be made payable to the Office of Teacher Education at least one month prior to the beginning of the semester in which the placement is sought; and

(2) If a recommendation for licensure/certification is to be made by Oklahoma State University, the student will be responsible for reimbursing OSU for at least one visitataion by an OSU supervisor in addition to the visitations performed by **the cooperating institution.**

Recommendations for licensure and certification **requires grades** of "B' or better in all sections of student teaching in order for the student to be recommended for licensure or standard certification* upon completion of the program. A grade of "C" in any section of student teaching will result in a recommendation for provisional certification upon completion of the program. A student assigned the grade of"D" or lower in any section of student teaching will not qualify for a recommendation for any level of teacher licensure or certification.

Oklahoma State University will not make a recommendation for licensure or any level of teacher certification until all criteria have been met that pertain to the approved teacher education program.

*Certification recommendations for initial entry will apply only to students completing programs before February 1, 1982. After this date, the recommendation will be for licensure as specified by state law.

Appeals procedures of decisions regarding admission/retention in teacher education are described in the guidelines of the Council on Teacher Education. Information pertaining to appeals procedures is available through the Office of Teacher Education, located in Gundersen Hall Room 101.

Admission to Graduate Teacher Education Programs. Graduate programs in teacher education are individually tailored to meet individual student needs. Admission to graduate programs of teacher education is also based upon a formal applicaton for admission and upon meeting specific criteria. Applications must be made through the departments which offer graduate certification programs in teacher education. *Admission must be secured for each degree-level program based upon criteria developed by the department offering the program, in* ***cooperation*** *with the Graduate College, and approved by the University Council on Teacher Education.*

Entry to advanced teacher education programs involves the following:

(1) Making applicaton for admission to the Graduate College.

(2) Completing an application to a graduate program in teacher education and submitting the application with other necessary forms to the head of the department in which the program is located.

(3) Satisfying the requirements for full admission to the Graduate College as established by the department, at which point the Director of Teacher Education will be informed of the student's admission to graduate-level teacher education.

Satisfy retention criteria as established by the department and approved by the Council on Teacher Education.

Tedbher Education Programs Offered at the Various Levels. Undergraduate programs are offered in the following areas: (1) general agriculture; (2) occupational agriculture; (3) vocational agriculture; (4) art education; (5) bookkeeping and clerical practice; (6) business education; (7) vocational business and office education; (8) vocational distributive education; (9) driver and safety education; (10) early childhood education; (11) elementary education; (12) foreign languages (Spanish, French, German); (13) health and physical education; (14) general home economics; (15) occupational home economics; (16) vocational home economics; (17) industrial arts education; (18) journalism education; (19) language arts education; (20) school librarian; (21) mathematics education; (22) instrumental music; (23) vocal music; (24) combined vocal/instrumental music; (25) science education; (26) social studies education; (27) special education-mentally retarded; (28) speech education; (29) trade and industrial education.

In addition, post-bachelor's certification programs for school counselors, psychometrists, reading specialists, audio-visual specialists, speech pathology, and in special education - emotionally disturbed, learning disabilities, and physically handicapped are available.

Areas of concentration in several of these fields may be included as part of a master's degree program if approved by the department head and the Dean of the Graduate College.

Master's degrees are available in virtually all of the above programs and doctorates are available in many.

Post-master's level certification programs are available in: (1) elementaray school principal; (2) school superintendent; (3) secondary school principal; (4) school psychology; and (5) professional school counselor.

Inquiries concerning any aspect of teacher education at Oklahoma State University should be addressed to the Director of Teacher Education or the head of the department offering the program.

College of Engineering,Technology and Architecture

Kenneth A. McCollom, Ph.D., P.E., *Dean*

Robert L. Swaim, Ph.D., P.E., Associate *Dean*

Bill L. Cooper, Ed. D. *Director of Extension*

Raymond E. Chapel, M.S., P.E., *Director of Research and Budget*

Larry D. Zirkle, Ph.D., P.E., *Director of Student Services*

School Heads

Agricultural Engineering, C. *Thomas* Haan, *Ph.D., P.E.*

Chemical Engineering, *Billy L. Crynes, Ph.D.*

Civil Engineering, James *V. Parcher, Ph.D., P.E.*

Electrical Engineering, *Charles M.* Bacon, *Ph.D., P.E.*

General Engineering, *Bennett* *L.* Basore, *Sc.D., P.E.*

Industrial Engineering and Management, *Kenneth E.* Case, *Ph.D., P.E.*

Mechanical and Aerospace Engineering, *Karl N. Reid, Sc.D., P.E.*

School of Architecture, *John H. Bryant M.Arch., A.I.A., Head*

School of Technology, *J.E.* ***Bose, Ph.D., P.E., Director***

The Schools of Engineering, Technology and Architecture offer a complete spectrum of educational opportunities designed to give graduates the capability and the flexibility to meet the ever-changing requirements ofour society-a society heavily committed to technological innovation. To be prepared to make continuing contributions, engineers, technologists and architects 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, technologist or architect must also be schooled in the social sciences and humanities that provide the understanding of non-technical factors that must shape technological innovation.

Most of the work of engineers, technologists and architects is concerned with the conception, design and fabrication of devices and installations, and processes and systems that serve human needs. This work provides ample opportunity to express creativity. It requires an ability to make decisions.

Engineers and architects, working side by side with technologists, 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, to increase productivity of needed goods and services, in short to improve the quality of life for all.

The professionals and semi-professionals who will be largely responsible for the shape of the world in the year 2000 and beyond are just starting their higher education. The power they will exercise makes an exciting prospect and presents a sobering responsibility. Many of the easy problems that are usually solved first are now a part of history. Many difficult problems remain. The need for well-qualified and well-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, technology or architecture while at Oklahoma State University.

The curricula are continually evolving to assist the student first to master the enduring principles upon which future practice will be based, and second to acquaint him with current applications of these principles. With such a bridge built between theory and practice, the educational experience will support one's following diverse interests and opportunities throughout the productive years of his or her life span.

Degrees. Academic programs offered in the College of Engineering, Technology and Architecture culminate in the following dcgrees:

Schools of Engineering:

Bachelor of Science in Agricultural Engineering, Chemical Engineering, Civil Engineering, Electrical Engineering, General Engineering, Industrial Engineering and Management, Mechanical Engineering, and Mechanical Engineering (aerospace major).

Master of Agricultural Engineering, Bioenvironmental Engineering, Chemical Engineering, Civil Engineering, Electrical Engineering, General Engineering, Industrial Engineering and Management, and Mechanical Engineering.

Master of Science in agricultural engineering, bioenvironmental engineering, chemical engineering, civil engineering, electrical engineering, general engineering, industrial engineering and management, and mechanical engineering.

Doctor of Philosophy in agricultural engineering, chemical engineering, civil engineering, electrical engineering, general engineering, industrial engineering and mechanical engineering.

School of Technology:

Associate Degree
Bachelor of Science in Engineering Technology.

School of Architecture:

Bachelor of Science in Architectural Studies
Master of Architecture.
Master of Architectural Engineering.

The Engineering Curricula

The traditional four-year bachelor's degree programs in engineering remain available at OSU. However, in order to meet the ever-changing and complex needs of a technological society, one who expects to enjoy a lasting and successful career in the practice of engineering should obtain a background in mathematics, the basic sciences and in engineering that cannot readily be acquired in four years. To meet this primary objective of an engineering education, the schools of the College of Engineering, Technology and Architecture encourage every qualified student to pursue a curriculum leading to a master's degree over a period of approximately five years, even though it is expected that there will be many entry-level job opportunities available for the graduate with the bachelor's degree. Furthermore, the bachelor's program in engineering is an excellent preparation for professional training in law or medicine, since it provides a student with maximum flexibility in career choices.

The Professional School Concept. In accord with the professional nature of a career in engineering, students entering OSU are 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 applies for admission to one of the professional schools of the College to continue in the upper-division program.

Students meeting admission standards then pursue a two-year curriculum leading to the **B.S.** degree or a three-year curriculum leading to a master's degree in their discipline.

Pre-engineering program. The pre-engineering program is comparable to the freshman and sophomore levels in other disciplines. The content of the pre-engineering program is uniform 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.

Admission to the Professional Schools. A student who will have completed, including his current enrollment, not fewer than sixty semester credit hours of study at an accredited institution of higher learning, and who has demonstrated satisfactory competence in the pre-engineering curriculum described above, is eligible to apply for admission to the professional school of his choice. An overall grade-point average of 2.30 on a4.00 scale, computed taking the last grade in any repeated course or courses, and including grades of"C" or better in the calculus, physics, chemistry and engineering science courses, is normally accepted as demonstrated satisfactory competence although a professional school may impose requirements in addition to these minimum requirements. Students may be admitted to the professional schools with certain limited deficiencies, with the understanding that the deficiencies must be remedied early during their programs of studies in the professional schools.

A common preprequisite for any student to enroll in upper-division course work offered by the professional schools of the College is competence equivalent to that required for admission to the schools, as described above. For students who have not been admitted to a professional school of competence will be evaluated on an individual basis by the head of the School or his designated representative.

Co-op Program. The College of Engineering, Technology and Architecture offers a Cooperative Education Program (Co-op) in the form of alternating semesters of work and study. The Co-op is voluntary, with the first work assignment following the sophomore year; transfer students must successfully complete one semester at OSU prior to their first placement. Under this plan, students attend classes every other semester, alternating with periods of paid employment in industry, private firms or government agencies. The Co-op Program combines classroom education at OSU with on-the-job experience, and one graduates with a bachelor's degree and asignificant amount of work experience. Students may obtain further information about the program from the coordinator of the Cooperative Education Program, Room 101, Engineering North.

Engineering 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. Invitation to the program is extended only to approximately the top five percent of entering students.

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 will be eligible for the Honors Program beginning with their first enrollment at OSU as freshmen. An ACT composite score of at least 30 is required for Engineering and Architecutre Honors students and at least 26 for Technology Honors students.

All other OSU students and transfer students who are classified as freshman (27 semester credit hours or fewer), and who have completed twelve or more hours with a grade-point average of 3.50 or above are eligible to join the Honors Program regardless of their ACT scores.

Requirements for a Bachelors, Degree with Honors. (1) A grade-point average of 3.50, both overall and in the major field. (2) A total of 12 semester credit hours with grades of "A" or "B" in honors sections of basic introductory-type courses from at least three of the following areas: English or foreign languages, mathematics or logic, social sciences, natural or physical sciences and humanities: (3) Honors credit with grades of "A" or "B" in a total of 12 semester hours of junior and senior courses within the student's major field, including at least three hours of independent studey. (4) Acquisition and submission of a formal application for the Honors degree within two weeks after the beginning of the final semester.

Bachelor of Science Degree. At the end of approximately four years of combined pre-engineering and professional school study, a student who has met the minimum criteria stated below may be awarded the Bachelor of Science degree in a designated field of engineering. The criteria for these degrees in amplification of University requirements are as follows:

(a) Completion of all pre-engineering requirements.

(b) Admission to and completion of the upper-division curriculum of one of the professional schools, including approximately one semester of courses common to all the professional schools, and 48 to 52 semester hours of course work specified by the professional school.

(c) A grade-point average (as computed by the office of the Registrar) of 2.00 (on a 4.00 scale) or better in all upper-division engineering courses listed on the degree requirement sheet.

Further details, including specific course requirements for each of the undergraduate degrees offered at OSU, can be found in the publication *Undergraduate Programs and Requirements,* published annually at OSU and available in the offices of counselors in high schools and junior colleges throughout Oklahoma. Details associated with advanced degrees can be found in the *Graduate Catalog* issued by the University.

High School Preparation. Enrollment in chemistry and mathematics for an entering student in the College of Engineering, Technology and Architecture is determined by his score on placement tests and/or on the amount of mathematics or chemistry completed in his high school program. Where credit has been obtained by advanced standing examination or by CLEP tests, the student may be permitted to enroll in more advanced course work.

Beginning 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, it is recommended that students planning an engineering degree obtain high school credit in one unit of general chemistry, one unit of general physics as well as one-half unit of graphics, if available.

Oklahoma State University continues to offer 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 listed for the B.S. degrees.

Assistance to high schools in the form of career guidance materials and qualified speakers on subjects related to academic programs and careers in the College of Engineering, Technology and Architecture can be obtained through the Director of Student Services for the College.

Transfers. Much, if not all, of the pre-engineering program made up of approximately two years of academic work in the lower division can be satisfactorily completed at junior colleges and other institutions of higher learning. The College of Engineering, Technology and Architecture sends faculty visitors to many of these institutions every year to provide students and pre-engineering advisers with information to help achieve the most satisfactory progress of the student. With this guidance, students can take courses directly applicable to the several engineering programs at OSU.

For those courses in pre-engineering not readily available at an institution prior to transfer to OSU, summer courses in each area of mathematics, sciences and the engineering sciences are always conducted. This helps a student to complete his or her pre-engineering program and enter the professional school curriculum on schedule the following fall semester.

Advisement. The College's Director of Student Services advises all pre-engineering students and first-year students in Architecture. (Consult the heading ***School*** *of Technology* for specific information regarding advisement, etc., for students in Technology programs.) The Officeof Student Services also administers placement examinations in mathematics and chemistry for entering freshmen, and can provide information regarding aptitude and advanced-standing examinations administered by the University Bureau of Tests and Measurements.

In support of the guidance function of his office, the Director of Student Services also arranges for industrial representatives to interview students for employment opportunities. Appointments are made through his office.

Progress Toward a Degree. Full-time students are expected to complete twelve or more semester credit hours each term with a grade-point average of 2.00 or above to make satisfactory progress toward a degree. Should either the hours completed or grade-point average for any term fall below the minimum, the student may be placed on academic probation. Normally, the terms of probation include a requirement that the student make satisfactory progress in the term during which he or she is in probationary status. When a student does not meet the terms of probation, he may be suspended from the College of Engineering, Technology and Architecture. A formal request for reinstatement may be considered by the College Reinstatement Advisory Board prior to the beginning of any subsequent term. Deadlines for submitting such a request may be obtained from the Director of Student Services.

Concurrent Enrollment. If a student expects to use credits toward a degree at OSU to be earned at another institution or through correspondence or extension, while enrolled in one of the programs of the College of Engineering, Technology and Architecture, 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. By the time of enrollment in the first engineering science course, an engineering or architecture student is expected to be equipped with an appropriate calculator. Any student not so equipped will be at a disadvantage in learning activities. 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.

Agricultural Engineering

PROFESSOR AND HEAD
C. T. Haan, Ph.D., P.E.

PROFESSORS
D. G. Batchelder, M.S., P.E.
P. D. Bloome, Ph.D., P.E.
Wendell Bowers, M.S., P.E.
G. H. Brusewitz, Ph.D., P.E.
B. L. Clary, Ph.D., P.E.
F. R. Crow, M.S., P.E.
J. E. Garton, Ph.D., P.E.
Jay G. Porterfield, M.S., P.E.
L. O. Roth, Ph.D., P.E.
D. P. Schwab, M.S., P.E.

ASSOCIATE PROFESSORS
A. D. Barefoot, M.S., P.E.
G. E. Cook, M.S.
W. R. Gwinn, Ph.D., P.E.
A. P. Lewis, M.S.
G. W. A. Mahoney, Ph.D., P.E.
C. E. Rice, Ph.D., P.E.
W. E. Taylor, M.S., P.E.
Richard W. Whitney, Ph.D., P.E.

ASSISTANT PROFESSORS
H. W. Downs, M.S.
Joseph F. Gerling, M.S.
R.L. Huhnke; Ph.D., P.E.
L. K. Jones, M.S.
D. E. Temple, M.S.

Agricultural engineers working in industry, for educational and research institutions and government agencies or as private consultants provide the agricultural industry with essential engineering services. These services include power applications, machine design and testing, structural design and development, livestock and crop handling equipment systems. Other services embrace the design and development of erosion, flood control, irrigation and drainage systems. The agricultural industry also depends on agricultural engineers to develop methods, equipment and systems for storing, processing and packaging products and transporting them to market.

Agricultural engineering students take courses in engineering science as well as courses in biological and agricultural sciences. Building on this foundation of basic courses, the specialized agricultural engineering courses apply this knowledge in mathematics, physics, chemistry and engineering science to design and develop new components and systems for agricultural production and processing. The curriculum also includes social studies and humanities for a better understanding of the principles of motivating people to achieve desired responses. This is important because the agricultural engineer often assumes supervisory and management responsibilities early in his or her career. The agricultural engineering program is accredited at the basic level by the Engineering Accreditation Committee of the Accrediting Board for Engineering and Technology (ABET).

In the professional engineering program students elect additional engineering and science courses to supplement a program of authentic involve-

ment in engineering practice. This additional educational experience provides more specialization in career opportunities for agricultural engineers.

Hydrology and water resources includes flood control, irrigation, water supply development and drainage. Students interested in this specialty elect additional courses in fluid mechanics, soil mechanics, soil physics and water quality.

Design and development of machines and equipment, power and controls systems, field machines, and equipment for handling agricultural products on farms and factories are included in agricultural engineering. Courses elected in advanced strength of materials, vibrations, hydraulic power and machine design help prepare students for this type of work.

Processing, handling and storage of agricultural products embraces drying, grinding, crushing, temperature and humidity control, and systems for taking raw products of agriculture through the processes necessary to place them on the market. Courses in process engineering, heat and mass transfer, instrumentation, refrigeration and systems analysis are used for electives to strengthen the student's education in this area of work.

Environmental engineering for animal and plant production includes confined systems requiring sophisticated controls, and open systems such as feedlots, waste management and pollution control resulting from animal and plant production. Usual elective courses to support this specialty are heat and mass transfer, systems analysis, control theory and thermodynamics.

Fundamental courses for agricultural engineers are also offered in the professional engineering program. These courses include: agricultural engineering applications, plant science, animal science, electrical application and instrumentation, watershed hydrology, flood control and drainage engineering, field machinery, environmental engineering, irrigation engineering, farm power, power and machinery lab oratory , farm machinery design, light structures, process engineering and waste management.

School of Architecture

PROFESSOR AND HEAD
John H. Bryant, M.Arch., A.I.A.

PROFESSORS
Louis O. Bass, M.Arch.Engr., P.E.
Geo. W. Baumiller, M.S.Arch.
Lester L. Boyer, Ph.D., P.E.
W. **George** Chamberlain, M. Arch., A.I.A.
James F. Knight, M.Arch., A.I.A.
Arlyn A. Orr, M.Arch.Engr., P.E.

ASSOCIATE PROFESSORS
Alan Brunken, M.Arch., A.I.A.
A. **E. Erdely,** Dip.Arch.
Bob E. Neatly, M.Arch.
Robert Wright, M. Arch.

ASSISTANT PROFESSORS
Walter E. Grondzik, B.Arch.Engr.
David Hanser, M. Arch.
John O. **Houston,** M.Arch.
A. David Jones, M.Arch.
Jack McSorley, B.Arch., A.I.A.

INSTRUCTOR
J. N. Worrell, B.Arch., A.I.A.

Architecture is the difficult and complex art and science of designing and implementing 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 art, architecture is rarely self-generated; it is rather a creative response to a stated or perceived human need. It thus must be more user-oriented than fine art alone and more humane than pure science. The keenest technological and economic functionality will fall far short of becoming architecture, unless it also strongly appeals to man's spiritual and emotional values.

The School's educational program strives to balance the human, visual and technological elements which go into design through a blend of lectures, seminars and studio courses. The primary thrust is directed at those planning to enter the profession of architecture; this goal will not necessarily be the choice of all.

The School offers both undergraduate and graduate curricula in architecture and architectural engineering. The first four years of study lead to a preprofessional degree of Bachelor of Science in Architectural Studies. This degree allows students to move into one of the two accredited professional (graduate) programs in architecture or in architectural engineering. The architectural base of the B.S. program can also be used for allied studies in art, social or behavioral sciences, planning, interior design, law, business, etc.

In an effort to maintain the most effective balance between students,

faculty and facilities, the faculty reviews and selects the most qualified candidates based upon academic achievement and professional potential for admission to the upper division of the preprofessional program. The minimum requirements for admission to the upper division (third year) of the preprofessional program may vary from year to year as the best qualified students are selected. However, as a prerequisite to be considered for admission, the student must have (1) completed a minimum of 60 semester credit hours, (2) completed, with a grade of "C" or better, all lower-division architectural courses required in the first two years; and (3) maintained an overall grade-point average of 2.30 or higher in the 60 or more semester credit hours. First preference will be given to those students who have successfully completed ENGSC 2114 prior to the admission date.

Preprofessional Degree. Unlike the Schools of Engineering, and many other bachelor's programs, the B.S. in Architectural Studies is a preprofessional degree and does not lead directly to licensing as an architect or architectural engineer. The professional architectural and architectural engineering curricula are each six years in length, modeled closely on the instruction patterns of pre-law/law and pre-medicine/medicine, and lead to professionally accredited degrees, Master of Architecture and Master of Architectural Engineering. Upon completing the B.S. degree, all qualified students are expected to continue their studies in one of the two professional curricula. These programs each require two years and 64 credit hours of studies. (See *Graduate Catalog* for details.) The Master of Architecture program is accredited by the National Architectural Accrediting Board (NAAB), and the Master of Architectural Engineering program by the Engineering Accreditation commission of the Accrediting Board for Engineering and technology at the advanced level.

Transfers. Due to the six-year professional nature of the program, evaluation of courses as substitutes for professional courses within the School is necessarily accomplished on a course-by-course basis. Classroom courses are evaluated through course description, texts required and content covered. The content and level of rigor of architectural studio courses, particularly at the beginning of the curriculum vary widely between accredited schools of architecture. For this reason, studio course substitution is evaluated by a committee of the studio faculty through the examination of examples of the students' works performed in each course in question.

Chemical Engineering

PROFESSOR AND HEAD
Billy L. Crynes, Ph.D.

PROFESSORS
Kenneth J. Bell, Ph.D., P.E.
John H. Erbar, Ph.D., P.E.
Robert N. Maddox, Ph.D., P.E.
Robert L. Robinson, Jr., Ph.D., P.E.

ASSISTANT PROFESSORS
Gary L. Foutch, Ph.D.
Archibald **G.** Hill, Ph.D.
M. **Seapan,** Ph.D.
Jan Wagner, Ph.D., P.E.

Chemical engineering is a profession which gives practitioners the background and opportunity to contribute to society in the broadest possible context. From research to sales, and from alternative energy sources to waste disposal, chemical engineers have the background to apply their creative talents.

Chemical engineers use and control chemical and physical changes to produce materials and energy for the benefit of people. Societal problems such as the development and production of new materials, new energy resources and the control of pollution will be solved through the application of chemical engineering principles and practice. Many commonplace materials, such as antibiotics, synthetic fibers, plastics and synthetic rubber were unknown a few years ago. Today these are manufactured in plants designed, built and operated by chemical engineers. Chemical engineers are making contributions in many developing areas of medicine including artificial hearts, kidneys and bone implants. Exciting opportunities are available in the rapidly expanding energy sector. Chemical engineering expertise is used in coal, oil shale and tar sands processing and modification, utilizing the energy of the sun, harnessing ocean thermal gradients, and developing many other nonconventional energy sources.

Within such a wide range of opportunities, chemical engineers are called upon for research and development leading to new products and new processes, the design of equipment and plants to make these products, efficient operation of the plants and technical assistance to the consumers of the products.

The varied background and experience of chemical engineers make them ideally suited for advancement into top-level managerial and executive positions.

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. Fundamental professional courses follow to provide the student an opportunity to apply the basic science 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.

Upon completing the B.S. studies the qualified student is encouraged to continue in one of two master's programs. The M.S. degree in chemical engineering is the traditional program integrating additional course work with a thesis or special project as the significant creative component of study. The Master of Chemical Engineering (M.Ch.E.) incorporates a summer internship and an additional graduate-professional year. During the graduate professional year actual experience in solving an engineering problem combined with more in-depth studies prepare the student for the practice of engineering.

A selection of engineering, science and mathematics electives allow the professional engineering program to be tailored to the special requirements and interests of each individual student.

This program is accredited at the M. Ch. E. level by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

Civil Engineering

PROFESSOR AND HEAD
James V. Parcher, Ph.D., P.E.

PROFESSORS
M. A. Abdel-Hady, Ph.D., P.E.
W. P. Dawkins, Ph.D., P.E.
R. N. DeVries, Ph.D., P.E.
T. A. Haliburton, Ph.D., P.E.
A. E. Kelly, Ph.D., P.E.
D. F. Kincannon, Ph.D., P.E.
P. G. Manke, Ph.D., P.E.
G. D. Oberlender, Ph.D., P.E.

ASSOCIATE PROFESSORS
Marcia Bates, Ph.D., P.E.
J. W. Harvey, Ph.D., P.E.
J. P. Lloyd, Ph.D., P.E.
J. F. B. Shaw, Ph.D., P.E.
D. R. Snethen, Ph.D., P.E.
E. L. Stover, Ph.D., P.E.
A. K. Tyagi, Ph,D,. P.E.

ASSISTANT PROFESSORS
S.A. Ahmed, Ph.D.
T. D. Jordan, Ph.D.
V. A. Mast, Ph.D.
J. N. Veenstra, Ph.D.

INSTRUCTOR
R. A. Padorr, B.S.C.E., M.B.A., P.E.

Civil engineering was the first engineering curriculum established to serve civilian needs. 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 man's environment-its control, altera-

tion 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, aircraft, missiles, space vehicles, surface vehicles and submarines, 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 judgement and confidence of the student engineer. This program is accredited at the basic and advanced levels by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

The purpose of the curriculum is to prepare the student for his or her professional career as a designer, office engineer, field engineer, contractor, engineering businessman or manager. The graduate of this program will be well prepared for work in engineering offices, city, state and federal governments and organizations, and the construction, chemical, petroleum and transportation industries.

Some degree of specialization is provided through the choice of elective courses in structures, engineering mechanics, transportation engineering, soils mechanics and foundations, construction engineering and management, bioenvironmental engineering and water resources. Strong support for various parts of the program are given by the Departments of Mechanical and Aerospace Engineering, Industrial Engineering and Management, Agronomy, Geology, Chemistry and Microbiology.

Electrical Engineering

PROFESSOR AND HEAD
Charles M. **Bacon,** Ph.D., P.E.

PROFESSORS
H. **Jack** Allison, Ph.D., P.E.
Bennett L. **Basore,** Sc.D., P.E.
Hans R. Bilger, Ph.D.
William L. Hughes, Ph.D., P.E.
D. D. **Lingelbach,** Ph.D., P.E.
Kenneth A. McCollom, Ph.D., P.E.
Robert J. Mulholland, Sc.D.
R. G. **Ramakumar,** Ph.D., P.E.
Ronald P. Rhoten, Ph.D., P.E.
J. R. Rowland, Ph.D., P.E.
K.Rao Yarlagadda, Ph.D., P.E.

ASSOCIATE PROFESSOR
Richard L. **Cummins, Ph.D., P.E.**

ASSISTANT PROFESSORS
Louis G. Johnson, Sc.D.
David L. **Soldan,** Ph.D.

If a student enjoys mathematics and has a natural curiosity about electronics, computers, communications, motors, generators or other electrical devices, then a career in electrical engineering may be an excellent and exciting choice.

By selecting electrical engineering as a profession, the student enters vital engineering field. No other engineering profession permeates our everyday lives in such a revolutionary way as does electrical engineering. All around us 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. A young man or woman who seeks a challenging and rewarding role in this continuing electronic revolution should consider electrical engineering as a career.

The undergraduate electrical 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 engineering subjects and can elect from the following areas: computer engineering, electronics, energy systems, communications, control systems, electromagnetics, solid state devices and network theory/signal processing.

Computer Engineering. A special program option in computer **engineering**

is offered by the School of Electrical Engineering at OSU. 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.

The School of Electrical Engineering offers excellent laboratory facilities for both instruction and 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 Engineering at Oklahoma State University offers a full range of undergraduate and graduate program options. The undergraduate program leading to the Bachelor of Science degree and the graduate program leading to the Master of Electrical Engineering degree are accredited, repectively, at the basic and advanced levels by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology. Graduate programs leading to the Master of Science degree and the Ph.D. degree are also offered. A degree in electrical 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 electrical engineering. For more information on either the electrical engineering or computer engineering programs at Oklahoma State University, contact the School of Electrical Engineering at (405) 624-5151.

General Engineering

HEAD
Bennett L. Basore, Sc.D., P.E.

General engineering is an integrated combination of communicative and

mathematical skills, the cultural, social and physical sciences, with the logical and analytical ability gained from engineering education, for the purpose of bringing to focus broad engineering fundamentals upon the problems and consequences of our expanding technology in order to realize greater living satisfaction for mankind.

General engineering embodies the fundamentals of four major engineering disciplines (civil, electrical, industrial and mechanical), in a broad curriculum a assuring proficiency in basic science and engineering fundamentals .egardless of the area in which these concepts are to be applied.

As a professional with an interdisciplinary background, the general engineer is prepared to solve problems and to bring his or her broad knowledge to bear upon the systems of nature. The student can analyze, design and synthesize solutions in a technically expedient manner, while considering the economics of design or process, as well as the humanistic requirements for utilization and operation. The student may choose to follow professional practice within one of the four disciplines; he or she may look to a career in research and development, particularly of an interdisciplinary nature; he or she may choose the avenues of development in professional consultation or individual proprietorship; or finally, because of his or her background and perspective, he or she may choose a career in the management circles of government or industry.

Because the general engineer can expect to be called upon to perform at a professional level in any or all of the disciplines covered by the curriculum, the student is encouraged to plan on a program leading to a master's degree, and with it a competitive level of competence in more than one engineering discipline.

The resources of the College, both faculty and laboratory facilities, are available to the general engineer. This course of study is most applicable to the student having a broad interest in the problems facing mankind and wishing to prepare for the future solution of those problems.

Because the general engineer can expect to be called upon to perform at a professional level in any or all of the disciplines covered by the curriculum, the student is encouraged to plan on a program leading to a master's degree, and with it a competitive level of competence in more than one engineering discipline. The Master of Engineering degree is accredited as the first professional degree in General Engineering by the Engineering Accreditation Board for Engineering and technology.

Industrial Engineering and Management

PROFESSOR AND HEAD
Kenneth E. Case, Ph.D., P.E.

PROFESSORS
Hamed K. Eldin, Ph.D., P.E.
Carl **B.** Estes, Ph.D., P.E.
Earl J. Ferguson, Ph.D., P.E.
Joe H. Mize, Ph.D., P.E.
James E. Shamblin, Ph.D., P.E.
M. Palmer Terrell, Ph.D., P.E.
Wayne C. Turner, Ph.D., P.E.

ASSOCIATE **PROFESSOR**
Philip M. Wolfe, Ph.D., P.E.

ASSISTANT PROFESSORS
John W. Nazemetz, Ph.D.
D. **Scott** Sink, Ph.D.

INSTRUCTOR
John **B.** Keats, Ph.D., P.E.

Industrial engineering is the newest of the five major engineering disciplines and is gaining most rapidly in popularity. It is concerned with designing, analyzing and operating a wide range of systems that include people, materials, money and equipment. Industrial engineering 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."

Enterprises of all types are finding that the industrial engineer provides an essential service to the organization. The projected demand for industrial engineers far exceeds the expected supply for the foreseeable future.

Productivity and effective utilization of resources, including energy conservation and 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 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 industrial engineering program at OSU is ranked among the top ten in the nation and the best in this part of the country. Prospective students are encouraged to write directly to the School of Industrial Engineering and Management for career guidance information. Both the undergraduate (B.S.) and graduate (M.I.E.) programs are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

Mechanical and Aerospace Engineering

PROFESSOR AND HEAD
Karl N. Reid, Sc.D., P.E.

PROFESSORS
James H. Boggs, Ph.D.
Raymond E. Chapel, M.S., P.E.
E. C. Fitch, Jr., Ph.D., P.E.
Richard L. Lowery, Ph.D.,P.E.
Dennis K. McLaughlin, Ph.D., P.E.
Faye C. McQuiston, Ph.D., P.E.
Peter M. Moretti, Ph.D., P.E.
Jerald D. Parker, Ph.D., P.E.
C. Eric Price, Ph.D., P.E.
Atmaram H. Soni, Ph.D., P.E.
Robert L. Swaim, Ph.D., P.E.
John A. Wiebelt, Ph.D., P.E.

ASSOCIATE PROFESSORS
Lynn R. Ebbesen, Ph.D., P.E.
David G. Lilley, Ph.D., C. Eng.
Troy D. Reed, Ph.D., P.E.
James H. Taylor, Ph.D., P.E.
Larry D. Zirkle, Ph.D., P.E.

INSTRUCTORS
Gary **B.** Ferrell, M.S.
James K. **Good,** M. M. E.

Mechanical engineering and aerospace engineering are professional disciplines which involve the invention, design and manufacture of devices, machines and systems that serve the ever-changing needs of modern society.

Mechanical engineering is an exceedingly diverse field 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 be 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, typewriters 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.

Aerospace engineering is that particular part of mechanical engineering which 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 man to the moon and continues to lead in the expansion of man's frontiers deeper into space and into the ocean's depths. Because of their unique backgrounds in aerodynamics and lightweight structures, aerospace engineers are becoming increasingly involved in solving some of society's most pressing and complex problems-such as high-speed ground transportation and pollution of the environment.

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

In the professional school, mechanical and aerospace engineering students extend their study of the engineering sciences and consider applications of fundamental principles and analysis tools to the solution of real technological problems of society. Students make extensive use of modern electronic digital computers in virtually every course in their program. Design courses involve students in the solution of authentic, current and significant engineering problems provided by industrial firms, such as Ford, Fisher Controls, IBM, Whirlpool, Conoco, Phillips, Halliburton, Procter and Gamble, Western Electric, Texas Instruments, Magnetic Peripherals, and 3M.

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 with a bachelor's degree, while others receive one of several graduate degrees. The academic programs are accredited at the basic level (mechanical and aerospace) and at the advanced level (mechanical), by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

School of Technology

James E. Bose, Ph.D., P.E., *Director*
Craig B. Robison, M.S., *Coordinator of Academic* Services

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.

Engineering technology education is designed to educate two-year, associate degree *technicians* and four-year, bachelor's degree *technologists,* either to assist engineers or to provide independently the support for engineering activities. The bachelor's degree *technologist* receives a more intensive education than the *technician* in his or her technical specialty and greater depth in mathematics and technical sciences. Further, the additional two years provide more 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.

The engineering technology graduate is qualified to select from a broad array of positions. In research and development, he or she may serve as a laboratory technician or engineering assistant in the performance of experiments, evaluation of data, or prototype development. **In** production, typical positions are engineering aide, process specialist, quality control technician, materials specialist, design technician, technical writer and production supervisor. In the field, he or she will often be identified as a technical representative, technical salesperson, field test technician or technical consultant.

The Bachelor of Science in Engineering Technology program is composed of each of the following curricular subdivisions:

Mathematics and science-algebra, trigonometry, applied calculus, general physics, and chemistry or other science.

Technical specialty- technical science and related technical courses.

Communication-English composition, and business or technical communication.

Social sciences and humanities-history, government, religion, literature, art, music, etc.

Electives-controlled and general.

High School Preparation and Counseling Information. At least two semesters of high school algebra and a course in plane geometry are recommended for entering students. One year of high school credit in physics and/or chemistry is desirable.

Those less intrigued with theoretical concepts but who have the interest and aptitude toward applications are likely engineering technology majors. This student particularly appreciates 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.

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.

Curricula. The curricula of the School of Technology provide the "two-plus-two" program. Thus, the associate degree requirements satisfy the lower-division requirements for the Bachelor of Science degree in Engineering Technology without loss of credit.

Associate Degree	Bachelor of Science Degree
Two-Year Technical Programs	*Engineering Technology Programs*
Construction	**Construction Management**
Electronics	**Electrical Power**
Fire Protection and Safety	**Electronics**
Mechanical Design	**Fire Protection and Safety**
Mechanical Power	**General**
Petroleum	**Manufacturing**
	Mechanical Design
	Mechanical Power
	Petroleum

The associate degree credit hour requirements vary from 61 to 66 hours, while the Bachelor of Science in Engineering Technology extend from 126 to 128 credit hours.

The accreditation status of each of these programs is given in the sections devoted to them below. The responsible agency is the Technology Accreditation Commission of the Accrediting Board for Engineering and Technology.

Construction Management

PROFESSOR AND CHAIRMAN
Garold D. Oberlender, Ph.D., P.E.

ASSOCIATE **PROFESSOR**
Jerrold F. Bradley, M.S., P.E.

ASSISTANT **PROFESSORS**
Jeremiah P. Allen, M.S., P.E.
K. Dean Imel, 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.

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, 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.

Students with an interest in architectural structures may select courses in the "building option" of construction management which provide him or her with a knowledge in 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 provide him or her with a knowledge in highways, soils, foundations and other course work for a career in the heavy and industrial construction industry.

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.

This program is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology.

Electrical Power

PROFESSOR AND CHAIRMAN
Perry R. McNeill, Ed.D., P.E.

ASSISTANT PROFESSORS
Samuel I. Kraemer, B.S.
James K. Shelton, B.S., P.E.

The electrical power upper-division curriculum prepares graduates for technical careers throughout the electrical power industry. This industry includes utilities, electrical equipment manufacturing companies and industries using electrical power for operations.

The work of the electrical power technologist will range from working with product development groups through supervision of manufacturing to field installation and service of complex equipment. The program prepares graduates for advancement to positions of increasing responsibility throughout their careers.

The electrical power program is based on mathematics and science with emphasis on using accepted engineering practices in problem analysis and solution. The upper-division study of electrical power is designed to build on the background students bring to the program. Graduates will be competent in more than a single discipline, ensuring a versatility highly desirable in industry.

Holders of associate degrees in electrical, electronics, mechanical and electromechanical technologies as well as other technical disciplines will find that this program builds directly on their backgrounds. Holders of associate degrees in nontechnical fields will be considered for admission on an individual basis.

Electronics

PROFESSOR AND CHAIRMAN
Perry R. McNeill, Ed.D, P.E.

ASSOCIATE PROFESSORS
Joseph R. Cleveland, Ph.D.
Rodney B. Faber, M.S.
Russell L. Heiserman, Ed.D., S.E.T.
Larry D. Jones, Ed. D.
Neal A. Willison, Ed.D., C.E.T.

ASSISTANT PROFESSORS
Peter C. Burton; M.S.
Samuel I. Kraemer, B.S.
James K. Shelton, B.S., P.E.
Fred V. Martin, 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 and government which depend upon electronics for control, communications or computation.

The work of technologists in electronics may range from assisting in the development of new equipment in the laboratory or in the field, to the operation or supervision of production operations, technical writing, customer service and sales.

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. This program is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology.

Fire Protection and Safety

ASSOCIATE PROFESSOR AND ACTING CHAIRMAN
James E. **Bose,** Ph.D., P.E.

ASSOCIATE PROFESSOR
Howard M. Johnson, Ph.D.

ASSISTANT PROFESSORS
Larry Borgelt, M.S., C.S.P., C.E.T.
Pat D. Brock, B.S., P.E.
Laurence G. Lee, M.E., C.I.H.

The nuclear/electronic/aerospace revolution, in conjunction with increased ecological awareness, has created an economic and moral responsibility within our nation to provide a cadre of trained personnel, knowledgeable in current loss-control and risk management techniques. In response to this challenge, the curriculum is designed to familiarize the student with inherent risks in such areas as fire protection, occupational safety and health, radiation hazards, product liability and industrial security. Courses and laboratories are structured to enable the recognition, evaluation and control of existing and potential hazards threatening losses to life, property or proprietary information.

The associate degree curriculum emphasizes fire prevention and control and property protection. The bachelor's degree curriculum is devoted primarily to personnel safety, occupational health and industrial security.

The bachelor's degree program is accredited buy the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology.

General

PROFESSOR AND CHAIRMAN
James E. Bose, Ph.D., P.E.

ADVISER
Craig B. Robison, M.S.

The general technology curriculum is designed to provide a bachelor's degree program that will prepare young men and women for employment as engineering technologists in more than one specific area. Normally, there are two classes of students who enroll in this program: (1) those who have an associate degree in one of the traditional technology specialties, but desire more diversification than continuing on in the same specialty; (2) 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: technical graphics, machine tool processes, hydraulics, computer programming, electronics, controls, dynamics, supervision and instrumentation.

Manufacturing

PROFESSOR AND CHAIRMAN
Raymond F. Neathery, Ph.D., P.E.

ASSOCIATE **PROFESSOR**
Gary G. Hansen, Ph.D.

ASSISTANT PROFESSORS
Dan D. Ashcraft, B.S.
John C. Scheihing, B.S.

The flow of affordable goods and products from producer to consumer is a major cornerstone of the free enterprise system that we enjoy 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 industrise 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 evalution and control plant operations product design and development and manufacturing methods.

The manufacturing technology option provides educational experiences

in the core areas of manufacturing processes, industrial materials, graphic communcation and technical science, as well as an opportunity to develop an area of specialization. This option is only available for the bachelor's degree. Manufacturing courses are cncentrated in the last two years allowing for efficient transfer from other OSU programs or from other colleges or universities.

Mechanical Design

PROFESSOR AND CHAIRMAN
Raymond F. Neathery, Ph.D., P.E.

ASSOCIATE PROFESSORS
D. Jack Bayles, Ph.D., P.E.
Ralph D. Brumfield, M.S., S.E.T.
Gary G. Hansen, Ph.D.
Gerald R. McClain, M.S., C.E.T.

ASSISTANT PROFESSORS
Dan D. Ashcraft, B.S.
John E. Harvey, M.S., S.E.T.
John C. Scheihing, B.S.

Mechanical design is an activity necessary for existence of the modern world. All the conveniences of today's world have passed through the designer on their way to being useful products. Mechanical design is applied in agriculture, chemistry, transportation, energy production, mining, oceanography, space exploration, food processing, electronics, steel, petroleum-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 in the product's creation.

The associate degree is available upon satisfactory completion of the freshman and sophomore requirements. Students wishing to terminate their education at this point usually accept positions with industry in the design drafting category.

After completion of the first two years' requirements, the bachelor's degree can be pursued without a break in training. The junior and senior years provide additional training in design principles, processes and other related areas necessary for more complex aspects of mechanical design. Bachelor of science graduates usually find employment in areas related to product design and production.

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 includes a 12 credit hour design option in which the student may emphasize design graphics, design analysis or manufacturing processes. Companies utilizing the talents of designers and design draftsmen 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. This technology program is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology and by the American Institute for Design and Drafting.

Mechanical Power

PROFESSOR AND CHAIRMAN
Marvin D. Smith, Ph.D., P.E.

PROFESSOR
Richard **G.** Murray, Ph.D., P.E.

ASSOCIATE **PROFESSORS**
Eugene K. Buchholz, Ph.D., P.E.
Franklin E. Eckhart, M.S., P.E.
Samuel O. Powers, M.S., S.E.T.

The mechanical power technology educational program prepares the graduate for entry into one of the most promising areas of the industrial world. Mechanical power itselfis the most important building block of civilization. So long as energy is utilized you will find that demanding and challenging positions in the area of mechanical technology are abundant.

This program is designed to introduce the student to the broad spectrum of mechanical devices and skills. It also produces a highly competent technical individual who is capable of immediate employment in diverse industrial, governmental and education institutions. It offers a depth of theoretical knowledge, as well as a breadth in equipment exposure.

A graduate of this program will be thoroughly familiar with the scientific principles and the equipment associated with the generation, transmission and utilization of mechanical power. The graduate will be equally well qualified to work for a steam power generating facility, a research laboratory, an automotive manufacturer, or the petroleum industry. .

This program is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology.

Petroleum

PROFESSOR AND CHAIRMAN
Marvin D. Smith, Ph.D., P.E.

PROFESSOR
Don Adams, Ph.D.

ASSISTANT PROFESSOR
James **G.** Mayberry, M.S.

High energy costs, fuel shortages and environmental concerns have brought the petroleum industry into focus in recent years. These factors, along with others, have caused an increase in activities in this vast industry. Retriev-

ing petroleum from adverse environments, such as offshore and Arctic regions, and retrieving more of the reserves from established fields are examples of the technical challenges facing the industry. Thus, the student will find long and challenging careers in the area of petroleum technology.

This program is designed to provide the graduate with both the theoretical and the practical knowledge required for employment and advancement in the diverse petroleum industry and related energy industries. It is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology.

The graduate of this curriculum is prepared for employment as a petroleum technologist in the areas of drilling and well completion, and in production, recovery, transportation, and processing of petroleum and related products. The graduate is capable of independent technical activities and of assuming responsibility as a coordinator or supervisor of other technical personnel.

College of Home Economics

Beverly Crabtree, Ph.D., Dean

Peggy Meszaros, Ph. *D., Associate Dean for Home Economics Cooperative Extension Programs*

Marguerite Scruggs, Ph.D., *Associate Dean for Research and Graduate Programs*

William Johnston, Ed.D., *Director of Center for Consumer Services*

Sharon Nichols, Ph.D., *Director of Family Study Center*

Beulah Hirschlein, Ph.D., *Director of Home Economics University Extension*

Esther Winterfeldt, Ph.D., *Director of Human Nutrition Center*

Beulah Kinney, M.S., *Director of Student Services and Undergraduate Programs and Coordinator of Instructional Media*

Heads of Departments and Director of School

Heads of Departments and Director of School

Clothing, Textiles *and* Merchandising, *Grovalynn Sisler, Ed.D.*

Family Relations and Child Development, *Frances Stromberg, Ph.D.*

Food, Nutrition and Institution Administration, *Esther Winterfeldt, Ph.D.*

Home Economics Education and Community *Services, D. Elaine Jorgenson, Ed.D.*

Housing, Design and Consumer *Resources, E. Carl Hall, Ed.D.*

School of Hotel *and* Restaurant Administration, *Baker Bokorney, Ed.D., Director*

The College of Home Economics is composed of five departments and the School of Hotel and Restaurant Administration, all being professional units. The departments are clothing, textiles and merchandising; family relations and child development; food, nutrition and institution administration; home economics education and community servics; and housing, design and consumer resources.

Each department prepares graduates to pursue professional careers in home economics in such areas as education, business, extension, research, dietetics and institution administration, social welfare, public health and international service.

The School of Hotel and Restaurant Administration graduates enter career fields in hotels/motels, diverse food service facilities, transportation, recreation and resort complexes, health care centers, business-related careers and education.

Home economics is the field of knowledge and service primarily concerned with strengthening family life. Home economics draws knowledge from its own research, the physical, biological and social sciences, and the arts, and applies this knowledge to the enrichment of the lives of individuals and families. The College of Home Economics is involved effectively and purposefully in the scientific, cultural, social and economic dynamics of a changing society.

Undergraduate Program. Bachelor of science degree graduation requirements include a minimum of 124 semester credit hours, a minimum of 248 grade points, and an average of "C" in home economics subjects. Students who satisfy the requirements in their chosen field of study and meet the general requirements of the College will be awarded the bachelor's degree. Entering freshmen are encouraged to complete two units of algebra or one unit of algebra and one unit of geometry in high school.

Curriculum. The program of studies composing the curriculum includes a combination of liberal and professional education. Courses in the natural and social sciences, the humanities and the arts are included in the liberal education requirements. Courses in home economics are included for professional preparation and for personal/cultural development.

The curriculum is organized to include (1) 41 semester hours of courses which contribute to a liberal education; (2) 22 semester hours of common requirements in home economics; and (3) the professional home economics requirements which vary according to the area of specialization chosen by the student.

The degree of Bachelor of Science in Home Ecomonics is awarded students majoring in each of the five departments. Students majoring in hotel and

restaurant administration receive the degree of Bachelor of Science in Hotel and Restaurant Administration. The curriculum in each of the programs includes (1) courses which will contribute to a liberal education, (2) some common courses in home economics, and (3) professional requirements which vary according to the area of specialization chosen by the student.

A minor may be pursued in several of the departments within the College. The School of Hotel and Restaurant Administration also has identified a minor. More detail about specific requirements may be obtained from the respective areas.

Guidance and Counseling. Guidance and counseling on the part of faculty members are an integral part of the total program. The faculty-student guidance system helps maintain closer interrelationships, thus providing an atmosphere conducive to goal accomplishment.

Graduate Programs. Graduate study is available in all departments of the College of Home Economics. Further information about available degree programs may be found in the *Graduate Catalog.*

The *Master of Science degree is* offered in the following fields: clothing, textiles, and merchandising; family relations and child development; food, nutrition and institution administration; home economics education; and housing, design and consumer resources.

The *Doctor of Education degree is* offered in home economics education. Doctoral students majoring in home economics education may have an area of emphasis in another field within the College of Home Economics.

The *Doctor of Philosophy degree* in the College of Home Economics is an interdisciplinary degree program available through any of the departments in home economics. Areas of emphasis include family and child studies, home economics education and administration, consumer and family environmental studies, and human nutrition and, food systems.

The *Doctor of Philosophy degree* in environmental science is an interdisciplinary degree program available through any of the departments of home economics in cooperation with the environmental science program.

The *Doctor of Philosophy degree* in food science is an interdisciplinary program available through the Department of Food, Nutrition and Institution Administration as one of the participating departments.

Clothing, Textiles and Merchandising

PROFESSOR AND HEAD
Grovalynn Sisler, Ed.D.

PROFESSOR
Kathryn M. Greenwood, Ed.D.

ASSISTANT PROFESSORS
Janice Briggs, Ph.D.
Sharon Hinchey, M.S.
Tana Stufflebean, M.S.
Deborah Strickland, M.S.

INSTRUCTOR
Jane Swinney, M.S.

The Department of Clothing, Textiles and Merchandising focuses on the interaction of people and the near environment through the utilization of clothing and textile products. Objectives of the Department are to assist students to:

(1) better understand others through recognition of the importance of clothing and textiles as used by various cultural groups;
(2) become aware of the economic structure in the United States and its relationship to consumer behavior in the area of clothing and textiles;
(3) appreciate the value of preservation and study of historic costumes and textiles; and,
(4) become qualified for gainful employment in education and in areas of business and industry related to clothing and textiles.

Two undergraduate options are available: clothing and textiles and fashion merchandising.

Clothing and textiles is for the student who is interested in fashion design, custom dressmaking, textiles or in employment as an educational representative for a fabric, pattern or notions company. The ability to create, adapt and promote new styles and fashions is essential for a design emphasis. A textile emphasis provides background for those who interpret research involving fibers, fabrics or finishes to consumers.

Fashion merchandising is for the student who is interested in buying, selling, promoting or coordinating fashion goods. Successful fashion merchandisers understand fashion, are productivity oriented and work well with people. Specialized course work and student work experience focus on developing competencies associated with major retail merchandising functions.

Students majoring in clothing, textiles and merchandising are employed by retail stores, advertising agencies, fabric, pattern or notion companies, apparel and textile manufacturers, and educational institutions.

Various combinations are available for students with interests in a specialized area. A clothing, textiles and merchandising major combined with specific home economics education requirements qualifies the student to teach in high school. Combinations may also be designed with other areas such as communications or marketing.

The Master of Science degree program in clothing, textiles and merchandising is designed to prepare individuals for careers in post-secondary and college teaching, extension, consumer education, research, and merchandising or promotion in business and industry.

The interdisciplinary.Doctor of Philosophy degree in the College of Home Economics with an emphasis in clothing, textiles and merchandising prepares individuals for university teaching and research, and for administrative positions in business and industry.

Family Relations and Child Development

PROFESSOR AND HEAD
Frances Stromberg, Ph.D.

PROFESSOR
John McCullers, Ph.D.

ASSOCIATE PROFESSORS
Leone List, M.S.
Judith Powell, Ed.D.

ASSISTANT PROFESSORS
Godfrey Ellis, Ph.D.
David Fournier, Ph.D.
Lorene Keeler, M.S.
Mona Lane, M.S.
Wayne Matthews, M.S.
Lois Mickle, M.S.
Mary Miller, M.S.
Ann Mills, M.S.
John Rusco, D.Min.
Betty Stratton, M.S.
Elaine Wilson, M.S.
Althea Wright, Ed.D.

INSTRUCTORS
Susan Avrett
Barbara Heister, M.S.
Janet Gambill, M.S.
Kay Murphy, M.S.
Catherine Smith, M.S.

Courses in family relations and child development assist students in developing attitudes and skills which are fundamental to satisfying relationships in the home and community and in preparing for people-oriented and service-oriented professions.

The Department has three major goals:

(1) to offer professional preparation in fields related to child development, early childhood education, and family relations and human development;

(2) to improve the student's opportunities for wholesome and satisfying personal and family life through an improved understanding of concepts of human growth and relationships;

(3) to make available to all university students, men and women, some general education for family living viewed as the basic human relationship.

Three plans of study are available:

(1) early childhood education with (a) certification or licensure for public school, nursery school and kindergarten or (b) preparation for child care professions;

(2) family relations and child development combined with certification or licensure in elementary education; and

(3) family services, which offers preprofessional preparation for social and community service.

All three plans of study may be strengthened and expanded with appropriate courses to prepare a student for graduate study. The B.S. degree in Home Economics requires a minimum of 124 semester credit hours.

Students completing degrees in this area, according to programs of study, follow careers in teaching children under six, public school teaching and social work in state and county human and community service agencies. Graduate study prepares the individual for teaching in colleges and universities, extension service, research, and supervisory positions and specialist positions in human and community service agencies.

Bachelor's and master's degrees are offered in the Department. The Ph.D. degree in the College of Home Economics with emphasis in family and child studies is offered. The Ed.D. degree is also available through a doctoral specialization in cooperation with home economics education. These programs are designed to prepare students for teaching and research positions in colleges and universities and for work in public and private institutions and agencies serving individuals and families. The University offers the M.S. and Ph.D. degrees in environmental sciences and students in the doctoral program in family relations and child development may elect the environmental sciences option.

Food, Nutrition and Institution Administration

PROFESSOR AND HEAD
Esther **Winterfeldt,** Ph.D.

PROFESSOR
Mary Alice Kenney, Ph.D.

ASSOCIATE PROFESSORS
Joan Baird, Ed. D. (visiting)
Lea **Ebro,** Ph.D.
Bernice Kopel, Ed.D.
Donna Payne, Ph.D.

ASSISTANT PROFESSORS
Allene Brown, M.S.
Amanda Chykaliuk, Ph.D.
N. Sue Knight, Ph.D.
Earl Palan, M.S.
Diane Lewis, M.S.
Judy Stadler, M.D.

INSTRUCTOR
Andrea Arquitt, B.S.

A wide range of professional opportunities are available for graduates in food, nutrition and institution administration. Human nutrition and the feeding of people, both individuals and groups, are the major concerns of the profession. Teaching and motivating people to attain optimum health through applied nutrition are the ultimate goals. Graduates become eligible for membership in the American Dietetic Association after graduation and applied experience in a hospital or other institution as specified by the Association.

Persons entering the field of dietetics and food service should enjoy working with foods and with people and have an aptitude for the social and physical sciences. He or she also needs to be able to share knowledge and to work with others.

The scientific composition and preparation of foods, human nutrition and principles of management in food service are the subject matter areas in this curriculum. Graduates hold positions as dietitian, nutritionist, food service manager, consultant, teacher or researcher. Dietitians work in hospitals, nursing homes, dining halls, school food service, business and industry, and in teaching in secondary schools, colleges, extension and adult programs. Nutritionists may work in health departments, in government and other public agencies, in teaching and in research. The food service manager may work in large institutions, such as military and veterans hospitals, colleges, hotels and restaurants.

The B.S. curriculum is based on the sciences, including physiology, chemistry and microbiology, teamed with psychology and sociology. Professional courses in management, food and nutrition build on the sciences, allowing students to apply scientific principles to management, human nutrition and health. The B.S. degree in Home Economics requires a minimum of 124 semester credit hours.

The M.S. and the Ph.D. degrees are also offered through the Department.

These programs prepare students for positions in teaching and research positions in colleges and universities; in government agencies; in mangement in dietetics positions and the food service industry.

Home Economics Education and Community Services

PROFESSOR AND HEAD
Elaine **Jorgenson,** Ed.D.

PROFESSOR
Anna M. Gorman, Ed.D.

ASSOCIATE PROFESSORS
Joan Baird, Ed.D. (visiting)
Lora **B.** Cacy, Ed.D.
Margaret Callsen, Ph.D.
Bettye Gaffney, Ed.D.
Beulah M. Hirschlein, Ph.D.
Irma Manning, M.S.

ASSISTANT **PROFESSORS**
Donna Cadwalader, M.S.
Renee Daugherty, M.S.
Shirley Hastings, M.S.
Wilma Wendt, M.S.

The undergraduate curiculum prepares men and women for professional positions in (1) community services, (2) secondary and adult education, (3) home economics communications (journalism, radio and television), (4) extension, and (5) business. Programs meet the approval of the State Board of Education, state and federal offices of vocational and technical education; and the Cooperative Extension Service of the University.

Areas of study taken to complete the bachelor's degree programs include courses in three major areas-general education, professional education and specialization in areas of home economics. All students entering the Department should request an information sheet identifying required grade-point averages and other specific regulations for graduation.

Bachelor of Science, Master of Science and the Doctor of Education degrees are offered in the Department. The Ph.D. in the College of Home Economics with an emphasis in home economics education and administration is also offered.

Home Economics and Mass Communication

PROFESSOR AND HEAD, HOME ECONOMICS EDUCATION AND COMMUNITY SERVICES
Elaine Jorgenson, Ed.D.

Many job opportunities in business, industry, education and government are available for students majoring in home economics with a focus on any one of several mass communication specialties.

Students may develop double majors in home economics education and community services with advertising, public relations, radio-tv-film and news-editorial journalism. A minor in any of these areas or a combination of more than one area (mass communication, general) may be taken with a major in any department within the College of Home Economics. (See the *College of Arts and Sciences* section of this Catalog for information about the School of Journalism and Broadcasting.)

The media positions often filled by home economics communication specialists include writing and editing newsworthy stories and self-help information for the mass media dealing with food, nutrition, fashion, child care, family relations, education, consumer resources, housing, interior design and life styles; production of and participation in radio and television broadcasts; preparation of commercial messages for print and audio-visual media; market analysis and media selection; magazine and book editing; speech writing; and preparation of brochures and other promotional literature, product information and stockholder reports.

Interested students should confer early with appropriate faculty advisers in both the College of Home Economics and the School of Journalism and Broadcasting.

Housing Design and Consumer Resources

PROFESSOR AND HEAD
E. Carl Hall, Ed.D.

ASSOCIATE PROFESSORS
Dorothy Blackwell, M.S.
Sue Herndon, M.S.
William Johnston, Ed.D. (visiting)
Kay Stewart, Ph.D.

ASSISTANT PROFESSORS
Bonnie Braun, Ph.D.
Patrick Fitzgerald, Ph.D. **(visiting)**
Betsy Gabb, M.A.
J. **Neil "Jay" Gabb, M.A.**
Suzi Holder, M.S.
Kenneth Larson, B.A. (visiting)
Sharon Nickols, Ph.D.
John Raedeker (visiting)
Dorothy Soldan, Ph.D. (visiting)
Margaret Weber, Ph.D.
Sue Williams, M.S.

INSTRUCTORS
Robert C. Kiel, B.A.
Kathleen McPherson, M.A.

The undergraduate curriculum in housing, design and consumer resources enables the student to major in one of the three areas included in the Department. The degree requires 124 credit hours and leads to the Bachelor of Science degree in Home Economics.

For a career in housing an individual must be concerned with the social, economic, and other basic needs of the family, neighborhood and community. The designs, structures and materials of housing are studied from the standpoint of the consumer and the producer. Housing of various cultures and for special groups is included in this area. Interdisciplinary programs are available with other departments of the University. Graduates from housing are employed in local housing authorities, as consultants to builders and contractors, and in extension.

The ordered relationship of light, form, color and texture is studied in interior design, both in reference to objects and to the larger complex of rooms and architectural wholes. The history of design is investigated while also looking at the current trends in the design field. Individuals interested in interior design should be able to meet and work with people, to understand the meaning of suitability and service while having artistic, creative ability and knowledge. Graduates from interior design are employed by department stores, furniture manufacturers and interior design studios.

The consumer resource field includes study in consumer affairs, human resources, equipment and family economics. The principles of management are studied along with the management of human and nonhuman resources in relation to individuals and families. The selection and use of home equipment is investigated relative to time and motion and planned work areas. The social and economic changes of the individual and the family as a consumer are explored along with public policies and programs for the consumer. Graduates

from consumer resources are employed in both the private and public sectors, by extension and businesses in the area of consumer affairs.

A Master of Science degree program is also available through the Department. Graduate degree students assume responsible positions in university teaching, research, extension, government agencies and family economic counseling. A Ph.D. degree in home economics with emphasis in consumer and environmental studies is available.

Hotel and Restaurant Administration

ASSOCIATE PROFESSOR AND DIRECTOR
Baker Bokorney, Ed. D.

ASSISTANT PROFESSORS
Allene Brown, M.S.
Dan Emenheiser, M.S.
Sue Knight, Ph.D.
Bernice **Kopel,** Ed.D.
Earl Palan, M.S.

VISITING ASSISTANT PROFESSOR
Richard Tas, M.S.

The hotel, restaurant and club industry provides a wide range of professional management career possibilities for students genuinely interested in service-oriented industries. Opportunities within the industry for professional advancement and growth are unlimited.

Business and industry in hotels, motels, clubs, restaurants and discotheques are complex. Their management requires knowledge and skill in many areas for the proper use of a great number of products in a wide variety of processes. The guest or customer must be received in a courteous manner, housed in a well-kept space with modern appointments, tastefully decorated; served appetizing food, properly prepared, skillfully purchased, carefully stored and controlled. Professional management in the hospitality industry encompasses knowledge of a myriad of related and interrelated processes.

Career opportunities include a wide range of specializations in sales, personnel administration, labor relations, public relations and promotion, auditing, front office and general management positions. Positions as regional managers or directors for hotel, motel, restaurant, discotheque, industrial and institutional food management chains are additional possibilities. Airline catering, food processing, convenience food processing, vending and individual restaurant entrepreneurship are excellent career areas.

To meet the needs of the industry and to provide sound academic training at the undergraduate level, the curriculum emphasizes important areas of learning including professional and general education. The professional area

includes courses in accounting, law, finance, communications, insurance, marketing and personnel management. Courses in nutrition, food preparation, food and beverage purchasing and control, layout and design, interior design, sales and promotion, front office management, tourism and advanced hotel and restaurant management courses are also included in the specialized area. General requirements are met through courses in English and the natural and social sciences: humanities, political science, history and government, psychology, economics, speech, chemistry, mathematics and computer application. The B.S. degree in Hotel and Restaurant Administration may be earned by completing a minimum of 124 semester hours and maintaining a 2.30 grade-point average.

Special facilities for learning experiences include the Union Club and the catering and engineering areas of the Student Union, dining and food facility areas in the residence halls, and local businesses.

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

College of Veterinary Medicine

Patrick M. Morgan, D.V.M., M. P. H., Dr.P.H., *Dean*

J. Mack Oyler, D.V.M., Ph.D., Associate *Dean and Professor*
Robert M. Wood, D.V.M., D.T.V.M., M.P.H., Assistant to *the Dean*
A.L. Malle, D.V.M., *Coordinator for Continuing Education*
Eric I. Williams, F.R.C.V.S., M.S., *Director of Admissions and Student Affairs*
Dan E. Goodwin, D.V.M., Ph.D., *Director of Animal* Disease *Diagnostic Laboratory*
Louie G. Stratton, D.V.M., Ph.D., *Professor and Director of Boren Veterinary Medical Teaching Hospital*
Donald D. Holmes, D.V.M., M.S., *Director of Laboratory Animal* Resources
Eddie J. Richey, D.V.M., *Supervisor, Pawhuska Research Station*

Department Heads

Medicine and Surgery, *Fayne H. Oberst, D.V.M., M.S.*
Parasitology, Microbiology, and Public Health, *Sidney A. Ewing, D.V.M., Ph.D.*
Pathology, *Roger J. Panciera, D.V.M., M.S., Ph.D.*
Physiological Sciences, *Everett C. Short, Jr., B.S., D.V.M., Ph.D.*

Attainment of the degree of Doctor of Veterinary Medicine requires, at a minimum, six academic years of collegiate training. More commonly, seven to eight years are required. Four years of professional training in veterinary medicine are prescribed. 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; but the chances of gaining entrance into veterinary medical college with only the minimum preparation are not great. Most of the entering veterinary medical students in recent years have had three 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.

Preparatory Requirements. Collegiate course requirements for entry into veterinary medical college may be completed at any accredited university or college. At Oklahoma State University the requirements can be met by appropriate studies in either the College of Agriculture or the College of Arts and Sciences. Special pre-veterinary curricula are available at Oklahoma State University. Furthermore, both Colleges offer programs of study in pre-veterinary medical sciences which provide for the award of a B.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 Agriculture Aor the College of Arts and Sciences.

Listed below are the *minimum* collegiate course prerequisites for consideration for admission to the College of Veterinary Medicine.

English composition and ***public speaking-8*** semester **credit hours.**

Chemistry-A minimum of **17** semester credit hours. All chemistry courses must include laboratory work. A *minimum* of 5 semester credit hours of organic chemistry is required. The course should be one designed for pre-veterinary, pre-medical and pre-dental students and must include both the aliphatic and aromatic series of organic compounds. A *minimum* of 4 semester credit hours of biochemistry (at least *3* hours lecture and 1 hour laboratory) is also required.

Physics-8 semester credit hours. Physics courses must include laboratory work and the following topics: mechanics, heat, sound, electricity, magnetism and light.

Mathematics-3 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-A minimum of 14 semester credit hours. Courses in zoology, botany, 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.

Note-6 semester credit hours of American history and political science are required if a bachelor's degree is to be earned at OSU.

Veterinary Medical Studies. Entering classes in veterinary medicine are restricted in enrollment and are admitted once yearly at the beginning of the fall term. Applications for admission in the fall must be submitted by mid-January.

An applicant must be a legal resident of Oklahoma according to regulations governing pursuit of higher education in Oklahoma. Questions about residency should be directed to the Office of the Registrar, Oklahoma State University.

Students are admitted as candidates for the Doctor of Veterinary Medicine degree on the basis of records of academic performance in preparatory studies, personal interviews and references to determine personal characteristics and career motivation, and standard achievement tests.

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, the fourth starting immediately after the third without a summer vacation, and organized into six-week periods, with sectioning of the classes to provide for lower faculty-student ratio and for more efficient utilization of clinical facilities.

Medicine and Surgery

PROFESSOR AND HEAD
Fayne H. Oberst, D.V.M., M.S.

PROFESSORS
Ralph **G.** Buckner, D.V.M., M.S.
Lester Johnson, D.V.M.
Eugene M. Jones, D.V.M.
J. Mack Oyler, D.V.M., Ph.D.
Louie **G.** Stratton, D.V.M., Ph.D.
Eric I. Williams, F.R.C.V.S., M.S.

ADJUNCT PROFESSORS/ PRECEPTORS
G. F. Anderson, D.V.M.
Don Beavers, D.V.M.
Don Biles, D.V.M.
Robert Boss, D.V.M.
Gary C. Brantley, D.V.M.
Phillip R. Chitwood, D.V.M.
Ross D. Clark, D.V.M.
Marvin L. Denney, Jr., D.V.M.
Paul W. Edmundson, D.V.M.
Robert H. Featherston, D.V.M., M.S.
Edward A. Fell, D.V.M.
Bill Foster, D.V.M.
Harry James, D.V.M.
James Jensen, D.V.M.
Thomas R. Latta, D.V.M.
Thomas **G.** Loafman, D.V.M.
Thomas A. Martin, D.V.M.
Gloyd Miller, D.V.M.
A. M. Pearson, D.V.M.
William R. Roberson, D.V.M.
John F. Rule, B.S., D.V.M.
William **G.** Smith, D.V.M.
Ted L. Wiggins, D.V.M.
Paul Winsor, D.V.M.

UNIVERSITY LABORATORY ANIMAL VETERINARIAN AND PROFESSOR
Donald D. Holmes, D.V.M., M.S.

ASSOCIATE PROFESSORS
Robert R. Badertscher, D.V.M., Ph.D.
Lawrence E. Evans, D.V.M., M.S.
Harold V. Miller, D.V.M.
Thomas Monin, D.V.M.
Art J. Quinn, D.V.M.
Lawrence E. Rice, D.V.M., M.S.
Thomas R. Thedford, D.V.M.

ASSISTANT PROFESSORS
Clarke E. Atkins, D.V.M.
Selwyn J. **Barron, B.V.Sc.**

Mary H. Bowles, D.V.M.
John S. Chitwood, D.V.M.
Joseph P. Desch III D.V.M., M.S.
Dickey D. Griffin, D.V.M., M.S.
Paul E. Howard, D.V.M.
Charles G. MacAllister, D.V.M. (visiting)
G. David McCarroll, D.V.M.
Timothy M. Neer, D.V.M.
Felix D. Prater, D.V.M.
Eddie J. Richey, D.V.M.
Richard V. Shawley, D.V.M., M.S.
Steven H. Slusher, D.V.M.
Robert A. Smith, D.V.M., M.S.

INSTRUCTOR
Marshall R. Putnam, D.V.M.

RESIDENT
Gregor L. Morgan, M.B.Sc.

Parasitology, Microbiology and Public Health

PROFESSOR AND HEAD
Sidney A. Ewing, D.V.M., Ph.D.

PROFESSORS
Paul B. Barto, V.M.D., Ph.D.
Richard E. Corstvet, Ph.D.
Helen E. Jordan, D.V.M., Ph.D.
Patrick M. Morgan, D.V.M., Dr.P.H.

ASSOCIATE PROFESSORS
Anthony E. Castro, D.V.M., Ph.D.
John T. Homer, M.A., Ph.D.
Andrew A. Kocan, M.S.P.H., Ph.D.
Charles S. McCain, D.V. M., M.S.

ASSISTANT PROFESSORS
Joseph C. Fox, Ph.D.
Katherine M. Kocan, M.S.P.H., Ph.D. (adjunct)
Rebecca J. Morton, D.V.M., M.S.
Robert M. Wood, D.V.M., D.T.V.M., M. P. H. (adjunct)

INSTRUCTOR
James A. Jackson, Ph.D.

TEACHING ASSOCIATE
Pat T. Franks, D.V.M.

Pathology

PROFESSOR AND HEAD
Roger J. Panciera, D.V.M., Ph.D.

PROFESSORS
Bertis L. Glenn, D.V.M., Ph.D.
Donald D. Holmes, D.V.M., M.S.
Albert L. Malle, D.V.M.
Andrew W. Monlux, D.V.M., M.S., Ph.D.
Jeffie F. Roszel, V.M.D., Ph.D.
E.L. Stair, A.A., D.V.M., Ph.D.

ASSOCIATE PROFESSOR
Delbert L. Whitenack, D.V.M., Ph.D.

ASSISTANT PROFESSOR
Ronald D. Tyler, D.V.M.

RESIDENTS
Rick Cowell, D.V.M.
Paul Greenlee, D.V.M.
Dexter Reavis, D.V.M.

Physiological Sciences

PROFESSOR AND HEAD
Everett C. Short, Jr., D.V.M., Ph.D.

REGENTS SERVICE PROFESSOR
D. R. Peterson; D.V.M., M.S.

PROFESSORS
Calvin G. Beames, Jr., Ph.D.
James A. Breazile, D.V.M., Ph.D.
Jonathan D. Friend, D.V.M., M.S.
W. S. Newcomer, Ph.D.
D. R. Peterson, D.V.M., M.S.

ASSOCIATE PROFESSORS
George E. Burrows, D.V.M., Ph.D.
William C. Edwards, D.V.M., M.S. (adjunct)
Duane Garner, Ph.D.
Jerry G. Hurst, Ph.D.
Charlotte L. Ownby, Ph.D.
Theodore E. Staley, D.V.M., M.S.

ASSISTANT PROFESSORS
James T. Blankemeyer, Ph.D.
Lester L. Rolf, Ph.D.
Ann C. Rusoff, PH.D.

RESIDENT
Gregor L. Morgan, M.V.Sc.

Oklahoma Animal Disease Diagnostic Laboratory"

DIRECTOR
Dan E. Goodwin, D.V.M., Ph.D.

ASSISTANT DIRECTOR AND CHIEF PATHOLOGIST
E. L. Stair, D.V.M., Ph.D.

BACTERIOLOGIST
Rebecca Morton, D.V.M., M.S.

PATHOLOGIST
Billy J. Johnson, D.V.M.
Delbert L. Whitenack, D.V.M., Ph.D.

TOXICOLOGIST
William C. Edwards, D.V.M., M.S.

VIROLOGIST
Anthony E. Castro, D.V.M., Ph.D.

RESIDENTS
Larry Kerr, D.V.M.
Sharon R. Wilson, D.V.M.
Mark A. Zimmer, D.V.M.

Graduate College

Norman N. Durham, Ph.D., ***Dean***

Since the first enrollment of graduate students in 1910, Oklahoma State University has gained a reputation as one of the major centers for graduate study in the Southwest. Graduate degrees offered are Master of Arts, Master of Architecture, Master of Architectural Engineering, Master of Business Administration, Master of Engineering, Master of Science, Specialist in Education, Doctor of Education and Doctor of Philosophy. Master's degrees may be earned in 68 fields, the Ed.S. in 6 fields and the Ph.D. or Ed.D. in 44 fields.

The Graduate College administers advanced study and degree programs under the supervision of the Graduate College faculty. Individual members of the general faculty are elected to membership in the Graduate Faculty in recognition of scholarly and creative accomplishments in their respective disciplines. Graduate College policies prescribed by the Graduate Faculty are designed to assure high-quality programs and effective interaction among faculty members and graduate students. These regulations are described in the *Graduate Catalog.*

The purpose of graduate programs is to provide an opportunity for advanced scholarly work to well-qualified students. Graduate students are encouraged to attain a broad education while pursuing a specialized field of their choice. Formal courses, individual and small group contact with a major adviser and other faculty scholars, independent study in up-to-date libraries and laboratories, and application of knowledge in the classroom and field are the means by which desire and capacity for independent study, research and teaching are developed.

Graduate study offers a unique challenge to the graduate student which differs sharply from his or her undergraduate experience. Students must provide initiative and assume responsibility for the progress of their studies. The basis for conferring the degree is not merely credit hours, but high attainment in a major field and thorough understanding of scholarly processes. To this end, the University offers its laboratories, its libraries and association with experienced scholars ready to guide and inspire.

Information about the Graduate College, courses, degrees offered and requirements for degrees may be obtained by writing the dean of the Graduate College, Oklahoma State University, and requesting a copy of the *Graduate Catalog.*

General Information

The University

Oklahoma State University was founded in 1890 as Oklahoma Agricultural and Mechanical College. The name was changed to reflect its University status in 1957. The University, proud ofits land-grant heritage, takes seriously the commitment to promote liberal and practical education on the campus, throughout the state of Oklahoma, and in those areas of the nation and world where its special talents can be put to use.

Oklahoma State University is located in north central Oklahoma in Stillwater, a town of about 25,000 population. The OSU campus is one of exceptional beauty with modified Georgian architecture in all buildings, University property includes the main campus of 415 acres at Stillwater, and lands and farms totaling 5,300 acres. In addition, the University holds title to the Lake Carl Blackwell area, containing 19,364 acres and a lake covering 3,380 acres, which provides recreational and experimental facilities and the University's water supply.

The Graduate College. Graduate study at Oklahoma State University was initiated in 1910. The first master's degree was granted in 1912 and the first doctoral degree in 1942. The Graduate College provides an opportunity for and coordinates advanced study in academic and professional areas across the University. It encourages and facilitates research and other creative and scholarly activity by the Graduate Faculty and students.

The College administers regulations and standards specified and established by the Graduate Faculty. The Graduate Council is elected by the Graduate Faculty to work with the Dean of the Graduate College in development and administration of policy.

The Division of Agriculture. Consists of the College of Agriculture, the Agricultural Experiment Station and the Agricultural Extension Service.

The College of Arts and Sciences. Includes Arts and Sciences Research and Extension Services and the School of Journalism and Broadcasting, and the School of Health, Physical Education, and Leisure.

The College of Business Administration. Includes the Business Extension Service and Business Research.

The College Of Education. Includes the Education Extension Service and Education Research.

The Division of Engineering, Technology and Architecture. Consists of the School of Engineering, the School of Technology, the School of Architecture, DETA Research and DETA Extension.

The Division of Home Economics. Consists of the College of Home Economics, the School of Hotel and Restaurant Administration and Home Economics Research.

The College of Veterinary Medicine is part of the Veterinary Medical Center which also includes the Oklahoma Animal Disease Diagnostic Laboratory and the Boren Veterinary Medical Teaching Hospital. Included in the Hospital, which was dedicated in 1981, are large and small animal clinics, areas for radiology and special medicine and facilities for faculty and students.

The Graduate Faculty Council. The Graduate Council is the executive committee of the Graduate Faculty. It formulates and reviews policies concerned with the conduct of graduate study at Oklahoma State University. All new policies are referred to the Graduate Faculty for approval.

All departmental requests for permission to offer advanced degrees are referred to the Graduate 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 this Catalog must be in the form of petitions to the Graduate Council. A supporting letter from the major adviser is also required. The Graduate Council meets monthly except for August and September.

Accreditation

Oklahoma State University is on the list of approved institutions of the Association of American Universities. It has been continuously accredited by the North Central Association of Colleges and Secondary Schools as a degree-granting institution since 1916. It is also a member of the Association of Land-Grant Colleges, the Association of American Colleges and the American Council on Education. The University is on the approved list of colleges and universities of the American Association ofUniversity Women. It is accredited by the National Council on Accreditation of Teacher Education.

It is an institutional member of the American Association of Colleges for Teacher Education, and the National Association of Schools of Music. It is a member of the Associated Collegiate Schools of Architecture, and its School of Architecture and the College of Engineering are registered by the University of the State of New York. Curricula in agricultural engineering, architectural engineering, general engineering, chemical engineering, mechanical engineering, electrical engineering, civil engineering and industrial engineering are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (formerly ECPD). In addition, the architectural program in the School of Architecture is accredited by the National Architectural Accrediting Board. The College of Veterinary Medicine is accredited by the Council on Education of the American Veterinary Medical Association. The School of Journalism is accredited by the

American Council on Education for Journalism. The College of Business Administration is fully accredited by the American Assembly of Collegiate Schools of Business. The Department of Forestry is accredited by the Society of American Foresters. The doctoral program in clinical psychology is accredited by the American Psychology Association under the aegis of the National Committee on Accrediting. The M.S. degree program in Rehabilitation Counselor Education in the Department of Psychology is accredited by the National Commission on Accrediting through the Council on Rehabilitation Education.

The University Library

Conveniently situated in the center of the campus, the attractive Williamsburg-style Library building contains over 1,250,000 volumes which support the diverse academic and research programs of the University. In keeping with its tradition of service, the Library has a friendly and competent faculty and staff, an open-stack arrangement so that patrons may browse and select their own materials, and coin-operated photocopy machines (5 cents per copy) located throughout the building for patron convenience. The hours of Library operation are from 7 a.m. (8 a.m. on Saturdays; 1 p.m. on Sundays) until midnight when classes are in session. These hours are reduced slightly when classes are not in session.

A new service, computer-assisted literature search and retrieval, was introduced by the Library in March of 1978. Known as ON-LINE, the new service provides instantaneous access to more than seventy computerized data bases located in different parts of the United States relating to nearly every area of campus teaching and research interest. The service is available to interested faculty and graduate students who are willing to pay for the on-line computer and communications time and any off-line printing that may be requested. Inquiries concerning ON-LINE should be directed to the appropriate reference desk where brochures are available which describe the service.

To improve operational efficiency and to provide greater conveniences for patrons, Library circulation services are centralized on the first floor. Library materials to be taken from the building must be checked out from this area. Exceptions to the centralized plan are Reserve (1st fl., SW), the Documents Department (5th fl.), and the Curriculum Materials Laboratgry (5th fl., SE) which continue to check out their own materials. In general, material in the Non-Book Room (1st fl., SE) and in Special Collections and the Map Room (3rd fl., S) are noncirculating, and current periodicals may not be checked out except by special arrangement with the division head in the area where the item is shelved.

Library materials are arranged in broad subject areas: physical sciences and engineering (basement); biological sciences and agriculture (first floor); fine arts and humanities (third floor); social sciences and education (fourth floor). The general reference area and the information desk are located on the

Library's second floor. Each of these areas as well as those described below has its own faculty and staff working under the direction of an experienced librarian with specialized training in the subject fields of that division or department. Graduate students are encouraged to make themselves known to the librarian in their area of study so that they may receive personal assistance. The Veterinary Medicine Library is housed outside the main Library.

Documents. Located on the fifth floor of the Library, the documents collection is considered by many to be the best in the Southwest, containing information on almost every subject. The department is regionally noted for its collection of U.S. patents. The documents area serves as a depository for all publications distributed by the United States Government Printing Office and the state of Oklahoma. In addition, documents are received from many surrounding states as well as nondepository materials issued by federal agencies-including the U.S. National Aeronautics and Space Administration, the Department of Health, Education and Welfare, and the U.S. Department of Agriculture. Publications of foreign governments and international organizations are also acquired in fields of special interest to the University. All sales publications are obtained from the Council of Europe, the International Trade Organization (GATT), the Organization for Economic Cooperation and Development, the Organization of American States, and the United Nations.

MapS.The Map Room of the Edmon Low Library houses the largest and most comprehensive collection of maps in the state. This collection contains over 120,000 maps, as well as 70,000 aerial photographs of Oklahoma. The Map Room is a depository for maps from both the Defense Mapping Agency and the United States Geological Survey, and its collections provide complete USGS topographic coverage of the United States.

MicrOforms.Numerous manuscripts, research reports, theses, books, periodicals, documents, and newspapers are available on the more than 900,000 pieces of microform which are housed in the Non-Book Room. In addition to the back files of newspapers on microfilm, including the *New York Times* and the London *Times,* this collection also contains large sets of material on microform, such as Landmarks of Science, Early American Imprints, Early English Books, and Western Americana. Staff members are available to locate material, to make paper copies from microfilm and microfiche, and to assist patrons with questions.

Interlibrary Loan. Interlibrary loan service is available at the OSU Library to students and faculty for obtaining material they need to carry out advanced University-related research. All borrowing and photocopying is done within the provisions of the *General Interlibrary Loan Code* of the American Library Association and those of the *Oklahoma State Interlibrary Loan Code.* Inquiries

regarding this service may be made at any subject division reference desk or at the Information Desk on the second floor.

Special Collections. The Special Collections area contains a diverse group of noncirculating collections which relate to OSU and its history, Oklahomiana, rare books and manuscripts. Books and journals in the OSU, Oklahomiana, and Rare Book Collections are listed in the main card catalog. Special finding aids and indices are available in the Special Collections area for locating material in the OSU classified collection, the vertical file collections and the manuscript collection. The latter contains the papers of two former Oklahoma governors, Henry S. Johnston and Henry F. Bellmon. The Special Collections area, which provides a reading room for patrons using this material, is on the third floor of the Library.

The Organization of Research

The creation and discovery of new knowledge through research and the dissemination of this knowledge to society is one of the most important missions of any major university. In addition research and creative activities at the university provide an avenue of instruction for graduate students to develop their capability for independent study and thought. Sound instruction and effective research are mutually supportive. In fact, they are so intertwined it is many times difficult to distinguish between research and teaching activities at the graduate level. Research activities also serve as an important component in the improvement of undergraduate as well as graduate instruction. At Oklahoma State University funds for the support of research are derived through the research offices in all of the colleges. These research offices are utilized to assist faculty and students in developing and transmitting proposals for grants and contracts to the appropriate outside funding agencies. The Resource Institute and the Office of the Assistant Vice President for Research also are available for information and assistance in developing research projects.

University Research Council. A University Research Council operates to assure proper consideration of research projects which 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 Assistant Vice President for Research, the Dean of the Graduate College, the Director of University Extension, a representative of the Faculty Council, a representative from Sigma Xi, the Director of Grants and Contracts Administration, and the Research Directors of the various colleges. The Research Council meets quarterly.

Research Facilities and Resources. Every major university must have state-of-the-art equipment and facilities for the support of research if it is going

to accomplish the mission of generating new knowledge. The various colleges at the University are extremely well equipped to pursue their various special areas of research. Clearly, major equipment items such as electron microscopes, nuclear magnetic resonance spectrometers, mass spectrometers, gas chromatograph-mass spectrometers, x-ray and laser systems, and crystal growth facilities are important to the pursuit of research in the areas of Agriculture, Arts and Sciences, Engineering, Home Economics, and Veterinary Medicine. The College of Business Administration and the College of Education utilize the excellent University computer facilities as well as their own specialized research equipment for the pursuit of research in their fields.

In addition to maintaining state-of-the-art equipment in the various colleges, the University does support the concept of research centers and institutes. It is the purpose of the University to maintain these various institutes and centers so they can compete with the very best in the nation. The Institute for Water Research and the Institute for Energy Analysis are nationally recognized. In addition a number of centers which are located in the colleges of the University exist to support research both in the college and as needed outside the college. The centers that have been formed most recently are the Center for Laser Research Studies and the Center for Application of Remote Sensing. In addition, long-standing centers such as the Statistics Laboratory within the Department of Statistics provide service for research in other areas of the University in addition to their own programs of teaching and research.

Perhaps the most impressive aspect of the research facilities and resources of Oklahoma State University is the cooperative attitude of the faculty and the students. In a number of instances it is important to pursue problems in a multidisciplinary mode where cooperation is extremely important. At Oklahoma State University cooperation is a way of life.

Environmental Sciences

The University's broad range of research, teaching, and public service activities which contribute to solving environmental problems are coordinated through the Resource Institute. As part of the environmental programs, many departments cooperate by offering a study opportunity to masters and doctoral level students who desire to develop special understanding and proficiencies in the environmental area while meeting basic requirements for a degree in their chosen academic area. This program recognizes needs of industry and governmental agencies who are seeking to employ individuals with a combination of specialized disciplinary training and the ability to contribute to the solution of problems associated with the environment which require a multidisciplinary approach.

A core curriculum has been developed to assist the student in identifying courses. Students can select courses from the behavioral, social, humanistic,

biological, and physical sciences which relate to environmental problems and solutions. The core includes several courses that were especially developed to meet the broad needs of graduate students in this option, assure a high-quality graduate program, and allow faculty members from different disciplines to cooperate through joint planning and team teaching. These courses emphasize a problem approach to environmental studies using basic knowledge from the sciences.

Students interested in environmental sciences should consult with faculty members in their department or with the Graduate College to determine specific procedures and requirements.

MASUA Traveling Scholar Program

As a member of the Mid-American State Universities Association, Oklahoma State University participates in the MASUA Traveling Scholar Program. Universities cooperating are Iowa State University, University of Kansas, Kansas State University, University of Missouri at Columbia, Kansas City, Rolla and St. Louis, University of Nebraska, University of Oklahoma and Oklahoma State University.

The MASUA Traveling Scholar Program is designed to provide breadth and depth in the opportunities for graduate study offered at MASUA universities by permitting advanced graduate students to study for a term at another MASUA university where they may utilize unique facilities or specializations.

Graduate students at MASUA universities are eligible to participate in this program for a minimum of one term of enrollment. The student's major adviser initiates the proposal for the student's participation by contacting the professor at another MASUA university where the student wishes to study. The dean of the graduate college at each MASUA university involved must concur in the proposed participation. During the term in which they are participants, students will register in GRAD 5880 for the appropriate number of hours and pay fees at their home university. For additional information concerning the MASUA Traveling Scholar Program, contact the Dean of the Graduate College.

Tuition and Fees

A $40.00 deposit, which is refundable, is required of all new or readmitted students.

All students, residents and nonresidents, are charged a general fee which includes the individual charges for registration, library, laboratory, health services, 4-H Club and Student Activity Building fee, student activity tickets, and other student service fees.

Resident Fees. $22.50 per credit hour.

Nonresident Fees. $68.50 per credit hour.

Occasional Fees: Occasional fees are charged as required:

Late registration. A fee of $5 per day is collected. This fee is charged beginning on the first day of classes. The maximum charge is $10.

Graduation fee. Master's degree-$15; Specialist in Education and Doctor's degree-$20.

Late payment fee. Fee is $1 to $5 maximum.

Reinstatement fee. Fee $5.

Thesis binding fee. $13.50.

Dissertation microfilming fee. $30.00.

Academic robe requirement. A cap and gown, and if necessary a hood, must be rented or purchased for commencement.

Fee for special services. (Required of all students)

Student Union fee: $12.25 per semester, $6.12 per summer term.

Health, Physical Education and Recreation Fee: For students enrolled in 6 or more hours, $19.20 per semester. For fewer than 6 hours, students pay $9.60 per semester. The summer rate is $9.60 per student.

Student Health Services. $18.25 per semester, $9.12 per summer term.

Withdrawal Refund Policy. Students withdrawing from the University (not to be confused with dropping a course) prior to completion of the semester must pay certain percentages of their total fees in order to cover administrative and/or instructional expenses. These will be levied in accordance with the schedule below:

Withdrawal prior to the third week of classes of a semester or second week of a summer session:	20% of total fees
Withdrawal during third or fourth week of classes of a semester or second week of a summer session:	50% of total fees
Withdrawal during fifth or sixth week of classes of a semester or third week of a summer session:	75% of total fees
Withdrawal after sixth week of classes of a semester or the third week of a summer session:	100% of total fees

Fellowships, Traineeships and Assistantships

The University participates in Federal fellowship programs through the National Science Foundation, United States Office of Education and the United States Public Health Service. It also offers traineeships through Federal programs sponsored by the National Science Foundation, and the United States Public Health Service. The Dean of the Graduate College and the head of the prospective major department can furnish specific information about available programs and will provide help and advice to students wishing to apply.

The University yearly awards numerous teaching and research fellowships and assistantships with competitive stipends. The terms of appointment

are one semester or longer. 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. The Graduate College has a limited number of Fee Waiver Scholarships for Oklahoma residents. They are awarded through departments and are based on scholarship and scholarship/need.

Housing

University owned apartments, furnished and unfurnished, ranging in size up to three bedrooms are available to married students. More information about them may be obtained by writing to the Manager, Married Student Family Housing, Oklahoma State University, Stillwater, Oklahoma 74078.

Unmarried students may obtain room and board in University dormitories. Information about these accommodations may be obtained by writing to Residence Halls Housing, Second Floor, Student Union, Oklahoma State University, Stillwater, Oklahoma 74078.

Off-campus, privately owned apartments are also available in Stillwater, as are rooms in private homes. For information, write to the Dean of Student Affairs, 370 Student Union, Oklahoma State University, Stillwater, Oklahoma 74078.

Student Health Services

It is required that all students enrolling at Oklahoma State University for the first time present a record of a physical examination by their local or family physician prior to enrolling, or else a recent equivalent record of physical examination, such as from a place of employment or a school, or in the Armed Forces. However, a student must complete the front page of the OSU *Medical History and Physical Examination Record.* This health report is for determination and evaluation of the condition of the student so that the student may be better served by the University.

In addition to the physical examination, each student is required to have had an Intradermal Tuberculin Test or a chest X-ray. He/she is advised to have a successful smallpox vaccination, polio shots and a tetanum/toxoid immunization.

Oklahoma State University is as interested in the students' physical and emotional well being as it is in their intellectual and cultural development. Good health will not guarantee academic success, but it will help; and poor health, either physical or emotional, can impair both academic and extracurricular careers.

The University Hospital and Clinic maintains a staff of 6 full-time physicians, 2 clinical psychologists, 15 registered nurses, 2 laboratory and X-ray technicians, a physio-therapist, a dietitian and other necessary supportive and ancillary personnel who make a specialty of providing the best

possible care at the least possible expense for students. Along with this full-time help, there are part-time specialists in internal medicine, psychiatry and radiology. Specialists in all other fields are available for individual cases as consultants if needed.

The latest in modern diagnostic X-ray, physio-therapy and laboratory equipment is available for use in the hospital and clinic. Most injuries and illnesses can be cared for, except major surgical cases, which can be diagnosed and then referred to either the family surgeon if time permits, or to a local surgeon in Stillwater.

There are no charges for office visits to see the physicians, or for allergy shots, and most physio-therapy treatments. Most of these services are covered by a portion of the general fee paid by the student. To cover direct costs of laboratory, X-ray, pharmacy and hospital services a moderate fee is imposed. The clinic is open from 8 a.m. to 11:45 a.m. Monday through Saturday and 1 p.m. to 4:45 p.m. Monday through Friday.

There are 19 beds available for hospitalization and isolation if needed. A registered nurse is on duty in the hospital at all times for emergency care of patients and a physician is on call at all times.

Graduate Degree Programs

Accounting, MS
Agricultural Economics, MS, PhD
Agricultural Education, MS, EdD
Agricultural Engineering, MEngr, MS, PhD
Agronomy, MS, PhD (in Crop Science and Soil Science)
Animal Science, MS
Animal Breeding, PhD
Animal Nutrition, PhD
Applied Behavioral Studies, MS, EdS, PhD
Architectural Engineering, MArchEng
Architecture, MArch
Biochemistry, MS, PhD
Bioenvironmental Engineering, MEngr, MS
Botany, MS, PhD
Business Administration, MBA, PhD (Accounting, Marketing, Management, and Finance)
Business Education, MS, EdD
Chemical Engineering, MEngr, MS, PhD
Chemistry, MS, PhD
Civil Engineering, MEngr, MS, PhD
Clothing, Textiles and Merchandising, MS
Computing and Information Science, MS
Corrections, MS
Crop Science, PhD
Curriculum and Instruction, MS, EdS, EdD
Dairy Science, MS
Distributive Education, MS
Economics, MS, PhD
Educational Administration, MS, EdS, EdD
Electrical Engineering, MEngr, MS, PhD
English, MS, PhD
Entomology, MS, PhD
Environmental Science, MS, PhD
Family Relations and Child Development, MS
Food, Nutrition and Institution Administration, MS
Food Science, MS, PhD
Forest Resources, MS
General Engineering, MEngr, MS, PhD
Geography, MS
Geology, MS
Health, Physical Education, and Recreation, MS
Higher Education, MS, EdS, EdD
History, MA, PhD
Home Economics, PhD
Home Economics Education, MS, EdD
Horticulture, MS
Housing, Design, and Consumer Resources, MS
Industrial Arts Education, MS
Industrial Engineering and Management, MEngr, MS, PhD
Mass Communications, MS
Mathematics, MS, PhD
Mechanical Engineering, MEngr, MS, PhD

Microbiology, MS, PhD
Natural Science, MS
Occupational and Adult Education, MS, EdS, EdD
Philosophy, MA
Physics, MS, PhD
Physiological Sciences, MS, PhD
Plant Pathology, MS, PhD
Political Science, MA
Poultry Science, MS
Psychology, MS, PhD
Rural Adult Education, MS
Sociology, MS, PhD
Soil Science, PhD
Speech, MA
Statistics, MS, PhD
Student Personnel and Guidance, MS, EdS, EdD
Technical Education, MS
Trade and Industrial Education, MS
Veterinary Parasitology, MS,
Veterinary Pathology, MS, PhD
Wildlife Ecology, MS, PhD
Zoology, MS, PhD

Abbreviations:

MA.....Master of Arts
MS ...Master of Science
MArch ... Master of Architecture
MArch Eng ... Master of Architectural Engineering
MEngr ...Master of Engineering
MBA ....Master of Business Administration
EdS.....Specialist in Education
EdD .....Doctor of Education
PhD.....Doctor of Philosophy

General Regulations

Responsibilities

All graduate students are expected to *read* and to *comply* with the written regulations. The regulations presented'in this Catalog may be supplemented by written departmental or program requirements available at departmental offices. General regulations in the following sections relate to requirements for admission, registration, enrollment, and graduate credit toward a degree. Succeeding sections outline requirements for the following degrees: Master's, Specialist in Education, Doctor of Education, and Doctor of Philosophy. 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 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 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 Council to evaluate reasons for requesting a waiver and to make a decision concerning departure from normal Graduate College regulations.

Admission to Graduate College

Qualified graduates of colleges and universities of recognized standing are eligible to seek admission to the Graduate College. Applicants may obtain application forms from the Graduate College office and must submit in *duplicate,* to the Graduate College, the completed application forms along with official transcripts of *all* academic work and degrees received.

(1) The student should request the institutions previously attended to send two copies of the official transcript to the Graduate College, Oklahoma State University, if the student does not have copies available.

(2) 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 for processing prior to enrollment, application forms and transcripts should be received by the Graduate College at least 30 days prior to expected enrollment. Transcripts and other credentials become the property of the University and must remain on file in the Registrar's office.

International applicants are expected to submit applications, transcripts, results of English Proficiency Test (TOEFL examination, etc.) by March 1 for Fall enrollment and by July 1 for Spring enrollment.

Since many departments require *standardized test scores,* such as those on the Graduate Record Examination, applicants must contact the appropriate department head for information regarding departmental requirements for these tests.

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 in 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 status of admission granted to the student as described in the following sections.

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/she does not have immediate plans to become a degree candidate but wants to take graduate courses or prerequisites.

(1) A special student must meet all of the academic requirements described for unqualified admission except that he/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/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 9 semester credit hours*** of coursework taken while a special student may be used on a plan of study to meet requirements for a degree.

Graduate Adjunct Status. A student with a bachelor's degree who is academically admissible but who has not been formally admitted to the Graduate College and wishes to enroll for a semester, summer session, workshop, or institute may be admitted as a "graduate adjunct."

(1) The adjunct forms, when properly completed, will be accepted in lieu of some credentials required of students seeking formal admission.

(2) Adjunct admission permits enrollment only for the semester or session for which the student applies. *Any future enrollment requires another application for admission.*

(3) If, at any later time, the applicant wishes to apply for admission to a degree program in the Graduate College, he or she must make normal application and submit all credentials including a complete official transcript of college and university work. Participation in the academic program as a "graduate adjunct" does not assure the applicant that the student will be formally admitted as a candidate for an advanced degree.

(4) The student may, after formal admission to the Graduate College, petition that work taken on an adjunct basis be applied toward an advanced degree. *No more than 9 credit* ***hours will be accepted toward a degree program.***

Graduate Student-Professional. Students with a bachelor's degree or equivalent level of academic attainment who wish to improve their professional competence by participating in postbaccalaureate study in a professional degree program may be admitted in the status of Graduate Student - Professional.

(1) Students admitted in this status, but desiring admission to a graduate degree program, must *submit a new application.*

(2) The student should be aware that only selected courses taken in this category, as recommended by the major adviser and approved by the Graduate College, may be used to meet requirements for advanced degrees such as the Master of Science, Doctor of Education, or Doctor of Philosophy. *Not all courses used to meet requirements for the professional degree can be used to meet requirements for graduate degrees.*

Unclassified Graduate Student Status. Students with bachelor's degrees from accredited colleges or universities may be admitted as "unclassified students" in the Graduate College on the basis of educational services, ***other than degrees,*** which can be extended to them in meeting their individual needs.

(1) The category of unclassified graduate students may include individuals working on teacher certification and postbaccalaureate objectives other than a graduate degree.

(2) No credit earned under this classification can be used toward a graduate degree at Oklahoma State University or at any other university.

Probation or Provisional Status. Applicants who are graduates of accredited colleges and universities who have attained less than an acceptable

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 to an unacceptable level (below 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.*

Graduate Credit for Seniors

Senior students who are graduating at the end of a semester or summer session may take graduate courses for graduate credit under the following conditions: (1) the credits must not be required or needed for the bachelor's degree; (2) the total registration must not exceed 18 credit hours for a semester or 9 credit hours for the summer session; (3) the student must either complete the requirements for the bachelor's degree at the end of the semester or 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; (4) admission to courses taken for graduate credit must have the approval of the head of the department in which the courses are offered and the Dean of the Graduate College; (5) not more than 14 credit hours taken while a senior may be approved for graduate credit, and a minimum of 16 credit hours must be completed in residence after the student registers in the Graduate College; (6) 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 for an advanced degree; and (7) 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 a minimum 3.0 grade-point average in *all* courses taken during the semester to receive graduate credit.

The request to receive graduate credit must be made on forms available in the Graduate College office before the end of the fifth week of class instruction of a regular semester or the second week of a summer session.

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 completed prior to admission at Oklahoma State University is as recommended by the student's advisory committee and approved by the Dean of the Graduate College at the time a program of study is planned.

Departmental or Group Requirements

Departmental or group requirements are in addition to the general requirements, and the student should consult the *Departmental Announcements* section of this Catalog. The general prerequisites to major in a department or field are given in that section. The department or major field decides whether similar work taken in another institution can be substituted for Oklahoma State requirements.

A student who desires further information about departmental requirements for a degree should write to the department in which he or she desires to major and enclose a transcript of all previous college and university work.

English Proficiency Tests for International Students

Before international students can complete their first enrollment at Oklahoma State University they are required to take certain English proficiency tests administered by the Oklahoma State University Department of English. These tests are scheduled on campus before each semester and summer session by the Graduate College in cooperation with the Bureau of Tests and Measurements prior to Orientation for International Students. These tests are in addition to any English proficiency test required as a part of the application for admission to the Graduate College.

Should a student's composite score on these tests indicate a need for further work in English, the student will be' required to enroll in a non-graduate-credit English course until the deficiency is removed.

Registration

Registration (enrollment) blanks for graduate students may be secured at the office of the Dean of the Graduate College. To receive credit for work being taken, the graduate student must be registered. Students in the Graduate College may enroll in a course without graduate credit or audit courses if such courses are recommended by an adviser and approved by the Dean of the Graduate College.

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 in an undergraduate school, the courses taken cannot be given graduate credit at some subsequent date.

Students who desire to enroll concurrently in another institution or by extension from this University must secure advanced approval from the Dean of the Graduate College and the Academic Council.

If the student is studying for an advanced degree, the trial study form must be approved by the adviser. A special student (see Special Student Status) must have approval of the Dean of the Graduate College to enroll.

Students will not be permitted to enroll or to add a course after the second week of a semester or the first week of a summer session. For short courses of less than 8 weeks, students will not be permitted to enroll after the second day of classes. Provisions for withdrawing from the University and dropping courses are described in the Oklahoma State University Catalog.

Enrollment Procedure

DEGREE CANDIDATE

MAJOR DEPARTMENTAL ADVISER

SPECIAL STUDENT
ADJUNCT STUDENT
UNCLASSIFIED

GRADUATE **COLLEGE** APPROVAL
202 Whitehurst

$40.00 DEPOSIT*
Bursar's Office
First Floor, Whitehurst

SECTIONING
Fourth Floor
Student Union

I.D. VALIDATION
Fourth Floor
Student Union

* New and readmitted students only.

Extent of Enrollment

Any graduate student using the facilities and faculty resources of the University must be enrolled.

Graduate students are expected to demonstrate a planned and orderly program for matriculation as indicated by enrollment. Every student is expected to satisfactorily complete no fewer than six semester credit hours during the academic year (Fall, Spring and Summer). Students may satisfy this requirement by enrolling for the required hours during any one term or by continuous enrollment during the three terms.

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 adviser and approved by the Dean of the Graduate College; however, should part or all of the courses be for graduate credit, the total registration shall not exceed 18 credit hours for a semester or 9 semester credit hours for a summer session. Regardless of the number of hours taken, a student may not count toward a degree more than 16 credit hours taken in a semester nor more than 9 semester credit hours earned in a summer session. For short-course sessions less than 8 weeks in length enrollment shall not exceed 1 credit hour for each week.

Full-time employees of the University are generally not permitted to register for more than 4 semester credit hours each semester, 8 semester credit hours for the academic year, and 2 semester credit hours in a summer session. A staff member teaching full time, on the written approval of the department head, the dean of the college in which the staff member teaches and the Vice-President for Academic Affairs may register for 6 semester credit hours of graduate work in a semester and 3 semester credit hours in a summer session.

Graduate students employed 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 22 hours per week may not register for more than 10 semester credit hours ofcoursework for a semester and 5 hours during a summer session. Other employment will permit registration for an appropriate number of hours. However, graduate students whose employment is such that results will be used for a thesis shall register for such additional thesis credit as may be recommended by the research adviser and approved by the Dean of the Graduate College.

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 staff members in the Schools of Engineering holding the rank of assistant professor or above.

Enrollment of Students During the Research Phase of the Program

Since enrollment reflects the involvement of University faculty members, the graduate student should be enrolled in thesis and/or problems courses for credit during the entire research phase of the student's program. Such enrollment may be nominal in credits earned, and such enrollment is not limited by the maximum number of credit hours of thesis which may apply toward a degree. A student pursuing graduate study *in absentia* may enroll by mail through his adviser.

All students who plan to complete the requirements for a degree by presenting a thesis or report and submitting to an oral examination must be enrolled in not fewer than 2 hours of thesis credit (or coursework credit for

Master's candidates only) for the semester or summer session in which the examination is scheduled, or other requirements are met.

Registration Requirements for Employed Students and Fellows

Any person holding a University appointment and/or fellowship requiring that the person be a graduate student must enroll in not fewer than 3 semester credit hours during each semester and not fewer than 2 semester credit hours for each summer session while in such status.

Extension Courses

Any student registering in a graduate course to be taken by extension must make application for admission to the Graduate College.

Graduate Centers

The University maintains Graduate Centers at Oklahoma City and Tulsa. Students may take one-half of the requirements for the master's degree at one or both of these Graduate Centers provided they comply with the conditions enumerated below.

1. Each student working for a degree must comply with requirements for admission given in this Catalog.
2. At least 22 semester credit hours must be completed after the plan for the degree has been approved by the student's advisory committee and the Dean of the Graduate College, and filed in the Graduate College. A minimum of 16 semester credit hours must be taken in residence on the Stillwater campus.
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 8 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

A master's degree in engineering may be obtained with all course requirements being met at off-campus centers of the 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 this Catalog, must be met.

Such a master's degree has the same designation as the one earned on-campus, except that the transcript will show the following words: "Off-Campus."

Correspondence Courses

The Oklahoma State University does not offer graduate courses by correspondence and does not accept credit taken by correspondence toward an advanced degree.

Graduate-Credit Courses

Courses numbered 5000 and above are primarily for graduate students, and only graduate students and selected seniors may enroll in them.

Courses numbered 3000 and 4000 may be taken for graduate credit if identified for graduate credit in the course list.

Some courses not identified for graduate credit in this College Catalog may be used to meet a part of the requirements for an advanced degree if they are approved by the student's advisory committee and the Dean of the Graduate College. These courses must be included in a complete plan of study and approved by the advisory committee before they are submitted to the Dean of the Graduate College. They cannot be approved as separate courses, and must be carried for one hour less credit on the study plan than they normally carry.

Minimum Grade Requirements

An average of "B" (3.0) is required to (1) maintain good standing as a graduate student and (2) meet requirements for a degree. Grades in all courses taken while in graduate student status (other than unclassified) are used in determining whether a student has met a "B" average requirement to remain in good standing, whether or not they apply toward an advanced degree.

In determining whether a student has met requirements for receipt of a degree, grades in thesis, report, and special problems are averaged separately from other courses on the plan of study. A student must have a "B" average in thesis, report and problems courses and also a "B" average in all other courses on the plan of study. 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 stricter requirements, and the major department should be consulted concerning minimum grade requirements.

Graduate Student Pass-No Pass Grading System

Graduate students may take a course utilizing the " Pass-No Pass" grading scheme with the consent of their major adviser and the Dean of the Graduate College, but courses taken under this scheme *cannot* be used on a plan of study to meet graduate degree requirements unless the following requirements are met.

The "P" or "NP" grade refers only to the final grade in the course as recorded by 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. For graduate students, "P" indicates a grade equivalent to an "A", "B", or "C" while "NP" indicates a grade equivalent to "D" or "F".

A graduate student wishing to use a course taken on a "Pass-No Pass" basis on his/her Plan of Study to meet degree requirements *must* submit a letter along with the packet at the time of enrollment to the major adviser. The major adviser will consider the request and if approved, the letter and enrollment packet will be submitted to the Dean of the Graduate College for approval. A student who chooses the Pass-No Pass grading scheme may change to the usual grading system with the consent of his/her major adviser and the Dean of the Graduate College any time prior to the second week of classes for a semester or prior to the beginning of the second week of classes for a summer session. Once the deadline has passed, a student will not be permitted to change his/her choice of grading system.

Application for Degree

At the time of enrollment for what is presumably the last semester or summer session of work toward a degree, the student completes an Application for Diploma card in the enrollment packet. Completion of that card initiates clearance toward graduation by the Graduate College and 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 reenrollment. Applications for degree will not be accepted after the first two weeks of a regular semester or the first week of a summer session.

Commencement Attendance

A candidate for an advanced degree must be present at the conferring of

the degree unless written permission to be absent has been granted. A written request to be granted a degree *in absentia* should be filed with the Dean of the Graduate College at least 10 days before the degree is to be granted. A forwarding address should also be given so that the diploma can be mailed to the graduate.

Records and Transcripts

All permanent records are 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 Registrar that all requirements for the degree have been satisfied. Such a transcript or statement will not be issued until all grades for the semester have been recorded.

The Master's Degree

The instructions about admission, registration and other topics under *General Regulations* of this Catalog apply to students working for the master's degree and should be read by each candidate.

Examinations for Admission to a Program

Some departments require that any student seeking a master's degree take an examination before being admitted to a program of study. The head of the major department should be consulted.

The majority of students seeking the Master of Science in Education must be admitted to a Master's curriculum in Teacher Education through the master's level Teacher Education Admissions Committee. All students working toward an M.S. in Education must take either the National Teacher Examination or the aptitude portion of the Graduate Record Examination. Students must check with their department head to determine if they need to be admitted through the master's level Teacher Education Admissions Committee and what tests are to be taken. The tests are administered by the University Bureau of Tests and Measurements located in North Murray Hall, Campus, and also through most other large universities.

Transfer of Credits

No more than 9 semester credit hours taken at another accredited college or university offering a graduate program can be accepted toward a master's degree.

Advisement

The student should go to the department head, who will 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.

Plan of Study

The preliminary plan ofstudy for the degree must be filed in the Graduate College prior to enrollment for the 17th graduate credit hour for students working for a master's degree in residence, or prior to enrollment for the 9th graduate credit hour for students pursuing graduate study at Extension Centers. The student should secure the plan of study blanks in the Graduate College office, work out the details with his adviser, and file three copies in the Graduate College office. 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 secure one master's degree cannot be counted toward another master's degree.

Major Subject or Field

A major field ofstudy may cross departmental lines subject to the decision of the major department. *Graduate students must enroll in no fewer than 21 semester credit* ***hours*** *of 5000- and 6000-level courses through the Oklahoma State University as presented on the Plan of Study to meet requirements for the Master's degree.*

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. A student who lacks 10 semester credit hours or fewer of the prerequisites required by the major department or field may take these courses and count the credits as part of the requirements of the degree if the courses are on a complete study plan approved by the head of the department before it is presented to the Dean of the Graduate College.

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 6 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.

Credit Requirements

The master's degree may be earned by one of three plans;
PLAN I with thesis, 30 credit hours, including six credit hours for the thesis;
PLAN II with report, 32 credit hours, including two credit hours for the report;
PLAN III with no thesis or report, 32 credit hours of course work.

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 major department, with the approval of the Dean of the Graduate College, decides which alternative the candidate shall pursue. Some departments require a further 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, with the exceptions noted below, complete in residence a minimum of 21 semester credit hours if they follow Plan I, or 23 semester credit hours if they follow Plan II or III. With the written recommendation of the head of the major department, the Dean of the Graduate College may authorize the thesis or report to be prepared *in absentia* and the credit counted toward meeting the residence requirement. When this is done, the student must register at the beginning of a semester or other session and conduct the study or research under the direction of a member of the graduate faculty of the department concerned.

Students taking courses at Graduate Centers may decrease the residence requirements to 16 semester credit hours if they have study plans approved in advance by the major department and the Dean of the Graduate College.

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.

The last 8 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.

Language Requirement

A candidate for the master's degree may be required to demonstrate a reading knowledge of a modern foreign language. A blank to show 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.

Should there be a foreign language requirement, 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.

If a student does not complete requirements for the master's degree within two years after passing the written examination, a new plan of study must be submitted and another written examination passed.

Thesis or Report

Any student working on a thesis or report should secure a copy of *Thesis Writing Manual: A Guide for Oklahoma State University Graduate Students,* published by the Graduate College and available in the Graduate College office. A thesis or report must conform to the specifications set forth in this manual. Variations may be made from the specifications only if requested by the head of the department and approved by the Dean of the Graduate College.

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 committee, and to the Graduate College. When the final draft copy is submitted, the title must be final, and any request for waiver of *Thesis Writing Manual* recommendations must be made. The proof copy must be signed by the adviser and be submitted

to the Graduate College no later than the stated deadline date (see Calendar).

Permission to administer the final examination is requested from the Dean of the Graduate College on Form T-1 which must contain the signature of each member of the examining committee, indicating that each has received the thesis or report and concurs in the request to administer the final examination. The adviser uses Form T-l to propose a specific time and place for the examination. The Graduate College will notify all committee members of the examination.

The final examination is primarily a defense of the thesis or report. If the defense is judged inadequate, a decision as to 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 on Form T-2. Following satisfactory completion of the final examination, the candidate will make changes required by the committee and by the Graduate College, and submit the report or thesis in final form signed by the committee to the Graduate College.

Thesis. The student must submit to the Graduate College three copies of a thesis with six copies of the abstract no later than the stated deadline (see Calendar) . These final copies of the thesis are accompanied by Form T-3. The thesis copies become the property of the University. Two copies are filed in the Library and one copy goes to the major department. The binding fee is $4.50 per copy, payable at the office of the Bursar.

Report. The student must submit to the Graduate College office one copy of a report, with six copies of the abstract. By paying $4.50, the student may have the report bound by the University. Otherwise, it should be bound in a pressboard cover as described in the *Thesis Writing Manual.* The final copy of the report, accompanied by Form T-3, must be in the Graduate College no later than the stated deadline (see Calendar).

Final Examination

If the thesis or report option is used, the Dean of the Graduate College arranges with the major department for the final examination after the thesis or report has been filed in the Graduate College 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. If the department requires a final and/or written examination, forms for arranging the examination can be obtained from the Graduate College. 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 four years after filing the plan of study.

To find out whether or not courses taken more than four years before the anticipated date of the degree can be counted toward the degree, the student should consult the department. 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.

Application for Degree and Commencement

A student must adhere to the deadlines and rules given under *General Regulations.*

Summary of Procedure for Master's Degree

Dean - Dean of Graduate College
Adviser - Person designated by department head to advise

GCO - Graduate College Office
TA - Temporary Adviser
DH - Department Head

Procedure	Approved by	Time
1. Apply for admission. (Follow instruction sheet carefully. See requirements for admission to Teacher Education under departmental announcements, *Curriculum and Instruction.)*	Dean	Complete 30 days prior to enrollment. (60 clays prior for International students.)
2. Read *General Regulations* and Master's *Degree* sections of the Graduate Catalog; then secure registration materials in the Graduate College office.	GCO	
3. Secure assignment of a temporary adviser from department head of major department and enroll for the first semester.	DH&TA	
4. Plan program with advice of department head or designated graduate faculty member and submit plan of study.	Dean	Prior to enrolling for the 17th credit for resident students and prior to enrolling for the 9th credit hour for extension students.
5. Proceed with coursework and research assignment.	Adviser	
6. Complete the Application for Diploma card in the enrollment packet; make any corrections needed on plan of study	Dean	At the time of enrollment for the semester or term in which the degree is to be conferred. (Application 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 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	Adviser	Dean Deadlines published yearly.

clearly. The format must follow the *Thesis Writing Manual* recommendations, unless a waiver is requested by the adviser. Formal requests for waivers should be submiffed along with the thesis or report final draft copy. The thesis title must be correct and cannot be changed since it will appear in the Commencement program. The adviser's signature must be on the copy submiffed to the Graduate College.		
9. Examining committee members formally acknowledge receipt of the thesis or report and concur in request to administer final examination to candidate (Form T-1). Graduate College notifies examining committee of time, date, and place of examination.	Dean	
10. Committee chairman notifies Graduate College of the examination results immediately following conclusion of the examination (Form T-2).	Dean	Deadlines published yearly.
11. Candidate makes 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 at least three approved copies of thesis or one copy of a report and six approved copies of the abstract along with clearance check (Form T-3) signed by the student and the adviser. Adviser certifies that all requirements have been met for non-thesis or report student. Forms for scheduling the final examination and notification of the completion of departmental requirements can be obtained from the Graduate College after the Application for Diploma card has been processed.	Dean	Deadlines published yearly.
12. Pay binding fee in the Bursar's office 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 exercises.		

Master of Engineering

The Master of 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. Approximately one year of graduate study is taken at the culmination of these programs offered in the Schools of Agricultural Engineering, Chemical Engineering, Civil Engineering, Electrical Engineering, General Engineering, Industrial Engineering and Management, and Mechanical and Aerospace Engineering.

Admission to one of these programs depends upon being accepted by one of the Professional Schools in the College of Engineering. The programs consist of undergraduate work corresponding to the junior and senior level, plus a 32-semester-hour study program in graduate-professional status meeting Graduate College requirements for a Plan III Master's degree. Students may enter a professional school at any level for which they are qualified that exceeds the minimum requirements for eligibility for admission. The undergraduate requirements are completion of 60 semester hours of study in an accredited institution of higher learning (up to half of this requirement may be met by advanced standing examination) and demonstrated satisfactory competence in the mathematics, chemistry, physics, engineering sciences, communications, social science and humanistics course work normally making up the first two years of an engineering degree program. A grade-point average of 2.3/4.0 is usually accepted as evidence of satisfactory competence in this pre-engineering course work.

To be admitted to graduate-professional status in a Professional School of Engineering, a student must have completed a curriculum leading to a B.S. degree in engineering meeting the requirements 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 in a Professional School of Engineering at a level that indicates a high probability of success in a graduate program requiring a 3.0/4.0 minimum GPA is also a requirement.

The 32 semester hours in graduate-professional status combine with 64 or more semester hours of undergraduate work to total at least 96 semester hours beyond the pre-engineering level for the professional programs. This coursework is taken in accordance with a Professional School plan of study established for each individual student to meet the objectives of the student and the Professional School in which he is enrolled. Three-year plans of study will include: 16 semester hours of required courses common to all engineering

curricula; not fewer than 36 semester hours of additional engineering work specified by the particular Professional School, and of these, at least 15 semester hours must be at the 5000 level, exclusive of professional practice; and six to eight hours of professional practice in the graduate year of the plan of study. The courses should be chosen at both undergraduate and graduate levels to meet ABET basic and advanced requirements for coursework that is classified as design. (Currently, one-half year of engineering design is required in the basic, i.e., undergraduate programs, and an additional one-third year in the advanced portion.)

The Professional School plan of study serves as the preliminary plan of study for the graduate portion of the program, but 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 Architecture and Master of Architectural Engineering

These degrees are described in the announcements of the School of Architecture, page

The Doctor of Philosophy Degree

The Doctor of Philosophy degree is granted in recognition of high achievement in scholarship and in independent investigation. The candidate must prove his acceptability not only by (1) successfully completing a series of courses comprising a plan of study, (2) passing various examinations demonstrating academic competence, and (3) carrying out a research program under supervision and preparing an acceptable dissertation, but also by demonstrating initiative, creative intelligence, and ability to plan and carry out research in his or her chosen field.

General Information

The instructions on admission, registration, and other information given under *General Regulations* are applicable to those who are working for the degree of Doctor of Philosophy.

Notice of Intention

Before taking additional courses after completing the requirements for a master's degree a student who expects to work for the Doctor of Philosophy

degree should file in the Graduate College office a statement of intention to become a candidate for the degree. The Notice of Intention form may be obtained in the Graduate College Office.

Since the Notice of Intention must be filed before the appointment of a temporary adviser, it is essential that the student complete and turn in the form at the earliest opportunity. Unless the form is submitted to the Graduate College, the courses taken may possibly not be accepted for the degree.

The Notice of Intention must be filed prior to mid-semester of the first semester of graduate enrollment beyond the master's degree or prior to the second summer of enrollment for those who enroll only during summer terms.

Examinations for 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. The student should consult his major department.

Temporary Adviser

Upon receiving the Notice of Intention of a student to become a candidate for the Ph.D. degree, the Dean of the Graduate College 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/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 thesis, and (6) conducting the final examination.

The chairman of the graduate committee must be a member of the Graduate Faculty. Under special circumstances, the Dean of the Graduate College may approve a substitute chairman. 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 work.

Preliminary Conference

As soon as the student is notified that an advisory committee has been appointed, the student should arrange with the chairman 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 two copies in the Graduate College office and two copies with the advisory committee, and retain one for personal files.

The plan must include all the acceptable graduate work that has been completed and all that will be taken for the degree. Forms for making the plan of study will be sent to the student by the Graduate College.

Since 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.

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 session in which the degree is to be conferred.

Minor Subject of 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.

Amount and Character of Work

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 (6000) for the dissertation.

The satisfactory completion of coursework (see *General Regulations) is* not the only requirement for receiving the degree. The student must also (1) pass a qualifying examination, (2) prepare an acceptable dissertation, (3) demonstrate ability to do independent study, (4) show qualities of leadership in his/her chosen field, (5) pass a final examination, and (6) comply with other requirements of the major department.

Residence

A minimum of 30 semester credit hours must be taken in residence at Oklahoma State University. All credit accepted toward the 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 and the Dean of the Graduate College, 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.

Foreign Languages

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 which will contribute to the needs of the individual program.

Qualifying Examination

The qualifying examination is comprehensive, covering the entire area of the student's graduate study. The examination may be all written or part written and part oral. The examination must be passed not less than six months before the degree is granted (see *Admission to Candidacy.)*

Before taking the qualifying examination, the student must have completed the main areas of an approved plan of study, have the approval of the advisory committee, and have an outline of the proposed investigation, approved by the advisory committee, on file in the Graduate College office.

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 roust have passed the qualifying examination, and have an approved plan of study and thesis outline filed in the Graduate College office.

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 thesis committee approved by the advisory committee chairperson.

The dissertation must follow specification in *Thesis Writing Manual: A Guide for Oklahoma State University Graduate Students,* published by the Oklahoma State University Graduate College and available in the Graduate College office. All dissertation copies must have the necessary approval signatures before submission to the Graduate College office.

After completing the research, the student prepares a final draft copy (complete and legible final draft) of the proposed dissertation and submits a copy, along with the abstract, to each member of his committee and to the Graduate College. The copy being submitted to the Graduate College must be approved by the student's thesis adviser. When the final draft copy is submitted, the title must be final and any request for waiver *of Thesis Writing Manual* recommendations must be made. The proof copy must be submitted to the Graduate College no later than the stated deadline date (see Calendar).

Permission to administer the final examination is requested from the Dean of the Graduate College on Form T-1 which must contain the signature of each member of the committee, indicating each has received the dissertation and concurs in the request to administer the final examination. The chairperson also uses Form T-1 to propose a specific time and place for the examination. The Graduate College will notify all committee members of the examination.

The final examination is primarily a defense of the dissertation. If the defense is judged inadequate, decision as to a re-examination 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 on Form T-2. Following satisfactory completion of the

final examination, the candidate will make changes required by the committee and by the Graduate College and submit the dissertation in final form signed by his 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 office no later than the stated deadline date (see Calendar). The final copies of the dissertation are accompanied by Form T-3. The dissertation copies become the property of the University: two copies are filed in the Library and one copy goes to the major department. The binding fee is $4.50 per copy payable at the office of the Bursar.

All dissertations are microfilmed by University Microfilms, Inc. The student is required to pay a $30.00 fee for microfilming of the complete document and for publication of an abstract of 600 words. The student must complete a University Microfilms Agreement Form after the dissertation has been accepted by the Graduate College. Copyrighting of 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 six years after filing a Notice of Intention. After that time a new program of study must be arranged with the advisory committee and filed in the Graduate College office.

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.

Application for Degree and Commencement

Students should be familiar with the deadlines and rules as given in *General Regulations.*

Summary of Procedure for Doctoral Degree

Dean - Dean of Graduate College
TA - Temporary Adviser

DH - Department Head
Ch. - Chairman of Committee
Comm. - Committee

Procedure	Initiate 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 temporary adviser from department head of major department and enroll.	DH & TA Dean	
3. File Notice of Intention to become a candidate for the degree. Obtain forms in Graduate office.	Dean	Prior to mid-semester of first semester of graduate enrollment or 2nd summer enrollment.
4. Provide temporary adviser with information as required to evaluate admissibility to program.		
5. On favorable action of appropriate Graduate Faculty group with respect to admission to program, request the appointment of advisory committee.	TA Dean	
6. Prepare plan of study with assistance of committee. Submit two approved copies to Graduate College.	Comm. Dean	Prior to pre-enrollment date (see University Calendar) during 2nd full semester of enrollment beyond Master's degree.
7. Fulfill foreign language requirement or attain other required proficiences.		Prior to qualifying examination.
8. Complete major portion of course work and plan thesis program with committee. Submit copy of approved thesis outline to Graduate College.	Ch. Dean	Prior to qualifying examination.
9. Apply for and take qualifying examination.	Ch. Dean	As early in the doctoral program as feasible.
10. Submit results of qualifying examination and/or application for admission to candidacy (Form G-4).	Comm. Dean	Not less than 6 months prior tc Commencement in which degree will be conferred.

	Procedure	Approved by	Time
11.	Verify accuracy of plan of study in Graduate office. Secure committee approval for any necessary changes. Check on 6-year time limit for the degree.	Comm Dean	At the beginning of the semester or term in which degree is to be conferred.
12.	Complete the Application for Diplama card in the enrollment packet.	Dean	At the time of enrollment for the semester or session in which degree is to be conferred. (Application is good for stated time only. File new application if conferring of degree is delayed.)
13.	Complete research, prepare final draft copy of dissertation and submit it at least one week prior to the examination, along with a copy of the abstract, to each member of the committee and to the Graduate College. The final draft must be corn plete 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 *Thesis Writing Manual* recommendations, unless a waiver is requested by the major adviser. Formal requests for waivers should be submitted along with the dissertation final draft copy. The dissertation title must be correct and cannot be changed since it will appear in the Commencement program. The adviser must sign the copy submitted to the Graduate College.	Ch. Comm. Dean	Deadlines published yearly.
14.	Advisory committee members formally acknowledge receipt of dissertation and concur in request to administer final examination to candidate (Form T-1). Graduate College notifies examining committee members of time, date and place of examination.	Comm. Dean	
15.	Committee chairman notifies Graduate College of the examination results immediately following conclusion of the examination (Form T-2).	Ch. Dean	

	Procedure	Approved by	Time
16.	Make changes in dissertation as required by examining committee and by the Graduate College. Advisory committee members sign final copies of dissertation. The dissertation is submitted to the Graduate College which makes the final decision on acceptance of the dissertation. Candidate submits at least three approved copies of dissertation and six approved copies of the abstract along with clearance check (Form T-3) signed by the student and the major adviser.	Ch. Comm. Dean	Deadlines published yearly.
17.	Pay binding and microfilming fees in Bursar's office; complete questionnaire and microfilming agreement form and return all forms to the Graduate College.		Form to be obtained from the Graduate College after the dissertation has been formally accepted by that office.
18.	Rent or buy cap, gown, and hood at Student Union Bookstore and attend Commencement exercises.		

The Doctor of Education Degree

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 thesis demonstrating ability to attack educational problems with a high degree of originality and independence; and (4) passing an examination covering the thesis and related fields.

General Information

The information on admission, registration, and other topics under *General Regulations* in this Catalog should be read by each student working for the Doctor of Education degree.

Admission

The student can secure an application form 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 and qualified applicants will be admitted provisionally for study toward the Doctor of Education degree.

Notice of Intention

Before taking additional courses after completing the requirements for a master's degree or after a bachelor's degree a student who expects to work for the Doctor of Education degree should file in the Graduate College office a Notice of Intention to become a candidate for the degree. The Notice of Intention form can be obtained from the Graduate College. Unless the form is filed courses taken may possibly not count towards the degree. The Notice of Intention is to be filed prior to mid-term of the first semester of enrollment beyond the master's degree, or prior to enrollment beyond 30 credit hours of coursework.

Admission to Program

The student planning to seek the Doctor of Education degree must complete a personnel folder which includes a personal vita, letters of recommendation as requested by the College of Education, transcripts, 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/her 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 Doctor of 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 College of Education will inform the student by letter of admission status.

Advisement

Upon receiving a Notice of Intention of a student to become a candidate for the Doctor of Education degree the Dean of the Graduate College 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.

If the recommendation of the Graduate Review Committee is favorable, the Dean of the Graduate College will appoint an advisory committee of not fewer than four members. The duties of the advisory committee consist of (1) advising the student, (2) assisting the student in preparing a program ofstudy, (3) preparing and administering the qualifying examination, (4) assisting in planning and conducting the research, (5) supervising the writing of and passing upon the thesis, 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 chairman and committee. Before the conference the student must see that the chairman 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 work out the plan of study for the degree, then make five copies and have them approved and signed by the advisory committee. One copy will be retained by the student, two copies left with the major adviser, and two copies taken by the student to the Graduate College office.

The plan is to include all the graduate work that has been completed and that will be taken for the degree. Forms for making the program ofstudy will be sent to the student by the Graduate College office.

The acceptance of work which the student desires to use toward the degree rests with the advisory committee. This makes it important to plan a complete program and have it approved as soon as possible. Changes in the

program can be made with the approval of the advisory committee and the Dean of the Graduate College.

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).

Amount and Character of Work

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 offull-time graduate study (a minimum of 60 semester credit hours) beyond the master's degree. This includes 10 credit hours for the doctoral thesis. The student must register for the thesis in the same way he or she registers for other courses.

Completing a number of courses with "B" average (see *General Regulations) is* only one of the requirements for the doctor's degree. The student must also (1) pass a qualifying examination, (2) prepare an acceptable thesis, (3) demonstrate the ability to do independent study, (4) show qualities of leadership in the chosen field, (5) pass a final examination, and (6) comply with other requirements of the major field or department.

Residence

A minimum of 30 semester credit hours must be taken in residence at Oklahoma State University. One academic year of the last two 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.

Foreign Language and Research Instruments

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. A certification that the student is proficient in handling research tools and other instruments must be filed in the Graduate College office by the advisory committee before the student takes the qualifying examination.

Qualifying Examination

Before taking the qualifying examination, the student niust have completed the main areas in a plan of study which has been approved by the advisory committee, have permission of the Graduate Dean to take the qualifying examination, have the approval of his/her advisory committee, and have

an approved outline for the thesis 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 his/her field of specialization, the breadth and depth of his/her professional education background and his/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 office at least six months before the degree is granted (see *Admission to Candidacy).*

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.

Admission to Candidacy

After passing the qualifying examination and with the approval of the advisory committee, the student should make application to be admitted to candidacy.

Before making the recommendation that the student be admitted to candidacy, the advisory committee will consider the following: (1) scholastic record at this and other institutions, (2) ability to use research methods and other instruments of learning, (3) progress on the thesis work, (4) achievement on the qualifying examination, (5) professional record, and (6) personal qualifications.

The student must be admitted to candidacy at least six months before the Commencement in which the degree will be received.

Dissertation

A dissertation (doctoral thesis) is required of each candidate for the degree of Doctor of Education. The thesis has three principal functions to perform: (1) training in research, (2) promoting professional growth, and (3) contributing to professional knowledge in education. Not every thesis will be expected to serve these three functions in the same way or to the same extent.

When the research is in a school system (1) the plans must be approved in advance by the student's advisory committee; (2) reports on the project must be made as directed by the advisory committee; and (3) the number of credits earned is limited to eight during one school year.

The format specifications, procedures, and regulations for the dissertation are the same as for the Ph.D., and the Ed.D. candidate should refer to the Ph.D. section on dissertations and submission procedures.

Time Limit

Students are expected to complete the requirements for the Doctor of Education degree within six years after filing a Notice of Intention. Otherwise a new program of study must be arranged with the advisory committee and filed in the Graduate College office.

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.

Application for Degree and Commencement

A student should be familiar with the deadlines and rules as given under ***General Regulations.***

The Specialist in Education Degree

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 their 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.

The information on admission, registration and other topics under *General Regulations* of this Catalog is applicable to candidates for the Specialist in Education degree.

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 and qualified applicants will be admitted provisionally for study toward the Specialist in Education Degree.

Notice of Intention

Before taking additional courses after completing the requirements for a master's degree or after a bachelor's degree, a student who expects to work for the Specialist in Education degree should file in the Graduate College office a statement of intention to become a candidate for the degree. The Notice of Intention form can be obtained from the Graduate College. Unless the form is filed courses taken may possibly not count towards the degree. The Notice of Intention is to be filed prior to mid-semester of the first semester of enrollment beyond the master's degree, or prior to the second summer enrollment.

Admission to Program

The student planning to seek the Specialist in Education degree must complete a personnel folder which includes a personal vita and letters of recommendation as requested by the College of Education, transcripts, 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 of admission.

Advisement

Upon receiving a Notice of Intention of a student to become a candidate for the Specialist in Education degree the Dean of the Graduate College 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.

If the recommendation of the Graduate Review Committee is favorable, the Dean of the Graduate College will appoint an advisory committee nominated by the head of the department in which the 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 and passes on the study and the report thereon, 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 chairman 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 duplicate, in the office of the Dean of the Graduate College. This plan may be modified with the approval of the advisory committee and the Dean of the Graduate College.

Amount and Character of Work

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.

Completing a number of courses with a "B" average (see *General Regulations)* is only one of the requirements for this degree. The student must also (1) demonstrate qualities of professional leadership, (2) pass the necessary qualifying examination, (3) conduct an appropriate study of education practice and prepare a report thereon, and (4) pass a final examination.

Qualifying Examination

A qualifying examination is required of all candidates for the Specialist in Education degree. Conditions governing it are essentially similar to those required for candidates for the Doctor of Education degree, as described in another section of this Catalog, to which the student is referred.

Residence

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 requirements.

Ordinarily the last twenty 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.

Other Regulations

Other requirements for the Specialist in Education degree are similar to those for the Doctor of Education degree contained in another section of this Catalog, to which the student is referred.

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

NOTE: Members *of the* Graduate Faculty, *their degrees* held and degree-*granting* institutions, and *most recent* academic *title at* O.S.U. *are* listed below. Dates following indicate: first, the year that the faculty member was appointed to his/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. Dates in parentheses represent periods not at O.S.U.

Members

DONALD CLAYTON ABBOTT, B.S. (Kansas State Univ.), M.S. (ibid), Ph.D. (ibid); *Professor of Biochemistry;* 1970, 1954.

MOHAMED ABDEL-HADY, B.C.E. (Ein-Shams Univ., Cairo), M.S. (Univ. of Illinois), Ph.D. (ibid); Registered Professional Engineer (Oklahoma); *Professor of Civil Engineering;* 1971, **1963.**

BETTY ABERCROMBIE, B.S. (O.S.U.), M.Ed. (Phillips Univ.), Ed.D. (O.S.U.); *Professor and Assistant Director of the School of Health, Physical Education and Leisure;* 1975, 1970.

FREDERICK GENE ACUFF, B.A. (Manhattan Bible College), M.S. (Kansas State Univ.), Ph.D. (Univ. *of* Missouri); *Professor and Acting Head of the Department of Sociology;* 1981, 1962.

THEODORE L. AGNEW, JR., B.A. (Univ. of Illinois), M.A. (ibid), M.A. (Harvard Univ.), Ph.D. (ibid); *Professor of History;* 1960, 1947.

SHAIR AHMAD, B.S. (Univ. of Utah), M.S. (ibid), Ph.D. (Case Western Reserve Univ.); *Professor of Mathematics;* 1975, 1968.

DOUGLAS *B.* AICHELE, A.B. (Univ. *of* Missouri), A.M. (ibid), Ed.D. *(ibid); Professor and Head of the Department of Curriculum and Instruction;* 1980, 1969.

DONALD EMERSON ALLEN, B.S. (Ohio State Univ.), M.A. (ibid), Ph.D. (Univ. of Missouri); *Professor of Sociology;* 1969, 1967.

HANSEL JACK ALLISON, B.S. (Louisiana State Univ.), M.S. (ibid), Ph.D. (O.S.U.); *Professor of Electrical Engineering;* 1976, 1961.

ZUHAIR F. AL-SHAIEB, B.S. (Univ. of Damascus), M.S. (Univ. of Missouri-Rolla), Ph.D. (ibid); *Associate Professor of Geology; 1976,* 1973.

CARL *R.* ANDERSON, B.M.E. (Univ. *of* Kansas), M.A. (ibid), Ed.D. (O.S.U.); *Associate Professor of Educational Administration and Higher Education;* 1975, 1969.

WILTON T. ANDERSON, B.S. (Northwestern State College), M.C.E. (Univ. of Oklahoma), Ed.D. (Univ. of Colorado); *Professor and Head of the Department of Accounting;* 1960.

DALE ELLSWORTH ARMSTRONG, B.A. (Centenary College), M.P.A. (Univ. of Texas), Ph.D. (ibid); *Associate Professor of Accounting;* 1967, 1965.

CHARLES M. BACON, B.S. (O.S.U.), M.S. *(ibid),* Ph.D. (Michigan *State* Univ.); *Professor and Head of the School of Electrical Engineering;* 1978, 1966 (1960-62).

DANIEL DELANO BADGER, B.S. (Virginia Polytechnic Inst.), M.S. (O.S.U.), Ph.D. (Michigan State Univ.); *Professor of Agricultural Economics;* 1969, 1964.

W. DAVID BAIRD, B.A. (Central State Univ., Oklahoma), M.A. (Univ. of Oklahoma), Ph.D. (ibid); *Professor and Acting Head of the Department of History,* 1981, 1978.

JOHN THOMAS BALE, JR., B.S. (O.S.U.), M.S. (ibid), Ed.D. (Univ. of Oklahoma); *Professor of Administrative Services and Business Education and Associate Dean of the College of Business Administration;* 1977, 1967.

DONALD J. BANKS, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Georgia); Associate *Professor of Agronomy;* 1968, 1966.

JOHN SCRIBNER BARCLAY, G.S. (Univ. of Maine), M.S. (Pennsylvania State Univ.), Ph.D. (Ohio State Univ.); *Associate Professor of Zoology;* 1975, 1970.

GEORGE LEWIS BARNES, B.S. (Michigan State Univ.), M.S. (ibid), Ph.D. (Oregon State Univ.); *Professor of Plant Pathology;* 1972, 1958.

EDDIE BASLER, JR., B.S. (Univ. of Oklahoma), M.S. (ibid), Ph.D. (Washington Univ.); *Professor of Botany;* 1967, 1957.

BENNETT LEE BASORE, B.S. (O.S.U.), Sc.D. (Massachusetts Inst. of Technology); *Professor of Electrical Engineering and Head of the School* of General *Engineering;* 1978, 1967.

DAVID GEORGE BATCHELDER, B.S. (Kansas State Univ.), M.S. (O.S.U.); *Professor of Agricultural Engineering;* 1978, 1955.

MARCIA HEADSTREAM BATES, B.S. (Texas Women's Univ.), M.S. (Texas Tech Univ.), Ph.D. (ibid); *Associate Professor of Civil Engineering;* 1980, 1975.

CAROLYN JUNE BAUER, B.S. (O.S.U.), M.S. (ibid), Ed.D. (ibid); *Associate Professor of Curriculum and Instruction;* 1977, 1966.

CALVIN G. BEAMES, JR., A.B. (New Mexico Highlands Univ.), M.S. (ibid), Ph.D. (Univ. of Oklahoma); *Professor of Physiological Sciences;* 1979, 1962.

BERNARD R. BELDEN, B.Ed. (State Univ. of New York-Plattsburg), M.A. (New York Univ.), Ph.D. (Syracuse Univ.); *Professor of Curriculum and Instruction;* 1959.

KENNETH JOHN BELL, B.S. (Case Inst. of Technology), M.Ch.E. (Univ. of Delaware), Ph.D. (ibid); *Regents Professor of Chemical Engineering;* 1977, 1961.

RICHARD C. BERBERET, B.A. (Carroll College), Ph.D. (Univ. of Nebraska); Associate *Professor of Entomology;* 1980, 1971.

DAVID SHELLEY BERKELEY, A.B. (Juniata College), A.M. (Harvard Univ.), Ph.D. (ibid); *Professor of English;* 1960, 1948.

KENNETH DARRELL BERLIN, B.A. (North Central College, Illinois), Ph.D. (Univ. of Illinois); Regents *Professor of Chemistry;* 1971, 1960.

HANS RUDOLF BILGER, Ph.D. (Univ. of Basel); *Professor of Electrical Engineering;* 1975, 1963.

JOHN A. BISSONETTE, B.A. (Univ. of Vermont), M.F.S. (Yale Univ.), Ph.D. (Univ. of Michigan); *Adjunct Associate Professor of Zoology;* 1977.

LEO VERNON BLAKLEY, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Chicago); *Professor of Agricultural Economics;* 1969, 1947.

PETER D. BLOOME, B.S. (Univ. of Illinois), M.S. (ibid); Professor *ofAgricultural Engineering;* 1979, 1970.

JAMES R. BOATSMAN, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Texas); Associate *Professor of Accounting;* 1980, 1973.

LAWRENCE L. BOGER, B.S. (Purdue Univ.), M.A. (Michigan State Univ.), Ph.D. (ibid); *President and Professor of Agricultural Economics;* 1977.

JAMES H. BOGGS, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Purdue Univ.); *Professor of Mechanical and* Aerospace *Engineering and Vice-President for Academic Affairs and Research;* 1967, 1943.

JAMES E. BOSE, B.S. (O.S.U.), M.S. (ibid), Ph.D. (ibid) ; Professor *and Director of the School of Technology;* 1977, 1960.

ROLLAND ARGENE BOWERS, A.B. (Kearney State College), M.A. (Colorado State College), Ed.D. (Univ. of Nebraska); *Professor of Educational Administration and Higher Education and Associate Dean of the College of Education;* 1975.

DONALD EDWARD BOYD, B.S. (Univ. of Oklahoma), M.S. (Univ. of Colorado), Ph.D. (ibid); Associate *Professor of Mechanical and* Aerospace *Engineering;* 1967, 1965.

LESTER L. BOYER, JR., B.Arch.Engr. (Pennsylvania State Univ.), M.S. (ibid); *Professor of Architecture;* 1979, 1970.

JAMES E. BREAZILE, B.S. (Univ. of Missouri), D.V.M. (ibid), Ph.D. (Univ. of Minnesota); *Professor of Physiological Sciences;* 1978.

LYLE D. BROEMELING, B.A. (Texas A.&M. Univ.), M.S. (ibid), Ph.D. (ibid); *Professor of Statistics;* 1978, 1968.

LARRY TODD BROWN, B.A. (Univ. of Kentucky), Ph.D. (Princeton Univ.); *Professor of Psychology;* 1973, 1961.

GERALD HENRY BRUSEWITZ, B.S. (Univ. of Wisconsin), B.S.M.E. (ibid), M.S. (ibid), Ph.D. (Michigan State Univ.); *Professor of Agricultural Engineering;* 1980, 1969.

RALPH G. BUCKNER, A.B. (Westminster College), B.S. (Kansas State Univ.), D.V.M. (ibid), M.S. (Univ. of Oklahoma); *Professor of Veterinary Pathology;* 1969, 1956.

J. BRUCE BULLOCK, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of California); Associate *Professor of Agricultural Economics;* 1980.

HERMANN G. BURCHARD, Dipl.-Math. (Univ. of Hamburg), Ph.D. (Purdue Univ.); *Professor of Mathematics;* 1977, 1972.

STERLING LEON BURKS, B.S. (Southwestern Oklahoma State Univ.), M.S. (O.S.U.), Ph.D. (ibid); *Associate Professor of Zoology;* 1977, 1969.

GEORGE E. BURROWS, B.S. (Univ. of California-Davis), D.V.M. (ibid), M.S. (Washington State Univ.), Ph.D. (ibid); Associate Professor *of Physiological* Sciences; 1978.

ROBERT L. BURTON, B.S. (O.S.U.), M.S. (O.S.U.), Ph.D. (O.S.U.); Associate *Professor of Entomology;* 1975, 1970.

LINVILLE JOHN BUSH, B.S. (Univ. of Kentucky), M.S. (Ohio State Univ.), Ph.D. (Iowa State Univ.); *Professor of Animal Science;* 1976, 1958.

JACK EDWARD BYNUM, B.A. (Pacific Union College), M.A. (Andrews Univ.), M.S. (Southern Oregon College), Ph.D. (Washington State Univ.); *Associate Professor of Sociology;* 1976, 1972.

H. STEPHEN CALDWELL, A.B. (Hanover College), M.S. (DePauw Univ.), Ph.D. (Purdue Univ.); *Professor of Psychology;* 1980, 1971.

GEORGE OLNEY CARNEY, B.A. (Central Missouri State College), M.A. (ibid), Ph.D. (O.S.U.); *Associate Professor of Geography;* 1976, 1968.

BURCHARD M. CARR, B.A. (Denison Univ.), M.A. (Ohio Univ.), Ph.D. (ibid); *Professor and Acting Head of the Department of Speech Pathology;* 1981, 1969 (1966-67).

KENNETH E. CASE, B.S.E.E. (O.S.U.), M.S.I.E. (ibid), Ph.D. (ibid) ; Professor *and Head* of the *School of Industrial Engineering and Management;* 1978, 1975.

KATHRYN S. CASTLE, B.A. (Univ. of Oklahoma), M.A. (Emory Univ.), Ed.D. (Univ. of Virginia); *Associate Professor of Curriculum and Instruction;* 1975.

WILLIAM GEORGE CHAMBERLAIN, B.Arch. (O.S.U.), M.Arch. (ibid); Registered Architect (Oklahoma and Arkansas; NCARB); *Professor of Architecture;* 1970, 1947.

JOHN P. CHANDLER, B.S. (Lehigh Uhiv.), M.S. (Indiana Univ.), Ph.D. (ibid); Associate *Professor of Computing and Information* Sciences; 1974, 1970.

IVAN CHAPMAN, B.A. (San Francisco State College), M.S. (ibid), Ph.D. (Univ. of Missouri); *Professor of Sociology;* 1972, 1969.

LANNY GORDON CHASTEEN, B.B.A. (Univ. of Texas), M.B.A. (Univ. of Arkansas), Ph.D. (ibid); *Professor of Accounting;* 1977, 1969.

JAMES RICHARD CHOIKE, B.S. (Univ. of Detroit), M.S. (Purdue Univ.), Ph.D. (Wayne State Univ.); *Associate Professor of Mathematics;* 1975, 1970.

MICHAEL D. CLADY, B.S. (Univ. of Michigan), M.S. (ibid), Ph.D. (ibid); *Adjunct Assistant Professor of Zoology;* 1976.

BOBBY L. CLARY, B.S. (Univ. of Georgia), Ph.D. (O.S.U.); *Professor of Agricultural Engineering;* 1978, 1966.

P. LARRY CLAYPOOL, B.S. (Southwest Missouri State College), M.A. (Univ. of Missouri), Ph.D. (Texas A.&M. Univ.); *Professor of* Statistics; 1979, 1967.

DONALD S. CORAM, B.A. (Univ. of Delaware), M.A. (Univ. of Wisconsin), Ph.D. (ibid); *Associate* Professor *of Mathematics;* 1976, 1971.

RICHARD ERLING CORSTVET, B.S. (Univ. of Wisconsin), M.S. (ibid), Ph.D. (Univ. of California); Professor *of Veterinary Parasitology, Microbiology, and Public Health;* 1971, 1965.

BEVERLY CRABTREE, B.S.Ed. (Univ. of Missouri-Columbia), M.Ed. (ibid), Ph.D. (Iowa State Univ.); *Professor of Home Economics and Dean of the College of Home Economics;* 1975.

JERRY CROCKETT, B.S. (Northwestern State College), M.S. (Fort Hays Kansas State College), Ph.D. (Univ. of Oklahoma); *Professor of Botany;* 1978, 1968 (1966-1962).

FRANKLIN ROMIG CROW, B.S. (Pennsylvania State Univ.), M.S. (O.S.U.); *Professor of Agricultural Engineering;* 1976, 1949.

LAVOY I. CROY, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Illinois); *Professor of Agronomy;* 1978, 1955.

BILLY L. CRYNES, B.S. (Rose Polytechnic Inst.), M.S. (Purdue Univ.), Ph.D. (ibid); *Professor and Head of the School of Chemical Engineering;* 1979, 1967.

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JACOB D. ZUCKER, B.A. (Univ. of Florida, M.Ed. (ibid), Ph.D. (ibid); *Assistant Professor of Educational Administration and Higher Education;* 1979.

Professors Emeriti

HAZEL JESSIE BAKER, B.S. (O.S.U.), M.S. (Iowa State Univ.); Associate Prof essor Emeritus *of Food, Nutrition and Institution Administration;* 1980, 1950.

LEROY H. BENGSTON, B.S. (Central State College), M.S. (O.S.U.);Associate *Professor and Acting Head Emeritus of the Department of Industrial Arts Education;* 1969, 1947.

MILTON EDWARD BERG, B.S. (O.S.U.), M.S. (ibid); *Associate Professor Emeritus of Mathematics and Statistics;* 1971, 1946.

FREDERICK M. BLACK, B.S. (O.S.U.), M.S. (ibid); Assistant Professor Emeritus of *Business Administration;* 1979, 1953.

JULIAN H. BRADSHER, A.B. (Univ. of South Carolina), M.A. (Univ. of Colorado), Ph.D. (Univ. of California); *Professor Emeritus of Economics;* 1977, 1948.

RALPH A. BRANN, B.S. (Bethel College), M.S. (O.S.U.), Ed.D. (ibid); *Professor Emeritus of Educational Administration and Higher Education;* 1979, 1964.

JOANNA ELISABETH CHAPMAN, B.S. (Univ. of Illinois), M.S. (Univ. of Colorado); Associate *Professor Emeritus of Home Economics Education;* 1967, 1947.

GEOFFREY PHILIP COLLINS, B.S.A. (Univ. of Toronto), M.S. (Univ. of Illinois); Associate *Professor Emeritus of Agricultural Economics;* 1970, 1939.

VALERIE COLVIN, B.A. (Women's College, Alabama), M.A. (Columbia Univ.); *Professor Emeritus of Health, Physical Education and Recreation;* 1969, 1929.

JAMES BENEDICT CORCORAN, D.V.M. (Colorado State Univ.), M.S. (Univ. of Oklahoma); *Professor and Acting* Head *Emeritus of the Department of Veterinary Pathology;* 1976, 1957.

MARY E. CURRIER, B.S. (Univ. of Tennessee), A.M. (Univ. of Chicago); Associate *Professor Emeritus of Food, Nutrition and Institution Administration;* 1967, 1944.

ELMER ROY DANIEL, B.S. (O.S.U.), M.S. (ibid); Registered Professional Engineer (Oklahoma); *Associate* Professor *Emeritus of Agricultural Engineering;* 1968, 1949.

FRANK FRANZ DAVIES, B.S. (O.S.U.), M.S. (ibid); *Associate Professor Emeritus of Agronomy;* 1971, 1937.

WILLIAM CLIFFORD ELDER, B.S. (O.S.U.), M.S. (ibid); *Associate Professor Emeritus of Agronomy;* 1968, 1935.

ROWAN ETHEL ELLIFF, B.S. (Kansas State Teachers College), M.A. (Univ. of Missouri); Associate *Professor Emeritus of Home Economics Education;* 1958, 1948.

LADISLAUS J. FILA, B.S. (Webb Inst. of Naval Architecture), A.E. (New York Univ.); *Professor Emeritus of Mechanical and Aerospace Engineering;* 1978, 1947.

OLIVE C. GALLOWAY, B.S. (Southwest Missouri State College), M.S. (O.S.U.); Associate *Professor Emeritus of Business Education and Office* Management; 1972, 1951.

J. LLOYD GARNER, B.S. (East Central State College, Oklahoma), Ed.M. (Univ. of Oklahoma); Associate *Professor Emeritus of Business Education and Office Management;* 1976,1942.

GORDON BRAZIL GILBERT, B.A. (Ouachita College), M.A. (George Peabody College for Teachers); Director of Recreation (Indiana Univ.); Associate *Professor Emeritus of Health, Physical Education and Recreation;* 1973, 1940.

BRENDA GOULD, B.S. (O.S.U.), M.A. (Teachers College, Columbia Univ.); Associate *Professor Emeritus of Clothing, Textiles and Merchandising;* 1965, 1932.

LEMUEL D. GROOM, B.A. (Univ. of Oklahoma); M.S. (O.S.U.); Associate *Professor Emeritus of Journalism and Broadcasting;* 1977, 1946.

CARROL FREMONT HARRIS, A.B. (Oklahoma Baptist Univ.), M.S. (O.S.U.); *Associate Professor Emeritus of Physics;* 1972, 1942.

EMPO HENRY, A.B. (Univ. of Oklahoma), M.A. (Columbia Univ.); *Associate Professor Emeritus of Clothing, Textiles and Merchandising;* 1945.

ELIZABETH CHARLOTTE HILLIER, B.S. (Juniata College), M.A. (Teachers College, Columbia Univ.), Ph.D. (Ohio State Univ.); Associate *Professor Emeritus of Home Economics Education;* 1974, 1958.

HERMAN HINRICHS, B.S. (O.S.U.), M.S. (ibid); *Professor Emeritus of Horticulture;* 1976, 1935.

MILLARD CHARLES KRATZ, B.S. (O.S.U.), L.L.B. (Harvard Law School); *Professor Emeritus of Business Law;* 1972, 1938.

DANIEL RONALD KROLL, A.B. (Michigan State Normal College), A.M. (Univ. of Michigan), Ph.D. (Columbia Univ.); *Professor Emeritus of English and Director Emeritus of General Studies;* 1975, 1946.

FRED LECRONE, B.S. (O.S.U.), M.S. (Iowa State Univ.); *Associate Professor Emeritus of Horticulture and* Assistant Dean *Emeritus of Resident Instruction in Agriculture;* 1973, 1939.

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CARROLL MENDENHALL LEONARD, B.S. (Kansas State Univ.), M.E. (ibid), M.S. (ibid); Registered Professional Engineer (Oklahoma); Associate *Professor Emeritus of Mechanical Engineering;* 1966, 1929.

VIVIA LOCKE, B.A. (Univ. of Oklahoma), M.A. (Univ. of Southern California); *Professor Emeritus of Humanistic Studies;* 1981, 1949.

VIRGINIA LEWIS MARSDEN, B.S. (Central Missouri State College), M.A. (Colorado State College of Education); *Associate Professor Emeritus of Education;* 1975, 1953.

GLADYS BOBECK MARSHALL, B.S. (O.S.U.), M.S. (ibid); *Assistant Professor Emeritus of Family Relations and Child Development;* 1971, 1947 (1939-43).

SARA DORIS MEADOR, B.S. (Texas State College for Women), M.S. (Iowa State Univ.); *Associate Professor Emeritus of Clothing, Textiles and Merchandising;* 1971, 1939.

GERTRUDE McALLISTER MEANS, B.A. (Park College), B.S. (Northeast Missouri State Teachers College), M.S. (Virginia Polytechnic Inst.); Assistant *Professor Emeritus of Home Management, Equipment and Family Economics;* 1971, 1950.

JOHN DAVIS NAFF, B.S. (Univ. of Alabama), M.S. (ibid), Ph.D. (Univ. of Kansas); *Professor Emeritus of* Geology, 1981, 1949.

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ARLO R. SCHMIDT, B.S. (O.S.U.), M.S. (Iowa State Univ.); *Associate Professor Emeritus of Physics;* 1971, 1960 (1942).

HERBERT SCHOLZ, JR., A.B. (Elon College), M.A. (Univ. of North Carolina); Associate *Professor Emeritus of Mathematics;* 1966, 1929.

GORDON C. SMITH, B.S. (O.S.U.), M.S. (ibid); *Assistant Professor Emeritus of Industrial Engineering and Management;* 1976, 1967.

1IOBART E. STOCKING, B.A. (Johns Hopkins Univ.), Ph.D. (Univ. of Chicago); *Professor Emeritus of Geology;* 1972, 1959.

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CHRIS G. WHITE, B.S. (O.S.U.), M.S. (ibid); Assistant *Professor Emeritus of Agricultural Education;* 1968, 1938.

WILLIAM ROSE WRAY, B.A. (Yale College), M.A. (Yale Univ.), Ph.D. (ibid); *Associate Professor Emeritus of English;* 1981, 1966.

Oklahoma City Technical Institute

Philip P. Chandler, M.S., Director

Dale C. Delano, M.Arch.E., *Associate Director*

Joe D. Kinder, M.S., Assistant *Director for Business and Finance*

Roy M. Black, M.S., *Assistant Director for Evening Division and Head, Police Science*

Barbara J. Baker, M.A., M.S.N., Assistant *Director for Instruction*

Lester E. Hunter, M.Ed., Assistant *Director for Student Affairs and Registrar*

Uville W. Ogle, M.Ed., *Business Manager*

Melvin Blevins, B.S., *Coordinator of Audiovisual* Services

Gloria R. Derby, A.S. *Coordinator of Financial Aid*

Edwina T. Cooley, M.Ed., *Coodinator of High School/College* Relations *and of Student Activities*

Patricia F. Reeves, M.Ed., *Coordinator Veterans Affairs and Special Services*

Carla C. Splaingard, M.Ed., *Director of Admissions*

Stanley Tipton, B.B.A., *Director of Computer* Services

Ronald G. Gappa, M.Ed., *Director of Continuing Education and Industrial Relations*

Merle R. Long, Ed.D., *Director of Learning* Resources

Dwight Lunow, B.S., *Director of Physical Plant* Services

Annette C. Duffy, M.L.S., *Librarian*

Department Heads

Architectural/Construction Technology, *Melton W. Cannon, B.S.*

Civil Technology, C. *Garland Pendergraf, M.S.C.E.*

Computer Programming Technology, *Ura Lee Denson, M.S.*

Electronics Engineering Technology, *Dewey A. Yeager, Ed.D.*

Fire Protection Technology, *Edward D. Steiner, M.S.*

General Engineering Technology, *Russell L. Kline, M.Ed.*

Horticulture Technology, *Hugh Hedger, M.S.*

Industrial Technology, *Russell L. Kline, M.Ed.*

Instrumentation Technology, *Phil Condreay, B.S.*

Nursing, *Margaret Brock, M.S.N.*

Oil and Gas Field Management, C. *Garland Pendergraf, M.S.C.E.*

Police Science, *Roy M. Black, M. S.*

Surveying Technology, C. *Garland Pendergraf, M.S.C.E.*

Technical Writing, Bea Sprouse, *M.Ed.*

Mathematics and Science, *Don E. Connel, M.N.S.*

The Oklahoma State University Technical Institute in Oklahoma City is a branch of Oklahoma State University and is accredited by the North Central Association of Colleges and secondary schools. The Institute offers two-year programs leading to the associate degree in accounting technology; architectural technology with emphasis in architecture or construction technology; civil technology with emphasis in public works computer programming technology with emphasis in accounting, business, systems analysis, scientific programming or computer operations management; electronics engineering technology with emphasis in electronics or biomedical electronics; fire protection technology with emphasis in either fire protection, environmental safety, or municipal fire protection; general engineering technology; horticulture technology; industrial technology; instrumentation technology with emphasis in air-conditioning and refrigeration; nurse science; oil and gas field management police science; surveying technology and technical writing.

The Technical Institute has become the institution most directly related to the education of technicians in the United States. It 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.

Methods of teaching are direct, with a strong emphasis on laboratory applications and somewhat less stress on an extensive theoretical approach. The curricula are designed to prepare graduates for a variety of positions in business, government and industry. Specialized technical courses in communication skills, personal development, and social and related practical courses enable the graduate to understand the underlying purposes of the operations of functions for which he or she is responsible and to utilize basic scientific principles in developing ideas. General courses in communication skills, personal development, and social and economic principles broaden the graduate's interests and aid him or her in the further development of his or her abilities.

For information and/or a catalog about the Oklahoma State University Technical Institute in, Oklahoma City, Oklahoma, contact the Director of Admissions, Oklahoma State University Technical Institute, 900 North Portland, Oklahoma City, Oklahoma, 73107. Phone (405) 947-4421, extension 269.

Course Listings

Contains course descriptions listed alphabetically by fields

Explanation of Course Listings

A course listing is comprised of the following elements, in order:

Course Number. The first digit of the four-digit course number indicates the year in which it is normally taken, 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. Course numbers ending in zero indicate 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 Requirements Codes. The capital letters in parentheses preceding some course titles designate courses fulfilling various undergraduate general education requirements (see Rule *6, Academic Regulations).*

Course Title. The title of the course is printed in bold-face, capital 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 couse being described are listed first, with no departmental abbreviation and in increasing numerical order. If from another department, that departmental abbeviation must precede the number of the prerequisite course. Those courses having prerequisites from both within and from outside the department bear combination entries such as *3303 and STAT 2012.* Prerequisites are listed in the following manner:

Prerequisites: A, B or C	*A or* B *or C* is acceptable
Prerequisites: A, B and C	*A* ***and*** B ***and*** *C* are required
Prerequisites: A, and B or C	*A* ***and*** either B or C
Prerequisites: A and B, or C	Both A and B, *or C* required
Prerequisites: A, or **B** and C	Either *A or* both *B and C* required
Prerequisites: A or equivalent, and B	Both A, or the equivalent of A, ***and*** B are required
Prerequisites: A, and B or equivalent	Both *A and B,* or the equivalent of B, are required
Prerequisites: A and B, or equivlents	Equivalents of both A and B are acceptable

Where no prerequisites are listed for couses numbered 3000 or above, it is understood that the prerequisite is 60 credit hours of work completed, or 45 credit hours completed with and overall grade-point average of 3.25, or consent of the instructor.

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 - - - -*. 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
AEROT	Aeronautical Technology
AG	Agriculture (orientation)
AGEC	Agricultral Economics
AGED	Agricultural Education
AGEN	Agricultural Engineering
AGRON	Agronomy
ANSI	Animal Sciences/Industry
ANTH	Anthrpology
APR	Advertisig and Public Relations
ARCH	Architecture
ART	Art
ASTRO	Astronomy
ATHL	Athletics
AVED	Aviation Education
BIOCH	Biochemistry
BISC	Biological Science
BOT	Botany
BUSAD	Business Administration
BUSED	Business Education
BUSL	Business Law
C&IED	Curriculum and Instruction Education
CHEM	Chemistry
CHENG	Chemical Engineering
CIVEN	Civil Engineering
COMSC	Computing and Information Sciences
CONST	Construction Management Technology
CTM	Clothing, Textiles and Merchandsing
DISED	Distributive Education
EAHED	Educational Administration and Higher Education
HUMAN	Humnities
IAED	Industrial Arts Education
ECON	Economics
EDUC	Education
EET	Electronics Engineering Technology
Elen	Electrical Engineering
ENGL	English
ENGR	Engineering
ENGSC	Engineering Science
ENTO	Entomology
ENVLIR	Environmental Sciences
EPT	Electrical Power Technology
FIN	Finance
FIRT	Fire Protection Technology
FLANG	Foreign Language
FNIA	Fod, Nutrition and Institution Administration
FOR	Forestry
FRCD	Family Relations and Child Development
FRNCH	French
GENAD	General Administration
GENE	Genetics
GENEN	General Engineering
GENT	General Technology
GEOG	Geography
GEOL	Geology
GRAD	Graduate
GRMN	German
HDCR	Housing, Design and Consumer Resources
HEC	Home Economics
HEED	Home Economics Education
HIST	History
HORT	Horticulture
HPELS	Jealth, Physical Education and Leisure Sciences
HLTH	Health
BRAD	Hotel and Restaurant Administration
PHSIO	Pyhsiological Sciences
PHYSC	Physics

INDEN	Industrial Engineering and Management
ITAL	Italian
JAPAN	Japanese
JM	Journalism
LATIN	Latin
LEIS	Leisure Sciences
LIBSC	Library Science
MAE	Mechnical and Aero-Space Engineering
MATH	Mathematics
MC	Mass Communications
MECAG	Mechanized Agriculture
MECDT	Mechanical Design Technology
MGMT	Management
MICRO	Microbiology
MILSC	Military Science
MKTG	Marketing
MPT	Mechanical Power Technology
MUSIC	Music
NATSC	Natural Sciences
OAED	Occupational and Adult Education
OFFMG	Office Management
PE	Physical Education
PET	Petroleum Technology
PHILO	Philosophy
PLP	Plant Pathology
POLSC	Political Science
PSYCH	Psychology
REL	Religious Studies
RNT	Radiation and Nuclear Technology
RTVF	Radio-Television-Film
RUSS	Russian
SOC	Sociology
SOCSC	Social Science
SPAN	Spanish
SPATH	Speech Pathology
SPCH	Speech
STAT	Statistics
TECED	Technical Education
TH	Theatre
TIED	Trade and Industrial Education
UNIV	University
VANAT	Veterinary Anatomy
VMED	Veterinary Medicine
VMS	Veterinary Medicine and surgery
VPARA	Veterinary Parasitology, Microbiology and Public Health
VPATH	Veterinary Pathlogy
WILDL	Wildlife
ZOOL	Zoology

ACCOUNTING (ACCTG)

2103 Principles of Accounting. Prerequisite: 24 semester credit hours or 12 semester credit hours with a 2.5 GPA plus ACT score above 50 %. Fundamental concepts, processes and informational forms of accounting applied to service and trading organizations.

2203 Principles of Accounting. Prerequisite: 2103. Use and development of accounting information within partnerships and corporations in regard to decision making in financial affairs and production control.

3103* Survey of Accounting Principles. Elementary financial and cost accounting with special emphasis on statement interpretation and industrial problems. Limited to engineering and MBA students and others with consent of Head of Department of Accounting. No credit for students with credit in 2103 or 2203.

3203* Budgetary Control and Cost Analysis. Prerequisites: 2203 and STAT 2023 or concurrent enrollment. Cost accounting concepts and objectives, budgetary control, direct costing, cost and profit analysis for decision making.

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.

4003* Fundamentals of Federal Taxation. Prerequisite: 9 semester credit hours in accounting or consent of instructor. Federal income tax and its relationship to other forms of taxation; primary emphasis on determination of federal income tax liability of an individual.

4010 Accounting Projects: 1-6 credits, maximum 6. Prerequisites: Consent of instructor and 3203 and 3403. Special topics, projects and independent study in accounting.

4203* Cost Determination and Control, and Special Topics. Prerequisite: 3203 with grade of C or better. Elements of cost, process costing, standard costing, other advanced costing, control and analysis problems.

4303* Fiduciary and Institutional Accounting. Basic principles underlying fund and governmental accounting; bankruptcies; receiverships; estates and trusts.

4403* Accounting for Consolidations. Prerequisite: 3403 with grade of C or better. Branch-house accounting, consolidated statements; actuarial accounting.

4503* Auditing. Prerequisite: 18 credit hours of accounting. Auditing theory, procedures and practices.

4603* Accounting Information Systems. Prerequisites: 15 credit hours of accounting and 3203. Accounting system design and installation for various types of business concerns. Problems and research.

4713* International Accounting. Prerequisite: senior level standing or approval of instructor. 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.

5003* Advanced Studies In Federal Taxation. Prerequisites: graduate standing and 4003. Federal income tax law applicable to corporations and to other entities in their capacity as corporate shareholders.

5013* Seminar In Tax Research and Planning. Prerequisite: graduate standing. Development and administration of federal tax law and the application of tax research and planning methodology to the determination of federal income, estate and gift tax liability. No credit for students with credit in 3202.

5023* Selected Topics In Federal Taxation. Prerequisite: graduate standing. Federal tax law applicable to trusts, estate, and individuals. Primary emphasis given to the federal estate and gift tax law.

5033* Oil and Gas Accounting and Taxation. Prerequisite: 4003. Accounting and federal income tax law for the petroleum industry applicable to individuals, corporation and other entities.

5043* Seminar In Taxation of Partners and Partnerships. Prerequisite: 30 credit hours in accounting. Federal income tax laws applicable to partners and partnerships.

5103* Managerial Accounting. Prerequisites: graduate standing and 6 credit hours of ac-

counting or 3103. Interpretation of accounting data in planning, controlling and decision-making. Not available to students who have credit in 3203.

5110* Graduate Reading or Individual Work In Accounting. 1-6 credits, maximum 6. Prerequisites: graduate standing, consent of instructor. Individual work on special topics, projects, or readings selected to acquaint students with significant accounting literature.

5203* Seminar in Contemporary Accounting Theory I. Prerequisites: graduate standing, 3203 and 3403. Origin and development of accounting and a critical study of modern accounting theory.

5303* Seminar In Contemporary Accounting Theory II. Prerequisites: graduate standing, 3203 and 3403. A study and critical evaluation of contemporary accounting theory.

5403* Practicum In Professional Accounting. 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. Prerequisites: graduate standing and 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. Prerequisites: graduate standing and 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. Prerequisites: graduate standing and 18 credit hours of accounting including 3203. Intensive study of cost-managerial accounting theory relating to problems of an advanced nature.

5902* Research Report. Prerequisites: graduate standing and 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 Reading in Accounting. 1-3 credits, maximum 10. Prerequisites: graduate standing and consent of supervising professor and coordinator of graduate programs in Accounting. Supervised reading of significant literature not included in regularly scheduled courses.

6703* Seminar In Financial Accounting. Prerequisites: 5203 and 5303, doctoral student status. Analysis of the theoretical literature on problem areas in financial accounting.

ADVERTISING AND PUBLIC RELATIONS (APR)

2013 Principles of Advertising. Prerequisite: sophomore standing. Elements and purposes of advertising; media functions, economic aspects, budgets, appropriations, rate structures and terminology.

3483 Graphs : Arts Production. Lab 3. Prerequisite: 2013. Typography and graphic arts processes: letterpress, lithography, gravure, color and screen printing, editor's and advertiser's schedule and cost-control problems.

3633 Principles of Public Relations. Public relations as a management function in business, industry, education, agriculture and home economics.

3763 Advertising Copy and Layout. Lab 3. Prerequisite: 3483. Advertising copy and layout; modern merchandising methods; practical application emphasizing local and regional problems.

3893 Advertising Media and Markets. Prerequisite: 2013. Analysis and evaluation of mass media for advertising; media and market research; media plans, budgets and sales presentations, advertising law and ethics.

4023* Public Relations Methods in Agriculture and Home Economics. Fundamentals of news writing and the role of mass communication media in agriculture and home economics and related fields.

4523 Creative Newspaper Promotion. Prerequisite: senior standing. Community newspaper

promotional methods; special pages, special editions, contests and self-advertising campaigns; counseling advertisers on merchandising efforts.

4563 Advanced Advertising Copy and Layout. Lab 3. Prerequisite: 3763. Creative strategy and execution of advertisement 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: 4563. Preparation and presentation of advertising-promotion-merchandising campaigns for national and local firms; work in teams with agencies and clients.

4633 Advanced Public Relations. Prerequisite: 3633. Case-method study of public relations; campaigns, practices, problems, policies. .

4653 Television and Radio Advertising. Lab 3. Prerequisite: 3763. Functions and characteristics of broadcast advertising; copywriting, scriptwriting, story boards, marketing plan; film and videotape commercial production.

4663 Industrial Magazine Practice. Prerequisites: 3483, 3633 and JM 3113. Management functions involved in editing and producing corporate and government publications.

AERONAUTICAL TECHNOLOGY (AEROT)

1103 Aircraft Inspection and Service. Lab 6. Aircraft airworthiness inspection techniques and procedures. Application and interpretation of federal aviation regulations.

1203 Airframe Structures I. Lab 6. Fabrication procedures and materials used in the construction and repair of aircraft and components.

1312 Aircraft Welding. Lab 3. Oxy-acetylene welding theory and practice. Repairs and alterations of steel structural members; aluminum welding and theory of heat treatments of nonferrous alloys. Techniques of recognizing welds meeting the standards of the aircraft industry.

1414 Airframe Structures II. Lab 6. Prerequisite: 1203. Investigation of criteria and applications of procedures in the construction of aircraft and components.

1632 Aircraft Science. Lab 2. Aircraft nomenclature, theory of flight, load scheduling and weight analysis.

1734 Aircraft Electrical Systems. Lab 6. AC and DC electrical theory, circuit analysis and installation, batteries, generating systems, motors and control systems.

2012 Fuels and Fuel Scheduling. Lab 3. Aircraft fuels and fuel systems; theory of carburetion, service and inspection of carburetors and fuel injection systems. Aircraft induction systems and supercharging systems.

2115 Reciprocating Powerplants. Lab 9. Theory, nomenclature, servicing and inspection of reciprocating aircraft powerplants.

2222 Powerplant Ignition. Lab 3. Theory, inspection and service of high tension, low tension and battery ignition systems.

2342 Propellers and Control Systems. Lab 3. Theory, inspection and service of aircraft propellers and attendant control systems.

2524 Aircraft Systems. Lab 6. Theory, service and inspection of aircraft hydraulic, pneumatic, cabin environmental control and associated systems.

3672 Aircraft Electronics. Lab 3. Prerequisite: EET 1213. Introduction to electronic theory and aircraft avionic systems; nomenclature, purpose and installation requirements.

4444 Powerplant Service and Test. Lab 6. Prerequisite: 2115. Testing, evaluation and inspection of aircraft powerplants. Theory and practice of diagnosing aircraft powerplant malfunctions.

AEROSPACE STUDIES-Air Force (AEROS)

1121 United States Military Forces In the Contemporary World I. Lab 1. Doctrine, mission and organization of the United States Air Force; US strategic offensive air operations; employment of nuclear weapons.

1221 United States Military Forces In the Contemporary World II. Lab 1. Aerospace defense; missile defenses; US general purpose and aerospace support forces; the mission,

resources and operation of tactical air forces with special attention to limited war; review of Army, Navy **and** Marine general purpose forces.

2021 Aerospace Power Growth and Development I. Lab 1. Prerequisite: Consent of **PAS.** Growth **and** development of aerospace power through history beginning with first manned flights **and** continuing through World War II.

2121 Aerospace Power Growth and Development II. Lab 1. Prerequisite: Consent of PAS. Development and growth of aerospace power from the period following World War II through the Viet Nam conflict; concepts of peaceful deployment of US air power.

3103 Readings in Air Force Leadership. Lab 1. Prerequisite: Consent of PAS. Air Force **leadership** at the junior officer level including its theoretical, professional and legal aspects. Analysis of leadership principles and their practical application to leadership situations through group discussions, case studies and role playing. Review of basic communication skills. Oral and written reports. Field trips.

3203 Management Survey. Lab 1. Prerequisite: Consent of PAS. Principles and functions of management, including setting objectives, decision-making, planning, organizing, coordinating, directing and controlling. Management tools, practices, controls and techniques used by successful managers. Problems and cases relating management principles to typical situations encountered by the junior officer.

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 and flight orientation **rides.**

4103 American Defense Policy I. Lab 1. Prerequisite: Consent of PAS. The military profession; civil-military interaction, framework of defense policy and formulation of defense strategy. Review of the Military Justice System.

4203 (S)Amerken Defense Policy II. Lab 1. Prerequisite: Consent of PAS. Strategy and management of conflict including limited war, insurgency, strategic arms limitation. **Formulation** and implementation of US defense policy.

4402 Applied Offlcership 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.**

4554 Flight Instruction Program. Lab 3. Prerequisite: Consent of PAS. **Includes academic and flying phase. Flight** characteristics, meteorology, navigation, FAA regulations **and radio procedures. Approximately** 25 hours flying time.

AGRICULTURAL ECONOMICS (AGEC)

1114 (S)Introductlon to Agricultural Economics. Economic theory of production, mar**keting and consumption** of agricultural products. The role and structure of agriculture in the American economy. Policies to achieve efficiency and welfare goals in agriculture.

2103 (S)Princlples of Economics Applied to Agriculture. Prerequisite: 1114. Economics of farm **and** business decisions. National economic policy with particular reference to agriculture.

3203* Agricultural Price Analysis. Prerequisite: 1114. 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 Quantitative Methods in Agricultural Economics. Prerequisite: 1114. Introductory topics in areas such as indices, graphics, budgeting, discounting, simulation, basic statistical measure **and** price analysis. Basic background methods for some of the courses involving analysis.

3303* Agricultural Marketing. Prerequisite: 1114. Analysis of the marketing system, its importance to the **economy** and the role of the individual firm. Understanding of basic concept problems **and** decision aids stressed.

3313* Agricultural Business Management and Finance. Prerequisites: 1114, and ACCTG 2103 or consent of instructor. Managerial functions and application to agricultural firms. The **acquisition,** organization and management of personnel, financial assets and physi-

cal assets. Procurement and merchandizing strategies under different economic conditions. Decision-making, problem-solving and operational strategies stressed.

3403 (L)Agricultural Business Records and Analysis. Financial accounts and **physical** records and their practical application to the successful management of the farm or ranch **and** other agricultural businesses.

3413* (L)Farm and Ranch Management I. Lab 2. Prerequisite: 1114. Production planning with budgeting, market planning, financial records and income tax management for the **individual** farm-ranch business.

3503* Land Economics. Prerequisite: 1114. Economic principles of land utilization; problems of **land** use and value; ownership and transfer of property rights; and land taxation.

3603* Agricultural Finance. Prerequisites: 3413, ACCTG 2103. Farm financial management; financial intermediaries serving agriculture; cash flow planning; procedure for evaluation investments; use of credit and other financial alternatives to acquire control of farm resources; alternative organizational forms for the farm business; estate planning.

3990 Special Problems in Agricultural Economics. 1-3 credits, maximum 3. Directed **study of selected agricultural economics topics.**

4313* Agricultural Marketing and Prices. Prerequisites: 3203,3303, and 3313 or another course in management. Analysis of the marketing system emphasizing inter-industry and **intra-industry relationships.** Application of the decision rools to the problems of efficiency of the system.

4323* Cooperative Organization and Management. Prerequisite: 3303. Principles, objectives, structure and management of cooperative organizations; cooperatives in the modem **economy-history,** legislation and evaluation.

4333* Commodity Futures Markets. Prerequisite: 3203 or consent of instructor. 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* (I)International Agricultural Markets, Trade and Development. Prerequisites: 2103 and 3303, or consent of instructor. 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 methods of planning under uncertainty; acquisition of resources and the use of information systems in managing the individual farm-ranch business.

4503* Environmental Economics and Resource Development. Prerequisites: 1114 and upper-division standing. Economic, social and political factors relating to conservation resource development and environmental quality. Legislation and the role of federal and state agencies in resource conservation and development. The impact of outdoor recreation on economic development, recreational, esthetic and other qualitative considerations relating 9 to our natural resources and environment.

4513* Farm Appraisal. Lab 2. Prerequisite:3413. Land value theory and practical application of the three approaches for estimating agricultural land and building values.

4703* American Agricultural Policies. Prerequisites: 1114 and upper-division standing. Economic characteristics and problems of agriculture; evolution and significance of programs and policies.

4723* Rural Economic Development. Basic concepts and theories used and problems encountered in the economic study of rural areas, including those applicable to location, space and planning, social accounting, identification to the planning region, intra-regional analysis and national and regional planning programs.

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: 4902. Contemporary problems in agricultural economics; career exploration; agriculture in the economics of the nation and the world. A continuation of 4902.

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. **Open only to students working for a** M.S. degree in agricultural economics.

5100* Research Methodology. 1 credit, maximum 1. rrerequisite: graduate standing. The **philosophical** bases for research methods used in agricultural economics. Alternative research methods compared with respect to their dependence on the concepts of economic theory, mathematics and statistics. Alternative approaches to planning research projects.

5102* Teaching Practicum in Agricultural Economics. Lab 4. Prerequisites: two semesters of **graduate** study in agricultural economics. Designed to expose the practitioner to different **philosophies** and techniques of teaching and the general tasks performed by a teacher, including student counseling, test and exercise preparation and grading, lecture organization, **preparation** and presentation.

5103* Introduction to Mathematical Economics. Prerequisites: differential calculus and ECON 3113. Mathematical tools necessary for a treatment of economic theory **and formulation** of elementary economic theory and formulation of elementary economic models.

5110* Applications of Mathematical Programming. 1-3 credits, maximum 3. Prerequisite: consent of instructor or graduate standing. The application of concepts and principles of existing linear and nonlinear programming techniques to agricultural problems.

5203* Advanced Agricultural Prices. Prerequisite: 5103 or consent of instructor. Demand **and** price structures, price discovery, time series and agricultural price research methods.

5303* Agricultural Market Policy and Organization. Prerequisite: consent of instructor. Market structure, economics of control, interregional trade theory.

5313* Food Distribution Systems. Prerequisite: graduate standing. 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* Resource Administration and Environmental Policy. Prerequisites: graduate **standing and** consent of instructor. Problems and policies involved in administering our natural resources. Economic analysis, particularly benefit-cost analysis emphasized. Development **and** administration of environmental policies relating to the quality of our **environment,** including land, air, water and related resources, analyzed in an economic framework.

5603* Advanced Agricultural Finance. Prerequisites: 3603 and graduate standing. Financial structure of agriculture, firm financial planning and management, financial intermediation in agriculture and agricultural finance in developing countries.

5703* The Economics of Agriculture, Food and Rural Development Policy. Prerequisites: 4703 **and** 5103. Application of welfare critera and economic analysis to agricultural, food **and** rural **development** problems and policies.

5713* Rural Resource Development. Prerequisite: 5103. Concepts of rural resource development **and** delineation of problem areas; theories of regional growth as applied to rural areas; policies and **developmental** programs for for stimulating rural development.

5723* Rural Development Planning and Project Appraisal. Prerequisite: consent of instructor. Methods of **development** planning with special emphasis on the economic and financial **analysis** of agricultural projects.

5733* International Agricultural Policy and Development. Prerequisite: consent of instructor. Review and evaluation of alternative agricultural and rural policies and development strategies in developing countries. Trade, marketing and storage, output incentives, infrastructure investments and income distribution.

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.

6103* Advanced Mathematical Economics. Prerequisites: 5103, and MATH 2315 or consent of instructor. A **mathematical approach** to the **theory** of economic equilibrium, growth, cycles and imperfect competition applicable to agriculture.

6113* Systems Analysis for Agriculture. Prerequisites: 5103 and STAT 4043, knowledge of FORTRAN or consent of instructor. 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.

6203* Econometric Methods. Prerequisites: 5103, and STAT 4203 or consent of instructor. **Application** of econometric techniques to agricultural economic problems, theory and estimation of structural economic parameters.

6213* Advanced Econometrics. Prerequisite: 6203 or consent of instructor. Advanced studies in the theory, principles of estimation and quantitative applications involving complex systems of structural relationships to economic relationships.

6300* Agricultural Marketing Seminar. 1-6 credits, maximum 6. Prerequisites: graduate standing and consent of instructor. Current developments in theory, techniques for evaluating marketing behavior, market legislation and market development.

6303* Advanced Agricultural Marketing. Prerequisite: 5303. Marketing theory, market structure **and** performance, governmental regulation and policy and bargaining in agri**cultural 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. Analysis of micro dynamic production economic problems; recent developments in defining management, measuring utility and decision theory, potential application of inventory, replacement, simulation, game theoretic, **Bayesian** and nonlinear programming models in production economics research.

6700* Agricultural Policy and Development. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Frontier issues in agricultural policy and rural development. An evaluation of recent research reports in these areas.

AGRICULTURAL EDUCATION (AGED)

3103 introduction to the Teaching of Vocational Agriculture. Prerequisites: 21 semester credit hours of agriculture with a 2.3 GPA and junior standing in the College of Agriculture or consent of instructor. Roles and responsibilities of the vocational agriculture teacher; steps of the teaching-learning process; place of vocational agriculture in relation to vocational education and education in general in school system.

3203* Planning the Community Program In Agricultural Education. Prerequisite: 3103. Determining resources and trends of local communities with respect to agricultural production and agribusiness. Emphasis on vocational agriculture program policies, FFA chapter advisement, planning and managing the instructional program, identification and completion of records and reports required of a teacher of vocational agriculture in **Oklahoma.**

3302* Organizing Agricultural Programs for Rural Groups. The nature of adult learning; methods of organizing and implementing educational programs for adult groups and individuals; dynamics of group action; application of the most effective methods and techniques for assisting adults to solve problems in agriculture and community living.

3403 introduction to 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/Clinical Experiences in Agricultural Education. 1-2 credits, maximum 1. Planned experiences in agricultural education career areas to acquaint students with the diversity of responsibilities and audiences served. Course planning to satisfy require-

ments for admission to teacher education and student teaching and to develop technical competence.

4103* Methods of Teaching and Management In Vocational Agriculture. Lab 2. Prerequisites: 3203, junior standing in the College of Agriculture and 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 complete during the same semester.

4200 Student Teaching In Vocational Agriculture. 4-7 credits, maximum 7. Lab 12. Prerequisites: 3203, admission to the University teacher education program and concurrent enrollment in 4103. Required of all students preparing to become teachers of **vocational** agriculture in secondary schools. Students spend full-time or one-half of the semester as part of a directed teaching experience in a department of vocational agriculture approved for training teachers.

4713* (I)International Programs In Agricultural Education and Extension. World hunger **and** its root causes. The function of international agencies, organizations, foundation and churches in improving the quality of life for people of the developing nations. Roles of agricultural education and extension at all levels for enhancing the effectiveness of indigenous programs of rural **development and adult education.**

4990* Seminar and Problems In Agricultural Education. 1-3 credits, maximum 6. Small group and/or individual study and research in problems relating to programs of occupational education in agriculture.

5000* Research and Seminar. 1-4 credits, maximum **4. Open** only to students pursuing graduate study to satisfy requirements for a master's degree. Independent research and thesis under the direction and supervision of a major professor.

5100* Organizing Curriculum and Programs of Vocational Agriculture. 1-3 credits, maximum 6. Prerequisite: graduate standing or consent of instructor. 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.

5122* Adult Education: Organization and Method. Prerequisite: graduate standing or consent of instructor. Determining the adult education needs and interest of the community. Securing **and** organizing the information needed for adult education programs and **planning** teaching activities.

5300* Extension Teaching Methods. 1-3 credits, maximum 6. Prerequisite: graduate **standing** or consent of instructor. Teaching methods **applicable** to extension work, their interrelationships and relative effectiveness. Result demonstration, method demonstration, meetings, tours, field days, exhibits, etc.

5402* Young Farmer Organizations. Prerequisite: graduate standing. Purposes and objectives of young farmer groups. Procedures for establishing and operating local chapters with emphasis on the role of the vocational agriculture teacher as adviser. Determining **educational** needs and interests of members. Securing and organizing information for individual and group instruction, planning training activities. Tours and/or field trips to observe programs in operation.

5500* Directing Programs of Supervised Training. 1-3 credits, maximum 6. Prerequisite: graduate standing or consent of instructor. Determining the supervised training needs and opportunities of individual students. Planning for supervision of vocational agriculture 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. Prerequisite: graduate standing or consent of instructor. 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. 1-3 credits, maximum 6. Prerequisite: graduate standing or consent of instructor. History, legal status, objectives, educational **philosophy,** aims and objectives and functional responsibilities.

5822* Advanced Methods of Teaching Agriculture. Prerequisite: graduate standing or consent of instructor. Developing facility in the use of conferences, demonstration, field trips, individual instruction, laboratory projects, supervised or directed study, surveys, visual aids and forms of programmed learning.

5862* Educational Aspects of Occupational Behavior. Prerequisite: graduate standing or consent of instructor. Career development and occupational choice methods and procedures are reviewed as they relate to agricultural careers. Resources, methods and approaches are developed for teaching about agricultural occupations.

5940* Agricultural Education Workshop. 1-3 credits, maximum 8. Prerequisite: graduate standing. For experienced teachers. Curriculum problems, farm practices adapted to different types of farming areas in Oklahoma. Development of units of instruction and methods of teaching or other special concerns in vocational agriculture.

5980* Research Design in Occupational Education. 1-3 credits, maximum 4. Prerequisite: graduate standing. 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. Prerequisite: graduate standing. 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. Prerequisites: advanced graduate standing and 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. A critical examination and analysis of 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. Prerequisite: graduate standing. 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.

AGRICULTURAL ENGINEERING (AGEN)

1302 Agricultural Engineering Principles. Lab 4. Prerequisite: MATH 1613 or consent of instructor. Engineering measurements and design procedure. Analysis of test data. Orderly presentation of calculations and results. Design of a simple system. Introduction to engineering standards.

3313* Flood Control and Drainage Engineering. Lab 3. Prerequisite: MATH 1613. Topographic and construction surveying. Planning and analysis for flood control reservoirs. Introduction to earthfill dams. Design of drainage systems, land leveling and field terraces. Students with credit in CIVEN 2613 will be given only 2 credits toward graduation.

3342* Field Machinery. Prerequisite: PHYSC 2014. Machine elements and their application to the design and development of field machinery.

3363* Electrical Applications and Instrumentation. Lab 2. Prerequisite: concurrent enrollment in ENGSC 2613. Analysis and design of electrical systems for agriculture. Theory and application of instruments and transducers used in agricultural engineering research.

4373* Environmental Engineering. Prerequisite: PHYSC 2114. Engineering and analysis of environmental control requirements and systems design for agricultural production.

4400* Special Problems. 1-4 credits, maximum 4. Investigations in specialized areas of agricultural engineering.

4401* Seminar. Prerequisite: senior standing. Technical and professional literature including preparation and presentation of papers.

4403* Watershed Hydrology. Prerequisites: 3313 and ENGSC 3233. Hydrology of upstream watersheds, hydrograph analysis, rainfall-runoff relations and frequency analysis. Flood routing for design of upstream flood control reservoirs. Design of closed conduit spillways, grade control structures, vegetated waterways and subsurface drainage systems.

4413* Irrigation Engineering. Prerequisites: AGRON 1214 and ENGSC 3233. Water supply development. Fluid mechanics and agronomic principles applied to the design of pumping plants, water conveyance and distribution systems.

4432* Farm Power. Prerequisites: PHYSC 2014 and ENGSC 3213. Design principles of the farm tractors and agricultural power units; fuels, accessories and their relationship to tractor performance; tractor stability.

4441* Farm Power and Machinery Laboratory. Lab 3. Prerequisites: 3342 and 4432. Evaluation of the functional structural characteristics of farm tractors and field machines and their components.

4443* Farm Machinery. Lab 3. Prerequisites: 3342 and ENGSC 2122. Force and motion analysis; design, construction and evaluation of field machinery.

4474* Light Structures I. Lab 3. Prerequisite: ENGSC 2114. Loan analysis, stress analysis and design of statically determinate and indeterminate light structural components in wood, light gauge metal and concrete.

4493* Process Engineering. Lab 2. Prerequisites: ENGSC 3233 and ENGSC 3213. Mechanics, heat and mass transfer in analysis of unit operations and systems processing biological agricultural materials. Process measurement and control.

5000* Thesis and Research. 1-6 credits, maximum 6. Prerequisite: approval 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.

5501* Seminar. Prerequisite: graduate standing. Discussion of current literature with special emphasis on research and experimental techniques.

5513* Experimental Engineering Analysis. Prerequisites: STAT 4023 and graduate standing. 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.

6503* Similitude In Research. Prerequisites: MATH 2613 and graduate standing. Theory of similitude and its use in planning, conducting and analyzing experiments in engineering and biological sciences.

6511* Research Methodology. Prerequisite: graduate standing. Methods, procedures and policies for planning, organizing, funding and reporting results in a graduate research and education program. Preparation and evaluation of research proposals.

6520* Problems in Soil and Water Engineering. 2-6 credits, maximum 6. Prerequisites: graduate standing and 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. Prerequisites: graduate standing and consent of instructor. Literature review and analytical studies of selected farm power and machinery problems. Written report required.

6570* Light Structures Design. 2-6 credits, maximum 6. Prerequisite: **4474** or consent of instructor. Execution of complete designs of statically indeterminate structures or frames for specified agricultural production enterprises.

6580* Problems In Transport Processes. 2-6 credits, maximum 6. Prerequisites: graduate standing and consent of instructor. Literature review and analysis of heat and mass transport and interval diffusion in biological materials. Transport phenomena at inter-

faces, 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.

6693* Principles of Particle Technology. Prerequisite: 6503. Small-particle statistics and dynamics in fluid conveying, dry solids flow, particle-fluid separation and aerosol generation and transport. Engineering applications to agricultural environmental control; processing, spraying and dusting; and sedimentation.

AGRICULTURE (AG)

1011 Orientation. Required of all freshman in the College of Agriculture. Methods of study, advisement system, organization of curriculum and discussion of requirements and career opportunities in various fields of agriculture.

3010 Internships in Agriculture. 1-3 credits, maximum 12. Graded on pass-fail basis. Supervised internships with business, industry or governmental agencies including cooperating veterinarians.

4010 Honors Seminar. 1-6 credits, maximum 6. Role of agriculture in society and adjustments to change in the economy.

AGRONOMY (AGRON)

1214 Introduction to the Plant Sciences. Lab 2. Factors determining economic plant growth, distribution, culture, improvement and utilization.

2013 Crops and Environment. Prerequisites: 1214 and BISC 1402. Important agronomic crops and the effects of climate, soils and biotic factors on crops and their productivity. Application of agronomic principles and practices.

2124 (H)Fundamentals of Soll Science. Lab 2. Prerequisite: CHEM 1025 or equivalent. 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.

2973 Range Plant Reponses. Lab 2. Prerequisite: 1214 or BISC 1303. Morphology, physiology, autecology, forage value, taxonomy, associated species, and response to grazing, fire, drought, herbicides, and other ecosystem factors for range plants of North American rangelands.

2982 Rangeland Resources. Rangelands, their identification, locations, values, uses and social economic importance to the state, nation and world.

3021 Agronomic Orientation. Prerequisite: junior standing in agronomy. Development and improvement of written and oral communicative skills; orientation to agronomic research **and** extension activities; academic requirements and procedures.

3153 Turf Management. Lab 2. Prerequistes: 1214, 2124 and BISC 1402. Selection, establishment and maintenance of grass species and other plant materials for special use areas.

3213* Pasture Management and Forage Production. Prerequisites: 1214 and MATH 1213. Pasture systems, livestock management and forage crop production for maximum economical production of introduced forage species.

3243 Tropical Crops. The nature and production of tropical crops. The relationship of tropical crops to United States agriculture, the consumer and the scientists.

3433* Soil Morphology, Genesis and Classification. Lab 2. Prerequisite: 2124 or consent of instructor. 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.

3553* (N)Genetics. Lab 2. Prerequisites: 1214 and BISC 1402 or consent of instructor. Basic principles of variation and heredity.

3683* (N)Physical Properties Of Soils. Prerequisite: 2124. Soil physical properties and processes and their influence on plant growth.

3782* Market Grain Technology. Lab 6. Prerequisite: 1214. Quality characteristics of grain for **utilization;** techniques, factors and practice in determining commercial grain quality; **organization** and administration of the federal market grain supervision system; channels of **accumulation,** marketing and distribution of commercial grain.

3792* Seed Technology. Lab 6. Prerequisite: 1214. Techniques, factors and practices in determining seed purity and germination; principles of seed testing; laws and regulations governing the **production,** processing, handling and marketing of seed.

3893* Soil Chemistry. Prerequisite: 2124. The chemical and mineralogical properties of soils, **weathering** and synthesis of minerals in soils, cation-exchange and plant nutrition, mechanisms of ion **uptake** by plants and the role of the soil-borne elements in plant nutrition.

3921* Principles *of* Rangeland Management Laboratory. Lab 3. Prerequisite: 3923 or concurrent enrollment. Laboratory **evaluation** and demonstration of rangeland principles and practices; field trips to observe effects of range management practices on range site **and condition.**

3923* Principles *of* Rangeland Mangement. Prerequisite: 2973 or 2982. Principles of range**land** resource management, grazing and animal management on rangelands, effects of grazing on forage production and vegetation composition.

4113* Weed Control. Lab 2. Prerequisite: 1214. Identification, growth habits and methods of **control of weeds and brush.**

4123* Crop Culture and Growth. Prerequisites: 1214 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.

4233* Solt Fertility and Management. Prerequisite: 2124 or equivalent. Soil fertility and use of fertilizer materials for conservation, maintenance, and improvement of soil productivity **and** to minimize environmental concerns.

4293* Plant Response to Climatic Stress. Prerequisites: 1214 or BISC 1402. The climatic factors affecting plant growth. Stresses encountered in the soil and in the microclimate: water, temperature, radiation, sand and wind stresses. Effects of stresses on whole plants, rather than on tissues and cells.

4353* Plant Breeding. Lab 2. Prerequisite: 3553 or equivalent. Basic principles dealing with the **improvement** of plants **through application** of genetic principles.

4360* Solis *of* Oklahoma and Their Utilization. 1-3 credits, maximum 3. Open to anyone interested in using soil information. Discussion of Oklahoma soils and their interpretation for agricultural and non-agricultural users for increased food production and for **environmental improvement. Preparations** of interpretive maps, soil judging in the field, **evaluations** of work-and-do reports.

4453 Advanced Turf Management. Lab 2. Prerequisite: 3153. Integration of factors which **control** the **production and** management of special-purpose turf **for recreational purposes and an appreciation of the modifying effects of these factors upon each other.**

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. Prerequisite: consent of the instructor. Problems in agronomic crops which include range and turf, plant breeding **and** genetics, weed control, soil chemistry and fertility, soil physics, soil **biology,** soil **conservation and soil morphology;** spring travel course.

4483* Soil Biology. Prerequisite: 2124. Soil ecology of microorganisms, biological transformations, **humus complex,** pesticide decomposition, plant nutrient cycles, **microflora of rhizosphere.**

4571 Senior Seminar. Prerequisite: senior standing in agronomy. Career opportunities (talks and field trips); preparation of resumes and interviews.

4673* Grain Crops. Lab 2. Prerequisites: 3553 or equivalent and BISC 1402. Production, distribution, classification, utilization and improvement of the major cereal crops.

4772* Oilseed, Pulse and Mucilage Crops. Prerequisite: 3553 or equivalent. Production, utilization and improvement of oilseed, pulse and mucilage crops with special emphasis on **peanuts** and soybeans.

4783* Cotton Production. Prerequisite: 3553 or equivalent. Production, utilization and improvement of cotton. Several other agronomic fiber crops briefly discussed.

4843* Range Techniques. Lab 2. Prerequisite: 3923. Techniques used to inventory range resources, determine range condition and trend, determine diet, forage quality, forage utilization and proper stocking and develop menagement plans.

4884* Rangeland Development and Improvements. Lab 2. Prerequisite: 3923. Improvement *and* development of deteriorated rangelands including biological, mechanical, chemical and physical methods. Field trips and reports in laboratory.

4913* Pesticides In the Environment. Prerequisites: BISC 1402, CHEM 1255. A discussion of pesticides (chiefly fungicides, insecticides, herbicides and nematocides), including potential movement, degradation, fate and significance in the environment. Same course as ENTO 4913 and PLP 4913.

4953* Soils of the World. Prerequisite: consent of instructor. The major soils of the world discussed with regard to factors responsible for their formation, developmental causes of soil differences and resulting effects on utilization for food production. International soil maps used to correlate soil characteristics with potential use.

4992* Comparative Rangeland Ecosystems. Lab 2. Prerequisite: 4843 or 4884. Students do a complete synthesis of the available literature concerning individual rangeland ecosystems; field trip during fall recess to view and discuss the selected ecosystems with practitioners of the area; compilation of all information into final comprehensive report.

5000* Master's Thesis. 1-6 credits, 6 maximum total credits under Plan I, and 2 maximum total credits under Plan II. Prerequisites: graduate standing and consent of adviser in agronomy. Research planned, conducted and reported in consultation with a major professor.

5020* Graduate Seminar. 1 credit, maximum 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.

5114* Advanced Crop Culture and Growth. Lab 4. Prerequisites: 4123. BIOCH 3653. Basic physiological concepts underlying culture and growth of crop plants. Emphasis on plant competition and physiological processes.

5230* Research. 1-6 credits, maximum 8 (not to exceed 4 credit hours of either crops or soils). Prerequisites: graduate standing and consent of a faculty member who will supervise the research.

5243* Advanced Genetics. Prerequisite: 3553, or equivalent, or consent of instructor. Classical concepts relating to the identification, transmission, distribution, arrangement, function and modification of genetic material.

5342* Cytogenetics. Prerequisites: AGRON 5243, concurrent enrollment in BOT 5232 or consent of instructor. Behavior of chromosomes, cellular organelles and cytoplasm in relation to genetic behavior.

5353* Advanced Soil Morphology. Lab 2. Prerequisite: 3433 or consent of instructor. Soil taxonomy, a basic system of soil classification for making and interpreting soil surveys. Soil classifications compared with those of other countries. Data and soil descriptions are utilized in classifications and interpretations for use.

5411* Plant Breeding Techniques I. Lab 2. Prerequisites: 3553, 4353 and STAT 4013. Selfing and crossing fall crop plants, managing breeding and yield nurseries, managing greenhouse, winter and other special nurseries, accumulating data, developing crop pest resistance and/or tolerance, and other breeding problems including cytogenetics, biochemical and statistical techniques.

5421* Plant Breeding Techniques II. Prerequisites: 3553, 4353 and STAT 4013. Selfing and crossing spring crop plants, managing breeding and yield nurseries, managing greenhouse, winter, and other special nurseries, accumulating data, developing crop pest resistance and/or tolerance, and other breeding probe problems including cytogenetics, biochemical and statistical techniques.

5431* Plant Breeding Techniques III. Lab 2. Prerequisites: 3553, 4353 and STAT 4013. Selling and crossing summer crop plants, managing breeding and yeld nurseries, managing greenhouse and other special nurseries, accumulating data, developing crop pest resistance and/or tolerance, and other breeding problems.(Includes cytogenetics, biochemical and statistical techniques.

5473* Advanced Soil Fertility. Prerequisites: 4233 or equivalent and graduate standing. Fundamental concepts, theories, approximations and techniques used in soil fertility investigations.

5513* Principles of Breeding Self-Pollinated Crops. Prerequisites: 3553, 4353 and STAT

4013. Selection procedures and breeding systems applicable to self-pollinated crops with emphasis on the application of genetic principles to plant breeding.

5523* Principles of Breeding Cross-Pollinated Crops. Prerequisites: 3553, 4353 and STAT 4013. Selection procedures and breeding systems applicable to cross-pollinated crops emphasizing the application of genetic principles to plant breeding.

5583* Soil Physics. Prerequisites: MATH 2265 or 2365, PHYSC 1214. Fluid flow through saturated and unsaturated soils; transport of solutes in the liquid phases; soil strength and deformation as it applies to plant response.

5615* Advanced Soil Chemistry. Prerequisites: 3893 or consent of instructor. Chemical and mineralogical properties of soils, methods of laboratory analysis including X-ray diffraction, atomic absorption and infrared spectroscopy and standard methods of analysis. Applications in soil engineering, agronomy and environmental problems.

5703* Evapotranspiration. Prerequisites: knowledge of calculus and basic physics. Evaporative demands by radiant and advective energy; transport by wind and turbulent mixing. Water movement from soil through plant to air to region. Water budget in bare and vegetated fields including phreatophytes and in regions. Methods of water budget and energy budget measurement and instrumentation.

5760* Range Science Seminar. 2-4 credits, maximum 4. Prerequisites: 3924 and graduate standing or consent of instructor. Oral and written discussion of selected current interest subjects concerning interrelationships among rangeland soils, plants, grazing animals and man.

6000* Doctor's 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.

6222* Physical Chemistry of Soil Colloids. Prerequisite: 5615 or consent of instructor. Chemistry of the colloidal fraction of the soil, measurement of soil colloidal properties such as surface area, viscosity and surface tension. Electron microscopy, X-ray diffraction and other modern analytical instruments used. Application in agronomy, soil engineering and environmental interactions.

6264* Classical Evolution. Prerequisite: 3553 or equivalent. Development of evolutionary concepts from the various scientific disciplines up to and including the present time; historical development of faunas and floras including adaptation and specification; evolution of the primates, man's physical and cultural evolution (including religion), and the origin and subsequent development of domesticated plants and animals.

6332* Soil Mineralogy and Crystallography. Prerequisite: 5615 or consent of instructor. Crystalline properties of soil materials and their determination by X-ray diffraction and X-ray fluorescence. Principles of crystallographic indexing of soil minerals, absorption of organic and inorganic chemicals from the environment and soil engineering applications.

6463* Advanced Plant Breeding. Prerequisites: 5513, 5523 or consent of instructor. The relationship of quantitative genetics, cytogenetics, physiology and biochemistry to plant breeding. An examination of breeding philosophies and new trends in plant breeding.

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.

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 (N)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.

2422 Horse Production. Lab 2. Management, care and handling of horses for work and pleasure.

3003 Fundamentals of 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.

3013 Livestock Management. Lab 2. Prerequisites: 1124 and 2123. Modern production and management practices for beef cattle, swine and sheep. No credit for animal science students with credit in 4542, 4613 or 4643.

3023 Poultry Science. Lab 2. Prerequisites: 1124 and 2123. 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.

3101 Undergraduate Seminar. Prerequisites: 64 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 BISC 1502 or equivalent. Application of the principles of quality control in food processing operations to maintain the desired level of quality.

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.

3223 Food Plant Systems. Lab 2. Prerequisite: MATH 1513. Food plant design and the application of machines to food processing, packaging and storage.

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 BISC 1502. 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* Fundamentals of Meat Science. Lab 3. Prerequisites: 2253 and organic chemistry. Anatomical and basic chemical and physical characteristics of meat animals studied. The application of scientific principles to the processing and economical utilization of meat animals, as well as in the manufacture of meat products, emphasized in the laboratory.

3373* Food Preservation. Prerequisite: organic chemistry. The involvement of water, sugars, salt, acids, starches, seasoning, preservatives, enzymes, radiation, fermentation, baking, freezing, evaporation, frying and curing in the preparation and/or preservation of food products. Study of packaging available.

3423* (N)Animai Genetics. Prerequisites: BISC 1303. 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, a 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: PHSIO 3034 or equivalent. 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: organic chemistry. Basic principles of animal nutrition including digestion, absorption and metabolism of the various food nutrients; characteristics of the nutrients; measure of body needs.

3603* Processing Dairy Foods. Lab 3. Prerequisites: BISC 1502 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.

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.

3803* Animal Growth and Performance. Prerequisite: PHSIO 3034 or equivalent. Physiological factors affecting growth and performance of domestic animals.

3903* (I)Ecology of Agricultural Animals. Prerequisites: 1124 and BISC 1303. The worldwide distribution, production and utilization of livestock and the factors involved in their adaptation to their environment.

4033* Meat Technology. Lab 3. Prerequisite: organic chemistry. The basic characteristics of meat and meat products as they relate to quality. Product identification, economy, nutritive value, preservation and utilization.

4122 Animal Nutrition. Prerequisites: BIOCH 3653 and 3721, or equivalent. Principles of animal nutrition, including the basics of digestion, absorption and utilization of food nutrients. Emphasis placed upon malnutrition. For veterinary medicine students only.

4333* Processed Meat. Lab 4. Prerequisite: 3333 or 4033. Meat and meat product composition. Techniques in the molding and forming of meat; sausage formulation; curing; quality control; and cost analysis.

4343* Avian Nutrition. Prerequisite: 3543 or consent of instructor. Nutritive requirements, feed ingredients, ration formulation and feeding practices for various classes of domestic fowl.

4381 Clinical Nutrition Conference. Lab 1. Prerequisites: 4122 and fourth-year standing in veterinary medicine. Nutrition applied to clinical animals.

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.

4542* Sheep Science. Lab 2. Prerequisites: 3433, 3443 and 3653. Breeding, feeding, management and marketing of commercial and purebred sheep.

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.

4613* Beef Cattle Science. Lab 2. Prerequisites: 3433, 3443 and 3653. Application of scientific principles and recent research advances to the production of commercial and purebred beef cattle. Feeding, breeding, management and marketing methods.

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.

4652* Feedlot Operations. Prerequisite: 3653. Application of scientific knowledge, management principles and research advances to modern cattle feedlot operations.

4863* (L)Interpretatlon of Research. Lab 2. Prerequisite: senior standing or consent of instructor. Introduction to the methods of science, descriptive statistics and literature organization. Students review the literature and make 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-months internship in addition to a report and final examination.

5000* Research and Thesis. 1-6 credits, maximum 6. Prerequisite: graduate standing. Independent research planned, conducted and reported in consultation with a major professor.

5010* Special Problems. 1-3 credits, maximum 6. Prerequisite: graduate standing. 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.

5112* Research Techniques in Food Science. **Lab** 3. Prerequisite: BIOCH 4113 or equivalent. **Methods** and techniques **applicable** in food research such as column **chromato**graphic separation of proteins, thin layer and GLC separation of lipids, taste panel designs **and preparation** of food samples for analysis.

5113* Advances In Meat Science. **Prerequisites: BIOCH** 4113 and PHSIO 3034 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.

5623* Experimental Methods in Animal Research. Lab 2. Prerequisite: STAT 4023. Methods used in large animal research including the selection of experimental material, record keeping, interpretation of results and a critical review of existing investigations.

5733* Advanced Animal Nutrition. Lab 2. Prerequisite: 3653 or consent of instructor. 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. Same course as PHSIO 5742.

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 or consent of instructor. 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 or consent of instructor. Nutritional, Biochemical and clinical aspects of protein metabolism as it relates to nutritional status.

5782* Vitamin and Mineral Nutrition. Prerequisite: BIOCH 5753 or consent of instructor. Development of the concept of dietary essential minerals and vitamins. Individual minerals and vitamins discussed for animal species from the standpoint of chemical form, **availability,** requirements, biochemical systems, deficiencies and excesses, and estimation in foods and feed.

6000* Research and Thesis. 1-10 credits, maximum 30. Prerequisite: M.S. degree. Open only to students continuing beyond the level of the M.S. degree. Independent research, planned, conducted and reported in consultation with and under the direction of a major professor.

6003* Population Genetics I. Prerequisites: 5303 or equivalent and STAT 4023. A study of the 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. Prerequisites: graduate standing and 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 (S)General Anthropology. Prerequisite 15 credit hours. Introduction to the field of **anthropology,** emphasizing human evolution, human genetics, old world archaeology and the distribution of various breeding populations around the world.

3353* (H,I,S)Cultural Anthropology. Introduction to culture, various subdisciplines of cultural **anthropology,** anthropological concepts and capsule ethnographies of assorted ethnic groups.

3823* North American Indian Cultures. The origins and cultural evolution of selected tribes within cultural areas. United States government-tribal relationships. Present-day social and cultural status.

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.

4643* (I)Women: A Cross-Cultural Perspective. Prerequisites: 60 hours or 45 hours with 3.2 GPA including 2353 and SOC 1113 or equivalents. Social, familial, economic and legal status and roles of women in both industrial and nonindustrial societies. 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,I)Comparative Cultures. Compares environments, economies, social and **political** organizations and other aspects of culture among selected literate and preliterate societies.

4990* Special Topics in Anthropology. 1-3 credits, maximum 6. Prerequisites: consent of instructor. Directed readings or research on significant topics in anthropology.

6850* Seminar In Anthropological Theory. 2-3 credits, maximum 6. Significant theoretical formulations in cultural anthropology with emphasis on the historical, functionalist and **evolutionary** schools. Relationship between theoretical developments and research emphasis.

APPLIED BEHAVIORAL STUDIES IN EDUCATION (ABSED)

1110 World of Work. 1-3 credits, maximum 3. 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. Graded on a pass-fail basis.

3013 (S)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 and theoretical concept with reality of application within the university community.

3092 Counseling and Guidance for Dormitory Personnel. Prerequisite: Consent of instructor. Principles and practices involved in counseling and supervising students.

3113* Psychological Foundations of Childhood. Prerequisite: PSYCH 1113. The child from conception to puberty focusing on educational implicatory of development in cogni**tive, 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 accomodating 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 focusing 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.

4052* Measurement and Evaluation In the School. Prerequisite: junior standing. Construction and selection of classroom tests typically used in elementary and special education settings. Criterion-referenced and norm-referenced measurement strategies are contrasted. Grading techniques, rudiments of standardized test selection and score interpretation and the basic statistics used to summarize and analyze test results.

4223* Human Learning In Educational Psychology. Prerequisites: 3113 or 3213 and an approved observation or field experience course. 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 Remedlatlon. Prerequisites: courses in mathematics and reading, or consent of instructor. 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 Emotionally Disturbed. Prerequisite: 3202 or 5633. Characteristics, identification and teaching of the emotionally disturbed/behavior, disordered student; a variety of theoretical approaches to the subject.

4640 Student Teaching In Special Education. 1-12 credits, maximum 12. Prerequisites: admission to teacher education and 3202. Supervised teaching experience in the area of special education in which the student is preparing to qualify for a teaching certificate.

4643 Student Teaching Methods. Prerequisites: 4453, 4713, and concurrent enrollment in 4640. Competencies of classroom instruction, scope and sequence of activities, individualization of programs, appropriate teaching materials and communication skills in the education of handicapped individuals.

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* Techniques for Teaching the Mentally Retarded Child. Prerequisites:3202 and consent of instructor. Techniques for teaching the mentally retarded individual from birth to adolescence.

4723* Curriculum and Methods for Teaching Mentally Retarded Adolescents/Adults. Prerequisites: 3202 and consent of instructor. 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* Methods and Techniques of Behavioral Management In the Schools. Prerequisite: 3202. Methods and techniques of behavior management and with ways to set up and evaluate programs of behavior change.

4763* Developmental Language for the Exceptional Individual. Prerequisites: 3202 and SPATH 3213. Normative receptive and communication skills, the deviations of exceptional individuals and techniques for educational intervention.

5000* Master's Thesis. 1-6 credits, maximum 6. Prerequisite: consent of instructor.

5013* Introduction to Graduate Study and Research In Education. Prerequisite: graduate standing. 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.

Emphasizes the scientific method in educational problem solving. No credit for students with credit in 5013 and 5952.

5023* Introduction to School Psychological Service. History, role and function, and issues and problems of the school psychological service worker.

5083* Principles of Counseling Psychology. Prerequisite: graduate standing. Development, theoretical foundations and applications of therapeutic models of counseling and psychology.

5103* Human Development In Psychology. Prerequisite: graduate standing or consent of instructor. Introduction to basic research and theories of cognitive, emotional and social development. Applications to educational and family settings.

5213* Advanced Educational Psychology. Prerequisite: graduate standing. Learning and its effect upon coping and adjustment. How learning, environmental and personality factors interact to change human behavior.

5320* Seminar In Applied Behavioral Studies. 3-6 credits, maximum 6. Prerequisites: consent of instructor and graduate standing. A seminar experience which provides an in-depth exploration of contemporary problems of applied behavioral studies.

5373* Educational Measurements. Prerequisite: graduate standing. Emphasizes 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. Prerequisite: graduate standing. 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.

5443* Theories and Problems In Educational Psychology. Prerequisite: graduate standing. Theoretical foundations and nature of the problems studied in educational psychology; current issues and historical overview.

5452* Vocational and Career Information. Prerequisites: graduate standing and one of the following: 5513, 5553 or 5573. Local, state and national sources of occupational information about jobs and sociological factors related to career planning and worker effectiveness.

5463* Psychology of Learning. Application to education of the principles and theories of the **psychology** of learning.

5483* Community Counseling and Resource Development. Prerequisite: graduate standing, 5562, 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. Prerequisites: graduate standing, 5562 or consent of instructor. 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* Practlcum in Educational Psychology. 1-6 credits, maximum 6. Prerequisites: graduate standing and consent of instructor. Supervised application of the principles and procedures of educational psychology in institutional settings appropriate for the preparation of students in the areas of their specialization.

5513* Principles and Administration of Guidance Services. Prerequisite: graduate standing or consent of instructor. The place of guidance in the secondary school program, principles and practices, organization and administration of guidance services.

5523* Individual Appraisal. Prerequisite: graduate standing or consent of instructor. Selection, administration, scoring and interpretation of both standardized group psychological tests and nonstandardized tools and techniques used by counselors in developing a comprehensive understanding of individuals.

5533* Developmental Intervention Strategies. Prerequisite: graduate standing or consent of instructor. Counseling theories and specialized approaches applicable to school age children and youth. Focus on individual and group counseling and consulting.

5543* Career Development Theories. Prerequisite: graduate standing. 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. Comprehensive foundaton for counseling practice and application of contemporary theories to further knowledge of counseling as a communication process. Same course as PSYCH 5553.

5562* Laboratory Experiences in Counseling. Lab 2. Prerequisite: graduate standing or 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.

5563* Program Development in Special Education. Prerequisite: graduate standing. 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.

5573* Guidance In the Elementary School. Prerequisite: graduate standing or consent of instructor. The needs of young children and how they may be met through a developmental guidance program. The cooperation of the school counselor, teachers, principals and parents stressed in organizing, developing, implementing and evaluating a school guidance program.

5583* Group Process. Lab 2. Prerequisite: graduate standing or consent of instructor. Group dynamics, theory and techniques applicable to working with people of all ages in various school and non-school settings. Group member competencies are stressed during the laboratory period.

5593* Counseling Practicum. Prerequisites: 5523, 5553, 5573, 5562 or equivalent and admission to the student personnel and guidance program. 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.

5603* Current Trends and Issues in Special Education. Prerequisite: consent of instructor. Current research and literature regarding the education of exceptional children considered.

5612* Methods of Teaching Students with Learning Disabilities. Prerequisites: 3202 or equivalent, 4623 and consent of instructor. Methods of preparing teachers in prescriptive techniques and individualized instruction. Procedures dealing with students who have specific learning problems; teacher/pupil-made materials; setting up learning centers or a resource room; pupil motivation; cultural differences, and effective communication with other teachers, parents and administrators.

5613* Programming of Instructional Systems. Prerequisite: graduate standing. 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.

5620* Practicum with Exceptional Learners. 1-8 credits, maximum 8. Lab 1-8. Prerequisites: 5612 and 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 learning style differences; and issues related to individualized educational planning and instruction. Practical experience with individuals having learning problems.

5633* Behavior Characteristics of Exceptional Individuals. Prerequisite: graduate standing. 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. Prerequisite: consent of instructor. 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. Prerequisite: graduate standing. 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. Prerequisite: consent of instructor. Theoretical origins of creativity and their concomitant applications in the learning environment. Blocks to creative thinking, imagination, imagery, creativity testing, developing ideas and innovations, creative problem solving and teaching techniques and methods to maximize creative potential in all kinds and types of students.

5713* Transpersonal Human Development. Prerequisite: consent of instructor. 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* Education Workshop. 1-8 credits, maximum 15. Prerequisites: graduate standing, teaching experience and consent of instructor. For teachers, principals, superintendents and supervisors who have definite problems in instruction or administration. Student must register for the full number of credit hours for which the workshop is scheduled for a particular term. Same course as C-IED 5720 and OAED 5720.

5732* Seminar In Education. Prerequisites: graduate standing and consent of instructor. Preparation of seminar study.

5733* Education of the Physically Handicapped. Prerequisites: 3202 and consent of instructor. Types of physical handicaps, their educational implications and various adjustments for optimal functioning.

5743* Materials and Resources for Exceptional Individuals. Materials and resources designed for use by teachers and other professionals, paraprofessionals and parents in working with exceptional individuals. Includes commercial and teacher-student-made materials.

5783* Psycho-Educational Testing of Exceptional Individuals. Prerequisites: graduate standing and permission of instructor. Intensive practice in the selection, administration and interpretation of individual tests, appropriate for exceptional individual tests.

5823* Characteristics and Identification of 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.

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 of the Exceptional Learner. Prerequisite: 4753 or consent of instructor. Various theoretical approaches to the management of individual and group behavior of exceptional learners.

5952* Elementary Statistical Methods in Education. Prerequisite: graduate standing. Elementary statistical methods needed by consumers of educational research are presented. Descriptive and inferential statistics. No credit for students with credit in 5015.

5983* Intermediate Research Techniques In Education. Prerequisites: 5015 or 5952 and consent of instructor. Selected techniques needed for effective research in education. Research design, data collection and analysis, and interpretation of results stressed. Specific attention will be directed to appropriate utilization of nonparametric, regression, and analysis of variance techniques.

6000* Doctoral Thesis. 1-25 credits, maximum 25. Prerequisite: permission of advisory committee chairman. Required of all candidates for doctorate in Applied Behavioral Sciences. Credit given upon completion and acceptance of thesis.

6013* Advanced Research Techniques In Education. Prerequisite: 5983 or consent of instructor. Selected techniques needed for effective research in education. Research design, data collection and analysis, and interpretation of results stressed. Specific attention directed to appropriate utilization of complex analysis of variance and multiple regression analysis.

6043* Post Adolescent Development and the College Experience. Prerequisite: graduate standing. The critical period in human development following adolescence. The impact of post-secondary education as it compares with direct employment.

6113* Seminar In School Psychology. Prerequisite: graduate standing. Assessment technology and indirect school psychological services.

6173* Higher Education Student Personnel Administration. Prerequisite: graduate standing. Develops an understanding of the history, philosophy, student life, critical issues and administration of student personnel work in higher education.

6210* Internship In School Psychology. 3-6 credits, maximum 12. Prerequisite: enrollment in 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.

6313* Advanced Practlcum/Supervision. Prerequisites: 5593 and master's degree. For prospective counselor educators, guidance supervisors and practicing counselors. Development of supervision skills is the primary emphasis, but students are also helped to improve their counseling and consulting competencies.

6373* Educational Program Evaluation. Prerequisite: 5013 or 5015 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.

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 In Education. Prerequisite: graduate standing. A theoretically oriented approach to the concept of motivation; essential precursors to human behavior and applications to the solution of real and hypothetical problems.

6560* Internship In Counseling. 1-3 credits, maximum 6. Prerequisite: admission to the doctoral program in student personnel and guidance and consent of supervisor. Designed to facilitate counseling effectiveness and to set the stage for a productive life of professional practice.

6663* Educational Psychology Research Seminar. Prerequisite: admission to advanced graduate program. Critical analysis of current research.

6650* Directed Reading. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Directed reading for students with advanced graduate standing.

6660* Internship In Education. 1-8 credits, maximum 8. Lab 3-24. Prerequisites: admission to advanced graduate program and consent of staff. Directed off-campus experiences designed to relate ideas and concepts to problems encountered in the management of the school program.

ARCHITECTURE (ARCH)

2003 (H,I)Architecture and Society. Design, planning and building considered in their social and aesthetic contexts.

2012 Architectural Graphics I. Lab 6. Visual communications for architects.

2013 Basic Design. Lab 8. Cognitive aspects of two-dimensional, three-dimensional and spatial designs as related to the human environment.

2022 Architectural Graphics II. Lab 6. Prerequisites: 2012 and 2013. General methods of depicting solids and spaces. Projection drawing including perspective, elements of descriptive geometry and other basic graphic systems.

2023 Introduction to Architectural Design. Lab 8. Prerequisites: 2012 and 2013. Investigation of two-dimensional, three-dimensional and spatial designs for function, applications of principles to problems involving human use.

2100 Architectural Studies. 2-4 credits, maximum 4. Lab 6-12. Prerequisite: transfer student status with minimum of one year of college. Beginning studies in graphics and design in architecture. Summer sessions only.

3013 (H)History and Theory of Architecture I. The form and significance of architecture in western culture from the beginning through the middle of the nineteenth century.

3116 Architectural Design I. Lab 16. Prerequisite: admission to professional school. Application of design principles to architectural exercises. Analysis, schematic study and the development of spatial problems related to human occupancy and need.

3226 Architectural Design II. Lab 16. Prerequisite:3116. Continuation of ARCH 3116.

3513 Materials in Architecture. Prerequisite: 2013. Architectural, structural, mechanical and electrical systems of construction and to the basic materials of buildings.

3613 Structures I. Lab 2. Prerequisite: ENGSC 2114. Structural theory for applications in architecture.

4013 Introduction to Urban Design I. Prerequisite: fourth-year standing in School of Architecture. Urban design concepts and their role in preconceiving the other environmental design disciplines. Emphasis on the identity, structure and the meaning of an environmental image.

4023 Urban Design Theory. Prerequisite: fourth-year standing in School of Architecture. An examination and evaluation of elements and activities of urban areas to develop and substantiate urban design concepts within a theoretical and operational framework.

4025 (H)History and Theory of Architecture II. Prerequisite: 3013. The evolution of contemporary architecture from the industrial revolution to the present time.

4236 Architectural Design III. Lab 16. Prerequisite: 3226. The application of design methods to architectural problems of varying types and characteristics.

4623 Structures II. Prerequisite: 3613. Elementary structural analysis and design of steel buildings used in architecture.

4713* Environmental Control I. Lab 2. Prerequisites: PHYSC 1214 or 2114 and upper-division standing or consent of instructor. A survey of acoustics, illumination and electrical' systems in buildings.

4723* Environmental Control II. Lab 2. Prerequisite: 4713. Continuation of 4713; mechanical aystems in buildings.

5000* Special Problems. 1-6 credits, maximum 6. Lab 3-18. Prerequisites: graduate standing and consent of instructor and Head of School. Theory, research or design its related disciplines. Plan of study to be determined jointly by student and graduate faculty.

5013* Urban Design I. Prerequisite: 4025 or consent of instructor. Basic principles of urban development; fundamental theories of urban planning and design.

5023* Urban Design II. Prerequisite: 5013. Application of principles in urban planning and design; current practices, limitations and recent examples.

5100* Special Topics. 3-6 credits, maximum 15. Prerequisite: graduate standing. Subjects to be selected by the graduate faculty in architecture to cover advances in the state-of-the-art.

5216* Advanced Architectural Design I. Lab 15. Prerequisite: graduate standing in School of Architecture. The study of architectural problems of broader scope, familiarization with related fields of professional activity.

5227* Advanced Architectural Design I. Lab 20. Prerequisites: graduate standing and 5998. Design of buildings and building complexes; integration of all aspects of building planning and systems; programming and analysis.

5503* Engineering Research Methods. Lab 3. Prerequisite: consent of instructor. Technical applications in architecture. Dimensional analysis, similitude, modeling, computer applications, phototypes.

5613* Structures Ill. Prerequisite: 3613. Analysis and design applications in architectural problems using concrete structures.

5623* Structures IV. Prerequisite: 3613. Design of timber structures in architecture. Glued laminated framing, plywood panels, girders shells with code applications.

5712* Comfort Analysis. Prerequisite: graduate standing. **Environmental comfort in buildings; human response** rating scales, environmental design criteria.

5713* Advanced Environmental Control I. Lab 3. Prerequisite: 4713. The detailed layout and design of mechanical systems for low-rise buildings.

5724* Illumination and Power Distribution. Lab 3. Prerequisites: 4723 and 5712. Illumination and electrical distribution in buildings, visual comfort, illumination design, solar control, daylighting, energy utilization, environmental impact.

5763* Environmental Power Systems. Lab 3. Prerequisite: 4723. Alternative energy systems for buildings; energy utilization, solar systems, total energy systems, on-site power generation, emergency power.

5913* Professional Practice I. Prerequisite: 5998. Principles of architectural practice.

5998* Architectural Design and Development. Lab 20. Prerequisite: 4225 or 4236 and graduate standing. Design and detailed development of a major **architectural** project; integration of all aspects of architecture and related disciplines **in professional manner and milieu.**

6000* Special Problems. 1-15 credits, maximum 15. Lab 3-18. Prerequisites: graduate standing and 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.

6100* Special Topics. 3-6 credits, maximum 15. Prerequisite: graduate standing. Subjects selected by the graduate faculty in Architecture to cover advances in the state-of-the-art.

6113* Survey of Non-Western Architecture. Prerequisite: graduate standing. Architecture in the non-Western and pre-Columbian World.

6117* Advanced Architectural Design II. Lab 20. Prerequisite: 5227. Advanced design of buildings and building complexes; integration of technological aspects of building **planning** and systems; programming and analysis.

6123* Survey of Contemporary Architecture. Prerequisite: graduate standing. Architecture of the 20th century.

6313* Professional Project Research. Prerequisite: 5227. Data **gathering, research and program** formulation related to professional project.

6327* Professional Project. Lab 20. Prerequisite: 6313. Development of a major project in **particular area** of specialization.

6500* Architectural Engineering Problems. 1-6 credits, maximum 6. Lab 3-18. Prerequisite: graduate standing in Architectural Engineering. Engineering problems in architecture involving structures, mechanical systems, acoustics, illumination, etc.

6513* Foundations of Architectural Engineering Research I. Lab 3. Prerequisite: graduate standing in Architectural Engineering, Mathematical formulation of archifectural structural behavior. Matrix applications, finite element, finite differences, Stability considerations and three-dimensional structural modeling.

6523* Foundations of Architectural Engineering Research II. Lab 3. Prerequisite: graduate standing in Architectural Engineering. Mathematical formulations and modeling in architectural structures. Seismic design of building frames. Human response to vibrations in buildings. Design for extreme winds on buildings.

6616* Advanced Structures I. Lab 6. Prerequisites: graduate standing in Architecture and 4623. Theory and design of architectural applications in steel framed building. Elastic and plastic, design, multi-story construction.

6624* Advanced Structures II. Lab 3. Prerequisites: graduate standing in Architecture and 5613. Design and analysis survey of multi-story reinforced concrete frames, prestressed and post-stressed applications, shells and plates.

6713* Advanced Environmental Control II. Prerequisites: 5713; or 5712 and MAE 4703. Environmental systems for high-rise buildings; plumbing, mechanical, electrical and vertical transportation systems.

6803* Shelter Systems for Environmental Hazards. Prerequisites: graduate standing or consent of instructor and Head of School. Fire safety in buildings, closed environmental systems concepts, shielding against nuclear radiation and other related topics.

6813* Acoustics, Vibrations and Noise Control. Prerequisites: 4723, 5712. Acoustical analysis and design; acoustical criteria, room acoustics, sound absorption, sound transmission, acoustical privacy, design for good hearing, mechanical equipment noise, environmental noice.

6923* Professional Practice 11. Prerequisite: 5913. Continuation of 5913.

ART (ART)

1103 Basic Drawing I. Lab 6. A freehand drawing course designed to develop the student's awareness of visual relationships found in the landscape, perspective, geometric and organic subjects, while utilizing design, value, line, shape, form and texture.

1113 Basic Drawing II. Lab 6. Prerequisite: 1103. Further experience in basic drawing.

1203 Color and Design. Lab 6. Basic color and design. Color theory dealing with its visual and psychological aspects. An organized sequence of problems dealing with line, shape, value, texture and color.

1333 Sculpture I. Lab 6. Basic concepts, materials and techniques in sculpture.

1403 Lettering. Lab 6. Calligraphic lettering with pen, reproduction lettering and design in several media.

1603 (H)Principles *of* Ad History. Basic art principles, ideas and concepts through the study of the historical and thematic development of the fine arts. Not for art majors.

1803 (H)Principles of Studio Art. Lab 6. A studio, oriented fundamentals course for non-art majors. Freehand drawing, color, design, composition and art appreciation. May be elected by student s in other divisions who plan to take only 3 credit hours of art.

2100 Intermediate Drawing. 3 credits, maximum 6. Lab 6. Prerequisite: 1113. Life drawing. Drawing from the figure and its environment with an emphasis on the development of visual ideas and imagery.

2203 THREE DIMENSIONAL DESIGN. Lab 6. Problem solving. Exploration of two dimensional and three dimensional design concepts stressing the inter-relationships of design materials and techniques.

2403 Graphic Design I. Lab 6. Prerequisite: 1103 or 1203. Emphasis on recognition and use of typographic and pictorial images as a visual language, using projects such as brochures, bookjackets, displays and magazine layouts.

2440 Color and Design. 2 credits, maximum 6. Lab 6. Intermediate color and design.

2503 Ceramics. Lab 6. Ceramic form, clay preparation, handbuilding, wheel forming methods, glaze techniques, methods of decoration, firing and kiln construction.

2513 Jewelry I. Lab 6. Personal expression in jewelry. Basic techniques of construction, surface embellishment and manipulation of metal into jewelry forms.

2603 (H,I)History Of Ad I. Development of art from pre-history through the Gothic.

2613 (H,I)History of Art II. Development of art from the Renaissance to the modern era.

3100 Advanced Drawing. 3 credits, maximum 6. Lab 6. Prerequisite: 2100. Drawing from the figure and still-life with an emphasis on individual creativity.

3123 Beginning Painting-Lab 6. Prerequisites: 1103, and 1203 or 2203. Painting in oil and other media with an emphasis on developing basic painting skills and techniques.

3133 Watercolor Painting. Lab 6. Prerequisites: 1103, and 1203 or 2203. Basic ideas, skills and techniques in water media.

3203 Applied Design. Lab 6. Prerequisites: 1203 and 2303 or equivalent. Application of design principles to the overall environment. Open to nonmajors.

3303 Sculpture II: Metal. Lab 6. Prerequisite: 1333. Sculpture in fabricated metal and nonferrous metal casting.

3313 Sculpture 111: Stone, Wood. Lab 6. Prerequisite: 1333. Sculpture in carved wood or stone and wood fabrication.

3403 Illustration. Lab 6. Prerequisites: 1203 and 2100. An introduction to ideas and methods in editorial, industrial and advertising illustration. The employment of inventiveness and the development of professional work habits using standard drafting procedures and various media.

3500 Advanced Ceramics. 3 credits, maximum 9. Lab 6. Prerequisite: 2503. A continuation of basic ceramic process and design. Firing clay body and glaze research. Emphasis on wheel forming.

3510 Jewelry II. 3-6 credits, maximum 6. Lab 6. Prerequisite: 2513. Casting and advanced jewelry and metalwork techniques.

3523 Metalsmihing. Lab 6. Prerequisites: 2513 or consent of instructor. Production of three-dimensional metal forms by hammering, raising and stretching metal.

3533 Art Appreciation. The historic development of the fine arts from the earliest times to the present.

3623 (H)History Of American Art. Visual arts in America from the Colonial period to the present. Major styles, ideas, uses of material, in architecture, painting, sculpture and design.

3633 (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.

3703 Introduction to Printmaking. Lab 6. Prerequisite: 1103 or 1203. A series of projects designed to introduce the student to printmaking processes. Basic techniques in wood block, etching, lithography and serigraphy.

3710 Serigraphy. 3 credits, maximum 6. Prerequisites: 1103, 1203. Advanced printmaking dealing with basic stencil techniques in silk screen. Emphasis on a student's ability to deal creatively with a variety of techniques including photographic processes.

3720 Advanced Printmaking. 3 credits, maximum 6. Lab 6. Prerequisite: 3703. Intaglio techniques including etching, dry point and aquatint. Drawing and printing lithographs on metal plates; and relief printing. Emphasis on the student's ability to deal creatively with technical processes.

4120 Advanced Painting. 3 credits, maximum 6. Lab 6. Prerequisite: 3123. Painting based upon the individual's creative ideas and their relationship to current thought.

4130 Advanced Watercolor Painting. 3 credits, maximum 6. Lab 6. Prerequisite: 3133. A continuation of the development of painting skills, techniques and ideas using watercolor and other water media, including acrylic.

4300 Sculpture IV. 3 credits, maximum 6. Lab 6. Sculpture in any material.

4403 Graphic Design II. Lab 6. Prerequisites: 1203, 2103 and 2403. Employment of skills gained in preparatory courses such as lettering, illustration and photography. Specific objectives relate to advertising design and publication art for printed media.

4603 (H,I)History of 20th Century Art. Major concepts and styles in the development of art from Post-Impressionism to the present.

4643 (H,I)Survey of East Asian Art. The art and architecture of China and Japan.

4800 Special Studies In Art. 1-3 credits, maximum 6. Prerequisites: junior standing and consent of instructor. Special subject courses offered on demand on campus or through extension workshops.

4900 Directed Study. 1-3 credits, maximum 6. Lab 0-6. Prerequisites: junior standing and consent of instructor. Self-designed special topics in studio art or art history.

ARTS AND SCIENCES (A&S)

1111 Educational and Vocational Orientation. Lab 1. An orientation course for freshmen. Study techniques, evaluation of one's abilities and the making of proper educational and vocational choices. Graded on pass-fail basis.

1120 Critical Thinking: A Process Approach. 1-3 credits, maximum 6. An interdisciplinary program to develop skills in analyzing statements, gathering information, evaluating

sources, judging arguments, testing hypotheses, etc. **Individually paced and personalized instruction.**

2000 Arts and Sciences Lower Division Honors Seminar. 1-3 credits, **maximum 8. Prerequisite: participation in the Honors program. Graded on pass-fail basis.**

3000 Readings for Honors Students. 1-3 credits, maximum 6. Prerequisites: 60 hours or 45 **hours with a GPA of 3.25, and participation in the Arts and Sciences Honors program. Directed readings under the supervision of a readings committee.**

3500 (I)Conoqulum In Area Studies. 1-3 credits, **maximum** 5. **Interdisciplinary** studies in one area: Africa, Asia, Latin America, Russia and East Europe or North America. **Individual undergraduate** research projects.

4000 Arts and Sciences Upper Division Honors Seminar. 1-3 credits, maximum 8. Prerequisites: 60 credit **hours** or 45 **hours** with **a** GPA of 3.25, **and participation in the Honors program. Graded on a pass-fail basis.**

5990* Introduction to University Teaching and Research. 1-3 credits, maximum 6. Prerequisite: appointment as graduate teaching and/or research assistant. A seminar for all newly appointed Arts and Sciences graduate teaching and research assistants. Includes university organization and procedures, claw preparation, instructional techniques, evaluation, learning process, role of research in graduate education. Graded on pass-fail basis.

6000* Research for Ed.D. Dissertation. 1-15 credits, maximum 15. Prerequisite: **candidacy** for Ed.D. degree. With permission of chairman of advisory committee, can substitute for CIED **6000.**

ASTRONOMY (ASTRO)

1104 (N)Elementary Astronomy. Methods of observation and analysis. Current interpreta**tions of observational data in regard to the solar systems, Milky Way galaxy and the universe.**

2023 (N)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. Prerequisites: 1104 or 2023, and consent of instructor. Topics **such** as **pulsars, quasars,** neutron stars, **black holes and** interplanetary space probes.

3023* Astrophysics. Prerequisite: PHYSC 1214; ASTRO 1104 recommended but not **required. Analysis and interpretation of stellar data in terms of the laws of physics.**

ATHLETICS (ATHL)

1101 Intercollegiate Baseball and Softball Lab 5. Development of knowledge and skills through participation in varsity competition.

1111 Intercollegiate Basketball. Lab 5. Development of knowledge and skills **through** participation in varsity competition.

1121 Intercollegiate Volleyball. Lab 5. Development of knowledge and skills **through** participation in varsity competition.

1131 Intercollegiate Football. Lab 5. **Development of knowledge and skills through participation in varsity competition.**

1141 Intercollegiate Swimming. Lab 5. Development of knowledge and skills **through** participation in varsity competition.

1151 Intercollegiate Gott. Lab 5. Development of knowledge **and skills through participation in varsity competition.**

1161 intercollegiate Track and Field. Lab 5. Development of knowledge and skills **through participation in varsity cross country,** track *and* field competition.

1171 Intercollegiate Gymnastics. Lab 5. Development of knowledge and skills through **participation in varsity competition.**

1181 Intercollegiate Wrestling. Lab 5. **Development of knowledge and skills through participation in varsity competition.**

1191 Intercollegiate Tennis. Lab 5. Development of knowledge and skills through participation in varsity competition.

1201 Intercollegiate Field Hockey. Lab 5. Development of knowledge and skill through participation in varsity competition.

AVIATION EDUCATION (AVED)

1113 Theory of Flight. A ground school course covering Federal Aviation Regulations, theory of flight, power plant operation, service of aircraft, principles of navigation and meteorology. Fulfills the ground school training needed for private pilot certificate.

1222 Flight Training. Lab **4.** Meets the flying requirements for a private pilot certificate. Includes all maneuvers and cross-country flying required by the Federal Aviation Administration for the issuance of a pilot certificate. Requires a minimum of 20 flight hours with an instructor and 15 hours of solo flight. Training conducted at the Stillwater Airport under the direction of Federal Aviation Administration certificated instructors. Special fee required.

2122 Secondary Flight. Lab 4. Prerequisite: AVED 1222 or private pilot certificate. First of three courses, 2122, 2332, and 3442, which terminate in the issuance of a commercial pilot certificate or benefit the pilot who wants to improve flying skills. Includes maneuvers and cross-country flying. Requires 10 flight hours with an instructor and 30 flight hours solo. Special fee required.

2332 Intermediate Flight. Lab 4. Prerequisite: AVED 2122. Special flight instruction in night flying, instrument flying, and cross-country flying. Includes training in use of radio navigation and the flight computer. Requires 20 flight hours with an instructor 15 flight hours of solo maneuvers and 20 flight hours of solo cross-country. Special fee is required.

3223 Advanced Theory of Flight 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. Prepares the student for the Commercial Pilot Written Examination.

3331 Theory of Multiengine Flight. Prerequisite: Private Pilot Certificate. Aeronautical theory and information required for operating the multiengine airplane safely, efficiently **and** within its specified limitations. Emphasis on aerodynamics and multiengine emergencies.

3441 Acrobatic Flight Laboratory. Prerequisites: 1113 and 1222. A minimum of ten hours dual flight training. Basic, intermediate and advanced acrobatic flight maneuvers including sequencing and dimensional box spacing. Special fee required.

3442 Advanced Flight. Lab 4. Prerequisite: AVED 2332. The final phase of flight training in preparation for the commercial pilot certificate. Requires 20 flight hours with an instructor and 10 flight hours of solo on precision maneuvers. Special fee required.

3551 Multienglne Flight Laboratory. Lab 2. Prerequisite: Private Pilot Certificate. Dual flight training in preparation for the Multiengine Flight Examination. The student will obtain the experience and skill necessary to add an airplane, multiengine land class rating to his/her private or commercial pilot certificate. Study of airplane systems, emergencies, single-engine flight and performance characteristics. Special fee required.

3552 Instrument Flight Laboratory. Lab 4. Prerequisite: Private Pilot Certificate. Dual flight training in preparation for the Federal Aviation Administration Instrument Flight Examination. Unusual attitudes, emergencies, instrument approaches, and IFR cross-country flight. Special fee required.

3562 Flight Instructor: Airplanes. Prerequisites: Commercial pilot certificate with instrument rating and at least 18 years of age. Dual flight training to meet the requirements of a flight instructor certificate with an airplane category rating and a single engine class rating. Requires 20 dual flight hours which includes maneuvers practice and giving maneuvers instruction.

3661 Flight Instructor: Instruments. Prerequisites: valid flight instructor certificate and valid FAA first class or second class medical certification. Dual flight training to meet the requirement of adding an Instrument Flight Instructor Rating to the flight instructor certificate. Special fee required.

4112* Aerospace Education. Prerequisites: junior standing and appropriate background in science education. The aerospace industry and its impact on this country's sociological

and technological development. Emphasizes the latest technological advancements in the **field and relationships between** the aerospace industry and other elements of the nation's **economy.**

4235 Theory of Instrument Flight. Prerequisite: passage of FAA Private Pilot Written Examination **or** AVED 1113. **Regulations which apply** to flight under instrument conditions, the air traffic system and procedures, navigation and approach procedures, and elements of forecasting weather trends. Helps prepare individuals for the FAA Instrument Written Examination.

BIOCHEMISTRY (BIOCH)

3543 (N)General Biochemistry. Prerequisite: CHEM 2344 or 2463. Descriptive survey of the chemistry of living systems. A terminal course for students in applied biological **sciences. Not recommended** for preprofessional students or for students planning graduate work in biological science. **No credit for students** with credit in 3653.

3653* Surrey of Biochemistry. Prerequisite: CHEM 3015 or 3053. An introduction to the chemistry of living systems. Chemical properties of the constituents of living organisms. **Mode of formation, reactions and function of these compounds** in microorganisms, plants **and animals. No credit for students** with credit in 3543.

3721* (N,L)Biodlemlcal Laboratory. Lab 3. Prerequisite: 3653 or 3543 or concurrent enrollment in either. Qualitative and **quantitative** examination of biochemical materials and **reaction.**

4112* Biochemistry Laboratory. Lab 6. Prerequisite: 3653 or concurrent registration. Qualitative **and quantitative experiments illustrating biochemical principles and basic laboratory methods.**

4113* Biochemistry. Prerequisite: 3653. An extension and expansion of 3653.

4990* Special Problems. 1-5 credits, maximum 5. Lab 3-15. 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.

5823* Biochemical Laboratory Methods. Lab 8. Prerequisites: 4113 or 5753, and CHEM 2113 and 2122, or 3324. Quantitative experiments illustrating biochemical principles **and basic laboratory methods. No credit for students** with credit in 5930.

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 pattern.

5930* Advanced Biochemical Techniques. 1-5 credits, maximum 5. Prerequisites: 5753 or concurrent registration, and consent of Head of Department. Comprehensive lecture and **laboratory** course in **advanced** research techniques covering photometry, chromatography, **isotopes, enzymes, macromolecules and** metabolism. Offered in 5 consecutive parts in a semester. Any or all parts may be taken separately; each for one hour credit. Reduced credit for students with credit in 5823.

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.

6732* Biochemical Regulation. Prerequisite: 5853 or 4113. A study of the mechanisms by **which biochemical reactions, pathways and** processes are controlled. Qualitative and **quantitative behavior** of various biochemical systems analyzed.

6742* Physical Biochemistry. Prerequisites: one semester of biochemistry, calculus and physical chemistry or consent of instructor. Physical principles underlying molecular phenom**ena of biology and methods for their study. Besides** core of topics, additional items may be chosen for individual or group study.

6752* Enzymes: Kinetics and Mechanism. Prerequisite: 5753 or 4113. Theory of and meth**ods for study of enzyme catalysis, including** kinetics, chemical modification and model studies, illustrated with examples from the current literature.

6762* Nucleic Acids and Protein Synthesis. Prerequisite: 5753 or 4113. An in-depth study

of the encoding of information into base sequences of nucleic acids and the expression of this information by means of protein synthesis. Structures, mechanisms, enzymatic synthesis and modification, reaction sequences, and control emphasized.

6772* Protein Structure. Prerequisite: 5733 or 4113. Protein structure (sequence, conformation, quaternary structure) illustrated by examples of selected proteins.

6782* Membranes and Transport. Prerequisite: 5853 or 4113. Components, organization and biosynthesis of cellular membranes, emphasizing structure/function relationships of plasma membranes. Mechanisms and energetics of transport of substances across various **membranes including plasma membranes and organelles.**

6820 Selected Topics In Biochemistry. 1-2 credits, maximum 6. Prerequisite: 5853. Subject matter will vary from year to year; students should inquire at the Department office before enrolling.

BIOLOGICAL SCIENCE (BISC)

1114 (N,L)Blologlcal Sciences I. Lab 2. Ecological principles, populations, man and environment; genetics, reproduction and development; concepts of evolution, selection, adaptation, speciation and taxonomy. For the nonmajor.

1214 (N,L)Bioiogical Sciences II. Lab 2. Cellular organization and function, energy relations, maintenance of living systems, coordination and behavior. For the nonmajor.

1220 (N)Current Topics in Biology. 2 credits, maximum 8. Topics of current interest especially designed for nonbiology majors.

1303 (N,L)Principles of Biology. Lab 2. High school chemistry or one semester of college chemistry recommended. Unifying principles of cellular, organismal, population and ecosystem biology. Genetics, evolution, classification, development, energy transformations, integration and control in biological systems. The nature of biological investigation will receive attention.

1402 (N)Plant Biology. Lab 2. Prerequisite: 1303. 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.

1502 (N,L)Microblology I. Lab 2. Prerequisite: 1303. Emphasis on growth and identification. A survey of the techniques used in the isolation, cultivation and physiological characterization of microorganisms.

1602 (N)Animal Biology. Lab 2. Prerequisite: 1303. 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.

2204 Human Anatomy. Prerequisite: 1602. Gross anatomy of the human body and its systems based on comparisons with nonhuman mammals dissected in the laboratory, with minor emphasis on embryology and histology.

3003* (N)Heredlty and Man. Prerequisites: 60 credit hours, including 1114 or consent of instructor. Study of human heredity; the impact of genetics on human endeavor. For the nonmajor.

3013* Cellular and Molecular Biology. Prerequisites: 1402, 1502 or 1602, 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.

3020* (L)Cellular and Molecular Biology Laboratory. 2 credits, maximum 2. Lab 3. Prerequisite: 3013 or concurrent enrollment. Techniques and instrumentation for biological investigation using living plants and animals.

3024* Genetic and Evolutionary Biology. Prerequisite: 1402, 1502 or 1602, or equivalent. Inheritance in plants, animals and microorganisms with equal emphasis on molecular and classical aspects.

3034* (L)General Ecology. Lab 3. Prerequisite: 1402, 1602 or equivalent. Physical and biotic environment, responses of organisms to the environment, community ecology, natural ecosystems, and man's interaction with ecosystems.

3113 Marine Ecology. Lab 2. Prerequisite: 3034. Adaptation of organisms for life in the sea,

food webs and mineral cycling, factors regulating community organization, and the sea as a resource.

4100 Problems and Special Study. 1-4 credits, maximum 4. Prerequisite: approval of instructor. Participation in research problems involving library, laboratory or field studies.

4200 Medical Technology Hospital Intemshlp. 1-19 credits, maximum 30. Lab 35. Prerequisite: completion of 94 credit hours as precribed for B.S. in Medical Technology. Clinical laboratory training in microbiology, chemistry, hematology, urinalysis, serology, blood bank and general medical technology. Lectures, demonstrations and clinical laboratory experience in a hospital school of medical technology accredited by the National Accrediting Agency for Clinical Laboratory Sciences. A total of 30 hours of credit during the 12-month internship must be earned to complete the requirements for the B.S. in medical technology. Graded on pass-fail basis.

4313* Biophysics. Prerequisites: 1402, 1502 or 1602; PHYSC 1214 or 2114; CHEM 3015; or consent of instructor. The application of physical concepts to biological structures and processes. Interaction of light with biological materials, effects of radiation on living systems, electrical processes of biological systems, thermodynamics, nature of biological materials and the application of physical concepts in biological instrumentation. Same course as PHYSC 4313.

5003* Productivity of Aquatic Ecosystems. Prerequisite: 3034 and ZOOL 4254. Analysis of energy flow and material cycling through aquatic food webs, primary, secondary and tertiary **productivity,** environmental control of aquatic production. Applications to theoretical ecology, fisheries and pollution.

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.

5133* Evolutionary Ecology. Lab 2. Prerequisite: 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.

5353* Membrane Biophysics and Bloenergetics. Prerequisites: PHYSC 1214, and BISC 3013 or BIOCH 4113 or CHEM 3354 or PHYSC 3313. Application of 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.

BOTANY (BOT)

3005 (N)Field Botany. Lab 9. Prerequisite: BISC 1402 or equivalent. Collecting and identifying vascular plants including use of keys and terminology. Field recognition of native dominant **Oklahoma** plant and plant communities on sight, and discussion of the ecologic factors that control them. For persons in range management, wildlife ecology, animal science, forestry, and agronomy, as well as for secondary school biology teachers. Four weekend field trips, including one during fall recess, required.

3013* Botanical Microtechnique. Lab 3. Prerequisite: BISC 1402. Techniques for preparation of **plant** materials for microscopic examination.

3024* Plant Diversity. Lab **4.** Prerequisite: BISC 1402. 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.

3114* Plant Taxonomy. Lab **4.** Prerequisite: BISC 1402 or equivalent. Vocabulary and concepts of plant taxonomy: terminology, keys, nomenclature, documentation, classification and **biosystematics.** Emphasis on angiosperm flora of Oklahoma.

3233* Plant Anatomy. Lab 3. Prerequisite: BISC 1402. 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 BISC 3020 should enroll for one hour; all others enroll for 2 hours credit.

3462* Plant Physiology. Prerequisite: BISC 3013. Water relations, translocation, gaseous exchange, photosynthesis, growth and development, reproduction, tropisms, hormones, dormancy and seed germination.

3463* Plant Physiology. Prerequisite: BISC 1402. Plant subcellular structure, water relations, water absorption and ascent of sap, translocation, gaseous exchange, nutrition, enzymes, respiration, photosynthesis, growth, development, reproduction, tropisms, hormones, dormancy and seed germination.

3693* Plant Geography. Prerequisite: BISC 1402 or consent of instructor. 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* Plant Ecology. Prerequisite: BISC 3034 or equivalent. Autecological principles applicable to higher plants including effects of specific environmental variants on plant processes and distributions..

4033* Freshwater Algae. Lab 3. Prerequisite: BISC 1402. The identification and classification of the algae of lakes, ponds and streams of Oklahoma with special reference to their relationship to wildlife and water supplies.

4053* Vegetation Sampling and Measurement. Lab 3. Prerequisites: 3005 and 4023 or consent of instructor. Theory and application of quantitative sampling of vegetation in terrestrial habitats with emphasis on density, frequency and mass. Local field trips and special project required.

4374* Agrostology. Lab 4. Prerequisite: BISC 1402. Grasses and the principles involved in their classification.

4400 Undergraduate Research. 1-2 credits, maximum 5. Prerequisite: consent of instructor. Undergraduate research problems in botany.

4553* Plants of the Southern Rocky Mountains. Lab 6. Prerequisites: BISC 1402 and consent of instructor. Skills and concepts needed to describe, identify and preserve plants. Sight recognition of a number of dominant plant species and plant communities from the Southern Rocky Mountains. Offered only as a summer session or a summer-fall intersession course. Two-week field trip to Colorado required.

5000* Research. 1-6 credits, maximum 6. Research for the M.S. degree.

5110* Problems In Botany. 1-5 credits, maximum 8. Prerequisite: consent of instructor. Special studies in any *area* of botany.

5212* Vascular Aquatic Plants. Lab 4. Prerequisite: BISC 1402. The taxonomy and ecology of vascular aquatic plants with emphasis on the flora of Oklahoma. Techniques of collection, preservation and identification.

5232* Cytogenetlcs Laboratory. Lab 4. Prerequisite: AGRON 5342 or concurrent enrollment therein. Introduction to cytogenetic research techniques, especially karyotyping; observation and interpretation of cytogenetic phenomena including mitosis, meiosis and chromosomal aberrations.

5263* Plant Physiological Laboratory Techniques. Prerequisites: 3463 and 3460 or equivalent. Research techniques applicable to plant physiological problems.

5314* Phylogeny and Classification of Flowering Plants. Lab 6. Prerequisite: 3114. Principles of plant taxonomy and the relationship of various groups of vascular plants.

5403* Physiological Action of Herbicides and Plant Growth Regulators. Prerequisite: 3463. The mode of action, breakdown and movement of herbicides and plant growth regulators in plants and soils.

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 BISC 3034 or consent of instructor. Physiological and evolutionary aspects of plant ecology as revealed by recent research. Spring recess field trip required.

5753* Physiology of Growth and Development. Prerequisite: 3463 or equivalent. Consideration of plant subcellular organization and function, gene and enzyme regulation, cell life cycles, plant hormones, cell growth and growth control mechanism, tropisms and phloem transport.

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.

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)

2010 Special Topics. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Special topics and independent study in business.

4010 Business Projects. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Special advanced topics, projects and independent study in business.

4050* Honors 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 our 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* (L)Organizatlonal Policy. Prerequisite: senior standing. A terminal integrating course in formulating and implementing basic policy for business. Emphasizes planning models, policy models and strategy development. Analytic approach to 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.

5013* Research Problems in Business and Public Administration. Prerequisite: graduate standing. Research problems and processes in business and public administration.

5110* Graduate Research Projects. 2-3 credits, maximum 9. Prerequisite: graduate standing and consent of supervising professor. Graduate research projects to partially meet the requirements of the MBA program.

5113* Entrepreneurship and Venture Management. Prerequisite: graduate standing. 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.

5613* Technological Forecasting and Environmental Analysis for Management Planning. Prerequisite: graduate standing. An essential element in long-run policy and strategic planning for business or government is forecasting. Provides the structure, analytical techniques and methodology for making `futures' studies. Includes elements of economic forecasting, technological forecasting and value forecasting. Delphi techniques including cross impact analysis, scenario building, relevance trees, morphological analysis and trend extrapolation.

5713* Analysis of the Multinational Firm. Prerequisite: graduate standing. 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. 3-9 credits, maximum 9. Prerequisite: approval of advisory committee.

6100* Seminar in Business Administration. 3-6 credits, maximum 6. Prerequisite: doctoral student status and consent of instructor. Interdisciplinary in nature; focused on research methodology.

BUSINESS COMMUNICATION

(See General Administration)

BUSINESS EDUCATION (BUSED)

2010 Career Exploration In Business Education. 1-2 credits, maximum 2. The profession and the teacher's role and function in the educational process; admission to business teacher education; exploratory experiences.

3010 Observation and Participation in School Program. 1 credit, maximum 2. Roles and responsibilities of business teacher coordinator, observation and participation in teaching/learning activities.

4130* Economic and General Business Education. 1-3 credits, maximum 3. Prerequisites: CIED 2113, ABSED 3213. Teaching economic and general business education including development of objectives, assessment and preparation of material, aids and evaluation procedures.

4243* Principles and Philosophy of Vocational Business and Distributive Education. Prerequisite: senior standing. Basic principles and philosophy underlying the organization and development of vocational programs in business education with special attention directed toward federally aided programs in this area.

4250* Teaching Secretarial Business Subjects. 1-3 credits, maximum 3. Prerequisites: CIED 2113, ABSED 3213 and skill in secretarial business subjects. Teaching typewriting, **shorthand,** transcription and related business subjects including development of objectives, assessment and preparation of material aids and evaluation procedures. Those who expect to qualify for the Business Education Standard Certificate should enroll for 3 credit hours. Those who expect to qualify for the Bookkeeping and Clerical Practice Standard Certificate should enroll for 2 credit hours.

4363* Teaching Bookkeeping/Accounting and Clerical Practice. Prerequisites: CIED 2113, ACCTG 2203, ABSED 3213. Teaching bookkeeping/accounting and clerical practice including development of objectives, assessment and preparation of material aids, and evaluation procedures.

4490 Student Teaching in Business Education. 1-7 credits, maximum 10. Prerequisites: CIED 2113, ABSED 3213, previous or concurrent enrollment in related special methods courses and consent of Department Head. Observation and student teaching under guidance of a skilled critic teacher. Student must enroll during each semester of the senior year. All courses to be taken during the spring semester of student teaching are scheduled to provide for full-time teaching experience in high schools. The fall semester offering is for 1 credit, including observation and procedures for student teaching, information on teacher licensure and certification, etc. Spring semester offering is for 6 credits, which include the full-time teaching experience.

4653* Data Processing Instructional Methods and Procedures. Lab 2. Prerequisites: appropriate computer science and accounting background and consent of instructor. Problems, methods and techniques in using and teaching the use of computer equipment as well as related off-line equipment such as key punch machines, sorters, reproducers and collators, and accounting machines. `Hands-on' experience included.

5000* Thesis. 1-6 credits, maximum 6. Prerequisites: graduate standing and consent of Department Head.

5110* Problems In Business Education. 1-3 credits, maximum 6. Prerequisites: graduate standing and consent of Department Head. Consideration of current problems in business education, based upon the interests and needs of the student.

5220* Seminar In Business Education. 1-3 credits, maximum 6. Prerequisites: graduate standing and consent of Department Head. Critical survey of research in business education and intensive study of selected problems.

5330* Field Study. 1-4 credits, maximum 4. Prerequisites: graduate standing and consent of Department Head. Individual investigations conducted in absentia; periodic conferences and reports during the progress of the study.

5433* Business Curriculum. Prerequisite: graduate standing. Principles, practices and problems involved in the reconstruction of business curricula.

5660* Business Education Workshop. 1-6 credits, maximum 6. Prerequisites: graduate standing; experience as a teacher or administrator or consent of Department Head. Development of instructional materials and plans based on individual and group interests and needs.

5770* Seminar in Cooperative Office Education. 1-3 credits, maximum 6. Prerequisites: graduate standing and consent of Department Head. Problems, materials, methods, history and current theory and philosophy of cooperative office education programs.

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.

6100* Review of Research. 1-3 credits, maximum 4. Prerequisite: graduate standing. Intensive study, analysis and evaluation of research in business education and related fields.

6110* Graduate Reading In Business Education. 1-3 credits, maximum 6. Prerequisites: graduate standing and consent of Department Head and supervising professor. Supervised reading of significant literature not included in regularly scheduled courses.

6240* Improvement of Instruction in Economic and General Business Education. 1-3 credits, maximum 4. Prerequisites: graduate standing and credit in principles of economics. Problems, materials and methods of teaching general business and economic education courses; recent experimentation and research.

6360* Improvement of Instruction in Cooperative Office Education. 1-3 credits, maximum 4. Prerequisites: graduate standing and consent of Department Head. Materials and teaching procedures in cooperative office education.

6470* Improvement of Instruction in Bookkeeping and Accounting. 1-3 credits, maximum 4. Prerequisites: graduate standing and ACCTG 2203 or equivalent. Problems, materials and methods in teaching bookkeeping and accounting.

6580* Improvement of Instruction in Typewriting. 1-3 credits, maximum 4. Prerequisites: graduate standing and skill in typewriting. Problems and materials in teaching typewriting; psychology of skill; analysis of various teaching techniques; recent research and experimentation.

6690* Improvement of Instruction in Shorthand and Transcription. 1-4 credits, maximum 6. Prerequisites: graduate standing and skill in shorthand. Problems, materials and methods in teaching shorthand; standards and measurement; recent research and experimentation.

BUSINESS LAW (BUSL)

1113 (S)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* Basic Business Law. Prerequisites: ECON 2123 and POLSC 2013, or 45 semester credit hours. Basic legal concepts and principles; the law of contracts and agency; interaction of law with the business and political environment.

3323* Personal Property and Commercial Law. Prerequisite: 3213. Bailments, including carriers and innkeepers, liabilities and defenses. Sales, including incidental transactions and documents. Sales of personal property; determination of risk; rights and remedies of buyer and seller; and warranties. Secured transactions; preservation of creditors' security rights and the enforcement of remedies to creditors. Commercial paper: a study of negotiability concept and requirements; checks, bills of exchange and promissory notes; banking relations.

3422* Business Law. Prerequisites: 50 semester credit hours and consent of Department Head. Legal background, contracts, bailments, agency, sales, negotiable instruments. Not open to students who have credit in 3213.

4413* Law of Business Organizations, Insurance and Creditors' Rights. Prerequisite: 3213. Business organizations: general and limited partnerships; business corporations; business trusts; and cooperatives. Insurance: general legal principles of property, casualty and life contracts as auxiliary to commercial transactions. Bankruptcy and receiverships: judicial distribution and disposal of property of insolvent debtors; debtor-creditor relations. Acts of bankruptcy. Priorities of creditors.

4523* Real Estate Law, Management and Practice. Prerequisite: 3213. Real property law and practice. Nature of real property; land descriptions; title information; conveyancing; listing and sales contracts; loans and mortgages; brokers and salesmen; landlord-tenant relations; condominiums, shopping centers. Successful completion qualifies persons to sit for Broker's and Salesman's State Licensing examination. Trusts and estates:

matters involving estate planning, wills, law of descent and distribution; probate administration; gift and estate taxes; and ficuciary management of property.

5163* Legal, Social and Ethical Concepts in Business. Prerequisites: 3213 and graduate standing. An analysis of the significance of legal, social, ethical and political concepts on business decisions and public policy.

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.

3243* Elements of Petroleum Refinery. 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 3213; 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.

3583* Science of Engineering Materials. Prerequisite: PHYS 3313. Structure of matter, properties of materials; corrosion and electrochemical effects; noncrystalline materials.

4002* (L)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* (L)Chemical Engineering Laboratory II. Lab 6. Prerequisite: 4002. A continuation of 4002.

4123* 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.

4363* Chemical Processes. Prerequisite: senior standing or consent of instructor. 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 or consent of instructor. 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 or consent of instructor. Recent developments in chemical engineering and the process industries.

4683* Petroleum Processes. Prerequisite: 3473. Analysis of the unit processes of petroleum refining.

4843* Chemical Process Instrumentation and Control. Prerequisites: 3013 and MATH 2613. 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.

5213* Selected Difuslonal Unit Operations. Prerequisite: graduate standing. 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.**

5253* Process Design and Economics I. **Prerequisites:** 4123 and 5423. **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.**

5320* Introduction to Nuclear Engineering. 3-4 credits, maximum 4. Prerequisite: consent of instructor. Principles and **application** of nuclear energy. The fission reaction, the **behavior of neutrons,** nuclear **reactor theory** and **nuclear** reactors.

5423* Process Heat Transfer. Prerequisite: graduate standing or consent of instructor. Appli**cation** of **fundamental** principles of single- and **two-phase** fluid dynamics and **heat** transfer to the design **and** analysis of process heat transfer equipment.

5530* Introduction to Nuclear Technology. 2-4 credits, maximum 4. Prerequisite: 5320 or **consent** of instructor. The **application** of **radioisotopes** to industrial problems and engineering research. **Production** of nuclear fuels **and** the separation of stable isotopes. Processing of radioactive wastes. Reactor materials and radiation damage. **Radiation** shielding.

5633* Stagewise Operations. Prerequisite: graduate standing. 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.**

5740* Special Topics In Chemical Technology. 2-3 credits, maximum 6. Prerequisite: grad**uate standing.** Unit **operations and** unit processes as **applied** to inorganic **and organic** chemical **manufacture.** Chemical reaction mechanisms and reaction kinetics encountered in chemical and **petroleum** processing. May be repeated for credit if subject matter varies.

5793* Process Design and Economics IL Prerequisite: 5253. A continuation of 5253.

5843* Principles of Chemical Engineering Thermodynamics. Prerequisite: **graduate standing.** Principles **of thermodynamics.** Properties of fluids and prediction of **thermody**namic **properties. Phase** and chemical equilibrium. **Thermodynamics** in unit **operations.**

5850* Nuclear Reactor Engineering. 2-3 credits, maximum 3. Prerequisite: 5320. **Nuclear reactor theory. Multigroup theory. Heterogeneous** reactors. Reactor power systems.

5882* Inorganic Chemical Technology. Prerequisite: graduate standing. Processes, **equip**ment **and techniques important to the manufacture of** inorganic chemicals. **Economics of inorganic chemical production.**

5902* Organic Chemical Technology. Prerequisite: graduate standing. Processes **and** tech**nology of** the **organic** chemical **industry.** The **organic unit** processes **such as polymeriza**tion, **chorination, oxidation and nitration. Economics of** organic chemical **manufacture.**

5953* Petroleum Technology. Polymerization, catalytic cracking, reforming and other **unit** processes. Unit **operations** as **applied** to petroleum refining. Economics of refining **opera**tions.

5990* Special Problems. 2-4 credits, maximum 9. Prerequisite: consent of instructor. Chemical engineering equipment and its use in the manufacture of special chemical products on a semi-plant scale.

6000* Doctoral Thesis. 2-15 credits, maximum 30. Prerequisites: approval of major professor **and graduate standing.** The doctorate candidate will register for a minimum of 3 semester credit hours to a maximum of 15 semester credit hours per semester 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 disser**tation.**

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 I1. 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. Prerequisite: graduate standing. 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 (NL)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 1025, 1215, 1314.

1025 (NL)General Chemistry. Lab 2. Chemical principles and selected inorganic compounds. Beginning course of an integrated general-organic biochemistry sequence, reconunended for students in the agricultural sciences. No credit for students with prior credit in 1014, 1215, 1314.

1215 (NL)General Chemistry. Lab 2. The beginning chemistry course recommended for students in the applied biological sciences. No credit for students with credit in 1014, 1025, 1314.

1225 (NL)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 1415 or 1515.

1314 (NL)General Chemistry. Lab 2. Prerequisite: MATH 1213 or one and one-half units of high school algebra. The beginning chemistry course recommended for students in basic biological sciences (including premedical science and preveterinary science), physical sciences and engineering. No credit for students with credit in 1014, 1025, 1215.

1415 (NL)General Chemistry. Lab 2. Prerequisite: 1314 or advanced placement. A continuation of general chemistry, recommended for students in the basic biological sciences. No credit for students with credit in 1225 or 1515.

1515 (NL)General Chemistry. Lab 2. Prerequisite: 1314 or advanced placement. A continuation of general chemistry, recommended for students in the physical sciences and engineering. No credit for students with credit in 1225 or 1415.

2113 Principles of Analytical Chemistry. Prerequisite: 1515 or 1415, and MATH 1513 or 1715. Modern theories of solutions, separation techniques and methods or 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.

2344 (N)Organic Chemistry. Prerequisite: 1025 or 1225 or equivalent. For students in agriculture taking 3-semester sequence 1025-2344-BIOCH 3543. Fundamentals of organic chemistry with an introduction to biologically important molecules. No credit for students with credit in 2463, 3015 or 3053.

2463 (N)Organic Chemistry. Lab 2. Prerequisite: 1225 or equivalent. For home economics students. Occurrence, methods of preparation, reactions and properties of common organic compounds, especially those in foods and textiles. No credit for students with credit in 2344, 3015 or 3053.

3015* (N)Introductory Organic Chemistry. Lab 4. Prerequisite: 1415 or equivalent. Termi-

nal course in organic chemistry covering general principles, methods of preparation, reactions and uses of both acyclic and cyclic compounds. No credit for students with credit in 2344, 2463, 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 2344, 2463 or 3015.

3112* Organic Chemistry Laboratory. Lab 6. Prerequisite: 3053. Laboratory exercises related to theoretical principles covered in 3053. No credit for students with credit in 3015.

3153* Organic Chemistry. Prerequisite: 3053. A continuation of 3053.

3324* Introductory Quantitative Analysis. Prerequisite: 1225 or equivalent. Volumetric, gravimetric and instrumental methods of analysis. A terminal course in analytical chemistry. No credit for students with credit in 2113 or 2122.

3354* Introductory Physical Chemistry. Prerequisites: 3324 or 2122, and PHYSC 1214, and MATH 1715 or equivalent. Covers those concepts of physical chemistry of most interest to students of biological sciences. No credit for students with credit in 3434.

3434* Physical Chemistry I. Prerequisites: 2113, MATH 2365. 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. No credit for students with credit in 3354.

3532* Physico-Chemical Measurements. Lab 6. Prerequisites: 2122, 3434. Apparatus, experimental methods and calculations employed in physico-chemical investigations.

3553* Physical Chemistry 11. Prerequisite: 3434. A continuation of 3434. Students who are not chemistry majors may receive graduate credit.

4024* Modern Methods of Chemical Analysis. Lab 6. Prerequisites: 2122, 3434. Theoretical and laboratory study of modern techniques, reagents and instruments employed in analytical chemistry.

4223* Chemistry of High Polymers. Prerequisites: 3153 and 3424 or equivalent. Preparation and polymerization of organic monomers; properties and uses of resulting high polymers; theories of polymerization; inorganic and natural organic polymers.

4320* Chemical and Spectrometric Identification of Organic Compounds. 2-4 credits, maximum 4. Lab 1-2. Prerequisites: 3112, 3153 and junior standing. For graduate students, usually 2 credits; for undergraduate students, usually 3-4 credits. Theory and practice in identifying organic compounds by spectroscopic methods and theory and practice in separating mixtures of organic compounds.

4330* Inorganic Chemistry I. 3-4 credits, maximum **4.** Prerequisite: 3 hours of physical chemistry. Valence, periodic system, complex ions and the more important classes of inorganic compounds, 4 hours credit for chemistry majors; 3 hours credit for others.

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 multistage separation methods: chromatography, liquid-liquid extraction, zone melting, etc.

5113* Equilibrium and Kinetics in Analytical Chemistry. Prerequisite: one year of physical chemistry. Physical and chemical principles of equilibrium and kinetics as applied to analytical problems.

5220* Modern Topics for Teachers. 1-6 credits, maximum 6. Prerequisite: Teaching experience or consent of instructor. Designed to help elementary and secondary science teach-

ers improve their subject matter competence in chemistry. Content varies, depending on the needs of specific groups of teachers.

5282* Radiochemistry. Prerequisites: 1515 and PHYSC 4213. Chemical aspects of nuclear reactions and reactors. Separation techniques: chemical effects of nuclear energy; isotope exchange and tracer applications.

5323* Reactions of Organic Compounds. Prerequisites: 3153 and consent of instructor. Products and mechanisms of reactions of importance in organic synthesis.

5362* Organic Reactions. Prerequisite: 5323. A continuation of 5323, covering more advanced material.

5443* Mechanism and Structure In Organic Chemistry. Prerequisites: 3153 and 3553. Re**lationship** of properties of organic compounds to their structure; mechanisms of organic reactions.

5522* Stereochemistry. Prerequisite: 3153. Optical isomerism, geometric conformational analysis, relative and absolute configuration and methods for determination of absolute configuration.

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.

5723* Solutions of Eletrolytes. Prerequisite: 3553. Thermodynamics of solutions of electrolytes; cell potentials, transference conductance, diffusion, dielectric constants and their theoretical interpretation.

5963* Inorganic Chemistry 11. Prerequisite: 4330 or consent of instructor. Application of molecular orbital theory to inorganic molecules. Transition and nonrepresentative metal chemistry. Kinetics, mechanisms, electronic spectra and magnetism. Topics in the chemistry of nonmetals. Investigative methods.

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. Prerequisites: 5011 or M.S. degree. Preparation and oral presentation of critical review on chemical subjects. Usually related to the student's research area. Completion of 1 credit hour required for the Ph.D. degree.

6050* Special Topics In Analytical Chemistry. 1-6 credits, maximum 6. Supervised study of topics and fields not otherwise covered.

6103* Electroanalytical Chemistry. Prerequisite: 4024 or consent of instructor. The theory, practice and instrumentation in various areas of modern electroanalytical chemistry.

6113* Analytical Spectroscopy. Prerequisite: 4024 or consent of instructor. Survey of selected topics in analytical applications of spectroscopic techniques. Fundamental concepts as well as current trends in research, including instrumentation.

6153* Mechanism of Organic Reaction. Prerequisite: 5443. Theories of organic reactions; prediction of their course.

6253* Organic Nitrogen Compounds. Prerequisite: one semester of graduate organic chemistry. Preparation and properties of types of organic compounds containing nitrogen.

6323* Chemistry of Heterocyclic Compounds. Prerequisite: 5362. Preparation and reactions of cyclic organic compounds containing atoms other than carbon in the ring.

6353* Chemistry of Natural Products. Prerequisite: 5522. 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. Prerequisites: 3553 and consent of instructor. 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, maxi-

mum 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 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.

3131 (L)Materiais Testing Laboratory. Lab 3. Prerequisites: 3413 or concurrent enrollment ENGSC 2114. Experimental investigation of the properties of structural materials and behavior of structural members subjected to load.

3413 Structural Analysis. Lab 3. Prerequisite: ENGSC 2114. Elementary analysis of determinate and indeterminate trusses and frames by exact and approximate classical methods. Introduction to matrix analysis of structures.

3513 Structural Steel Design. Lab 3. Prerequisites: 3413 and 3131 or concurrent enrollment. **Introduction** to the design of structural steel members and connections in accordance with AISC specifications.

3523 Reinforced Concrete Design. Lab 3. Prerequisites: 3413 and 3131 or concurrent enrollment. Introduction to the design of reinforced concrete elements in accordance with the strength design requirements of the ACI Building Code.

3603 Surveying. Lab 3. Prerequisite: MATH 1613 or 1715. For students not majoring in civil engineering. Basic course in plane surveying techniques. Linear and angular measurements, traverses, differential leveling, horizontal and vertical curves and earthwork calculations.

3613 Surveying II. Lab 3. Prerequisite: 2613. 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.

3633 Transportation Engineering. Prerequisite: 3613. Study of administration, management and operation of transportation systems. Introduction to location studies, traffic surveys, design procedures and construction problems for rural and urban highways and other transportation media. Consideration of political, economic, aesthetic and social **aspects of transportation systems.**

3813 Bioenvlronmental Engineering Science. Prerequisite: CHEM 1515. Engineering aspects of the life support system; the carbon-oxygen cycle; cycling of nitrogen, sulfur and phosphorus; the hydrologic cycle; the nature of organic matter; composition of organic matter; hydrocarbons, carbohydrates, lipids; proteins, nucleic acids. Oxidizability and energy content of organic matter. Introduction to Biochemical Oxygen Demand (BOD); living organic matter as an engineering material.

3844 HydraulicsHydrology. Prerequisites: ENGSC 3233 or concurrent enrollment. Part 1. Hydraulics Introduction to hydraulics of channels, rivers, culverts, and pipelines. Analysis of pumps and distribution systems. Introduction to use of hydraulic models. Demonstrations of hydraulic flow regimes. Part 2. Hydrology Introduction to the various phases of the hydrologic cycle. Particular emphasis on the variation of the occurrence, distribution, movement and properties of the waters of the earth and their environmental relationships.

4003* Computer-Aided Analysis and Design. Prerequisite: Completion of or concurrent enrollment in 3513, 3523, 3633, 3844, 4714 and 4833 or consent of instructor. Simulation of civil engineering systems by numerical and approximation methods utilizing the digital computer for design and analysis.

4010* Civil Engineering Research. 1-4 credits, maximum 12. Prerequisite: senior standing or consent of instructor. Research and investigation of civil engineering problems.

4041 * Seminar. Prerequisite: senior standing. Readings and reports from technical and professional periodicals; discussion of professional aspects of engineering.

4273* Construction Planning and Scheduling. Lab 3. Prerequisite: senior standing. Critical-path methods of planning, scheduling and controlling construction projects. Includes both computer and noncomputer techniques. Same course as CONST 4273.

4623* Advanced Surveying. Lab 3. Prerequisite: 3613. Cadastral, topographic and geodetic surveying; legal aspects of property surveys; modern instrumental techniques; statewide plane coordinate systems; photogrammetric methods of mapping and control extension.

4714* Soli Mechanics I. Lab 3. Prerequisite: ENGSC 2114. Physical and mechanical properties of soils, specific gravity, grain size distribution, plasticity, shrinkage, permeability, compressibility, consolidation and shear.

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 Bloenvlronmental Engineering. Prerequisites: 3813 and 3844. Basic theory of water and wastewater treatment unit operation.

4643* Bioenvironmental Engineering Design. Lab 3. Prerequisite: 4833. Design of water and wastewater treatment systems.

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; in from 4 to 6 credits if a thesis is to be written.

5010* Civil Engineering Seminar. 1-3 credits, maximum 6. Prerequisite: graduate standing and approval of major professor. Review of literature of major fields of civil engineering.

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.

5113* Advanced Strength of Materials. Prerequisite: consent of instructor. One- and two-dimensional problems in stress, deformation and instability by analytical methods.

5123* Theory of Elastic Stability. Prerequisite: 5113. 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.

5223* Linear Systems Analysis. Prerequisites: senior or graduate standing. Applications of linear mathematical techniques to solve typical civil engineering systems.

5414* Theory of Structures I. Prerequisite: 3413. Analysis of statically indeterminate beams, plane trusses, portal frames and arches by numerical procedures, real work, least work, virtual work, slope deflection and column analogy. Influence lines for continuous beams.

5424* Theory of Structures II. Prerequisites: 4003 and 5414. 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.

5514 Advanced Reinforced Concrete Design. Lab 3. Prerequisite: 3523 or consent of instructor. Advanced topics in reinforced concrete with emphasis on frames, slabs, shells and the design of earthquake-resistant concrete structures.

5524* Steel Structures. Lab 3. Prerequisite: 3513. Planning and design of steel mill or industrial-type buildings, ordinary steel bridges and special steel structures.

5613* Traffic Engineering. Prerequisite: 3633. The principles and practice of traffic engineering, including traffic control devices(signs, signals, pavement markings, channelization) driver and vehicle characteristics, parking studies, accident analysis, safety standards, administration and public relations. Systems approach to safe and expeditious movements of road traffic.

5623* Terrain Interpretation and Evaluation. Lab 3. Prerequisite: 4714 and GEOL 1114 or

GEOL 3023 or consent of instructor. Study of the engineering and related properties of terrains and their reflection in topography, vegetation and man's use of surfaces. Characteristics of aerial **photography** and remote sensing imagery. Training and practice in the use of these media in applications and problems.

5633* Contracts and Specifications. Prerequisite: senior or graduate standing. Construction **and** interpretation of engineering contracts. Case studies. Principles of specification writing. Changes, delays and legal problems.

5643* Asphalt Materials. Lab 3. Prerequisite: graduate or senior standing. Composition, characteristics and uses of asphalt as a contruction material. Introduction to the physical, chemical and rheological properties of asphalt that affect its durability under service conditions.

5653* Asphalt Mix Design. Lab 3. Prerequisite: 3633. Theory and design procedures of hot-mix asphalt concrete, including production and control of the mixture. Asphalt concrete pavement specifications and construction methods. Design and construction of asphalt pavements and bases; **soil-asphalt** stabilization, asphalt surface treatments and seal coats.

5673* Concrete Materials. Lab 3. Prerequisite: consent of instructor. Methods of concrete mix design. Cement, aggregate and admixtures and their effect on concrete strength **and durability.** Experimental investigation of physical properties.

5683* 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.

5683* Pavement Design. Prerequisite: 3633. Basic principles and current methods of **pave**ment design. Soils and paving materials and their behavior under vehicle loads. Design of a pavement to support and spread vehicle loads to the supporting soils under all climatic conditions.

5713* Soil Mechanics II. Prerequisite: 4714 or consent of instructor. Application of soil mechanics to stability of slopes, retaining walls and foundations. Frost action in soils. Introduction to seepage.

5722* Advanced Soil Testing Methods. Lab 6. Prerequisite: 5713 or concurrent enrollment or consent of instructor. Advanced methods and procedures for engineering soil testing. Triaxial, direct and vane shear strength determination. Advanced consolidation and swell testing. Methods for design of new tests, procedures and apparatus.

5723* Foundation Engineering I. Prerequisite: 4714 or consent of instructor. Types of structural **foundations** including footings, mats, rafts, piles and piers. Site characteristics, **exploration** programs, field data, test results and construction materials and methods as basis for selection of type of foundation and design. Design procedures and methods.

5733* Rock Mechanics In Engineering Design and Construction. Prerequisite: adequate background in civil or architectural engineering or geology. Stresses, strength variations and **deformational** behavior of rocks. 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. Prerequisite: senior or graduate standing in Civil Engineering or consent of instructor. A study of theory and applications in finite-difference and discrete-element methods for analysis of soil-supported structural elements. Procedures for **analysis** fo beams, beam-columns and grid systems considering linearly elastic and nonlinear flexural stiffness and soil support. Methods of predicting nonlinear soil re**sponse and organization** of equations for computer analysis.

5753* Engineering Soil Stabilization. Lab 2. Prerequisite: 4714 or consent of instructor. Theoretical and practical aspects of engineering soil stabilization as a method for improving and upgrading low quality and/or unsuitable soils for engineering purposes. Use of lime, portland cement, asphalt, sodium chloride and other physical/chemical admixtures. Conduct and **evaluation** of laboratory test methods and interpretation of test data. Necessary cqnstruction methods and procedures.

5763* Construction Equipment Management. Prerequisite: graduate standing or consent of instructor. Concepts and theories of equipment operation and ownership costs and their **relationship** to production systems. Analysis of depreciation and other fixed costs for equipment pricing on construction projects. Application of engineering fundamentals to construction methods.

5773* Concrete Construction. Prerequisite: graduate standing or consent of instructor. Design **and** analysis of formwork for concrete structures; economics of formwork designs.

Concepts of slab construction such as for parking areas, streets and highways; cost of mixing concrete, subgrade preparation, forms, finishing, sawing and curing.

5813* Sanitary Science. Lab 6. Prerequisite: 4823. Basic chemical and microbiological aspects of sanitary engineering, including control of microbial populations, residual chlorine, dissolved oxygen and biochemical oxygen demand. Emphasis on volumetric procedures.

5823* 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.

5833* Water Quality Management. Prerequisite: consent of instructor. Physical, chemical and biological factors in pollution and natural purification of rivers and lakes in relation to water supply, sewage disposal and disposal of industrial wastes. Principles of sanitary limnology. Identification and control of plankton.

5843* Hydrology. Prerequisite: consent of instructor. Study of the rate of exchange of water between phases of the hydrologic cycle and in particular of the variations in this rate with time and place.

5853* Bio-Engineering I. Prerequisite: adequate background in chemistry and microbiology. Advanced treatment of microbiological and biochemical principles applied to bioengineering, sanitary engineering analysis and design.

5863* Advanced Unit Operation in Bloenvironmental Engineering. Prerequisites: 4833. Theory and design of advanced physical-chemical water and wastewater treatment processes.

5873* Air Pollution Control Engineering. Prerequisite: graduate standing. Causes, effects and control of atmosphere pollution.

5883* Solid Waste Management. Prerequisite: consent of instructor. Theory, design and operation of solid waste collection, disposal and reclamation systems.

5913* Groundwater Hydrology. Prerequisite: consent of instructor. Theory of groundwater movement, storage, exploration and pumping tests. Design of groundwater recovery and recharge systems.

5923* Water Resources Engineering. Prerequisite: 5843 or consent of instructor. Problems in water resources conservation and utilization with particular emphasis on river basin studies involving multiple water uses. Evaluation of river basin improvements.

5933* Water Treatment. Prerequisite: 4823. Theory, design and operation of water treatment plants. Water treatment plant control procedures.

5953* Biological Waste Treatment Design. Lab 3. Prerequisite: 4823 or graduate standing. The use of laboratory and pilot plant studies in the design of biological waste treatment plants. Various methods of scaling-up pilot plant studies to full-scale plants are presented.

6000* Ph.D. Research and Thesis. 1-16 credits, maximum 30. Prerequisite: graduate standing. 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: graduate standing, 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.

6113* Theory of Elasticity. Prerequisite: consent of instructor. Stress, strain and deformation analysis of two- and three-dimensional elastic continua. Propagation of stress waves through elastic continua.

6414* Introduction to Plate and Shell Structures. Lab 3. Prerequisite: 5113. Bending of isotropic rectangular and circular plates. Analysis by classical and numerical methods, yield line theory. Membrane analysis of singly and doubly curved shells. Design considerations.

6424* Advanced Topics in Plate and Shell Structures. Lab 3. Prerequisite: 6414. Advanced topics in plate and shell analysis; anisotropic and orthotropic plates, continuous plates and plates on elastic foundation, buckling of plates and large deformation theory. Bending theory of shells, folded plates. Finite element analysis.

6433* Dynamics of Structures I. Prerequisites: 5113 and 5414, or consent of instructor. Anal-

ysis 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* Theory of Structures III. Prerequisites: 5113, 5424 and consent of instructor. Analysis of plane stress and plane strain by finite element method. Development of element matrices for simplex, complex and parametric elements.

6444* Theory of Structures IV. **Prerequisites: 6434** and consent of instructor. Matrix formulation and solution of complex two- and three-dimensional problems in structural analysis. Large displacements, stability, material nonlinearities, dynamics. Advanced topics in finite element analysis.

6453* Theory of Plasticity. Prerequisite: 6113. Mechanics of perfectly plastic solids, stress-strain relations for plastic behavior; flexure and torsion of prismatic members; axially symmetric problems in plane stress and plane strain; elastically contained plastic deformation.

6514* Prestressed Concrete. Lab 3. Prerequisite: 3523 or consent of instructor. Design of simple and continuous prestressed beams. Least weight design concepts.

6533* Behavior of Reinforced Concrete Structures. Prerequisite: consent of instructor. Influences of creep, shrinkage, repeated and dynamic loads, high temperatures and complex states of stress on the performance of reinforced concrete structures.

6543* Plastic Steel Design. Prerequisite: consent of instructor. Plastic steel design in accordance with AISC specifications. Design of single and multistory frames. Limit analysis using energy methods of analysis.

6553* Earthquake-Resistant Design. Prerequisite: consent of instructor. 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* Soil Mechanics III. Prerequisite: 4714. Seepage through dams and foundation soils. Properties of line seepage. Seepage pressures. Piping and boiling as applied to stability of dams and levees and sheeted excavation. Groundwater lowering for construction purposes. Subdrainage of airfields.

6723* Foundation Engineering II. Prerequisites: 4714, and GEOL 1114 or GEOL 3023, or consent of instructor. Problems associated with soil or rock support of engineering projects. Application to projects such as tunnels, dams, transportation facilities and river and coastal improvement works. Other topics include use of earth or rock as a construction material, natural slope stability, frost effects and earthquake design.

6763* Construction Management. Prerequisite: graduate standing or consent of instructor. Administration and control of the construction organization. Ownership types, construction contracts, organizational structure, accounting and business methods, scheduling, bonds and insurance, labor law and safety.

6813* Open Channel Flow and Hydraulic Structures. Prerequisite: 3844. Hydraulics of free surface flow; analysis and design of dams, canals, spillways, penstocks, culverts and navigation structures.

6823* Bio-Engineering II. Prerequisite: 5853. Advanced application of physical, chemical and biological principles in establishing quantitative relationships in control of the aqueous environment and in sanitary engineering analysis and design.

6833* Advanced Biological Waste Treatment Design. Prerequisite: 5953. Use of kinetic models in the design of biological wastewater treatment plants.

6913* Advanced Sanitary Science. Lab 3. Prerequisite: 5813. Effect and control of water pollutants.

6923* Industrial Wastes Engineering. Prerequisite: graduate standing. Theory and methods of treating and reducing industrial wastes.

CLOTHING, TEXTILES AND MERCHANDISING (CTM)

1103 Basic Clothing Construction. Lab 4. Construction of clothing for the individual. Problems involving fabric selection, basic fitting and sewing techniques.

2113 Applied Design in the Clothing Industry. Lab 4. Appreciation of art elements and design principles; development of skill in application of design within various segments of the clothing industry.

2323 Intermediate Clothing Construction. Lab 4. Prerequisite: 1103. Development of judgment, originality and skill in construction; emphasis on pattern selection and alteration, fitting, pressing and decorative techniques.

2433 Fashion Innovation and Marketing Processes. The process of fashion innovation; variables of fashion affecting production and distribution of consumer goods; development of present structure in the fashion industry.

2573 Textiles for Consumers. Lab 2. Consumer-oriented study of textiles emphasizing fibers, care and serviceability of apparel and household fabrics.

3002 (S)Professional Image and Dress. Role of appearance and dress in creating a professional image for men and women. Figure and wardrobe analysis, professional clothing needs, individualized clothing decisions. Not open to CTM majors.

3102 Fashion Sketching. Lab 4. Prerequisites: 2113 or 3 hours of art and completion of 60 credit hours. Principles and techniques of sketching in the fashion field.

3113 Clothing in an Ecological Framework. Relationship between human beings and their dress within the environment. Relative effects of custom, technology and economic factors in determination of dress in different societies.

3213 Heritage of Dress. Prerequisites: 2113 or 3 credit hours of art and completion of 60 credit hours. 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.

3432 Fashion Retailing. Prerequisites: 2433 and completion of 60 credit hours. 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.

3572* (L)Analysis and Comparative Study of Fabrics. Lab 2. Prerequisites: 2573 and 4 credit hours of chemistry. A critical analysis and comparison of the performance of fabrics with reference to fiber content, yarn construction, weave, color and finish; standard methods of textile testing.

3643 Fashion Accessories Sales Techniques. Prerequisites: 2433 and completion of 60 credit hours. Consumer selection factors affecting fashion products. Merchandise information studies.

3853 Merchandise Display Essentials. Lab 2. Prerequisites: 2113, 2433 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-Work Experience Seminar. Prerequisites: 3432, 3643, 3853. Skills requisite to completion of a directed, practical experience in a work situation within the fashion industry.

3994 Student Work Experience. Lab 8. Prerequisites: 3991 and consent of instructor. Directed practical experience in an approved retail store or in a work situation related to the fashion industry.

4011 Post-Work Experience Seminar. Prerequisite: 3994. Study and comparison of student work experiences. Individual student conferences review of merchant supervisor reactions.

4013* Flat Pattern Design. Lab 4. Prerequisite: 2323. Interpretation of dress design developed through the medium of flat pattern; introduction to pattern drafting.

4052* Dressmaker Tailoring. Lab 4. Prerequisite: 2323. Construction of a coat or suit based on a commercial pattern using the dressmaker method of tailoring.

4153* Family Clothing. Use of family resources in meeting clothing needs at various stages of the family life cycle.

4243* Draping. Lab 4. Prerequisite: 2323. Interpretation of dress design developed through the medium of draping on dress forms padded to individual measurement.

4272 Creativity In Textiles. Lab 4. Prerequisites: 2113, 2573 and completion of 60 credit hours. Exploratory study of textile designing techniques in the creation of woven, knotted, dyed and printed fabrics.

4303* Fashion Buying and Management Procedures. Prerequisites: 3432 and completion of 90 credit hours. Fundamental principles for successful merchandising of fashion goods. Retail management and supervision responsibilities. Analysis of case studies, apparel markets and consumer demand.

4363* Fashion Promotion Media. Prerequisites: 2433 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.

4403* Creative Costume Design. Lab 4. Prerequisites: 3213, 4013 and 4243 or consent of instructor. Application of design principles and construction techniques in the development of original designs.

4453* Apparel Shop Entrepreneurship. Prerequisite: completion of 90 credit hours or consent of instructor. In-depth study and development of individualized plans for opening a women's or men's apparel shop including entrepreneurship, accounting and control, merchandising and buying, operations and management, and advertising and promotions.

4512 Seminar In Clothing, Textiles and Merchandising. Prerequisite: completion of 90 credit hours or consent of instructor. Career contacts and responsibilities for clothing, textiles and merchandising-related positions in business, industry and education. Development of skills and attitudes for professional success and advancement.

4553* Profitable Merchandising Analysis. Prerequisites: 3432 and completion of 90 credit hours. 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, etc.

4850* Special Unit Course In Clothing, Textiles and Merchandising. 1-3 credits, maximum 6. Prerequisite: consent of instructor. Various units of work taught by specialists in the field.

5000* Master's Thesis Or Report. 1-6 credits, maximum 6. Research related directly to clothing, textiles and merchandising for the master's thesis or report.

5053* History of Costume. Prerequisite: 3213 or consent of instructor. The development and preservation of historic costumes including dating criteria, storage and display.

5133* Research Methods In Clothing, Textiles and Merchandising. Prerequisite: consent of instructor. Survey and discussion of research methods, experiences in research design and analysis of data.

5232* Experimental Clothing. Lab 4. Prerequisite: 8 credit hours in clothing and textiles. Independent and creative study of current problems in clothing construction.

5273* Social and Cultural Aspects of Clothing. Prerequisite: 3113. An exploration of the sociological, economic, psychological and cultural aspects of dress.

5323* Textile Analysis. Lab 4. Prerequisites: 3572 and CHEM 2463 or consent of instructor. Testing equipment and methods applicable in the determination of certain physical and chemical characteristics of textile materials.

5333* Custom Tailoring. Lab 4. Prerequisite: 4052 or consent of instructor. Techniques of custom tailoring. Construction of a coat or suit.

5383* Methods and Materials for Teaching Clothing and Textiles. Prerequisite: 9 credit hours in clothing, textiles and merchandising. Discussion, demonstrations and projects for innovative teaching of clothing and textiles.

5440* Clothing, Textiles Merchandising Career Internship. 1-6 credits, maximum 6. Prerequisite: consent of instructor and Head of Department. 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 clothing, textiles and merchandising.

5453* Textile Economics. Prerequisite: 3572. Economic background of the textiles and apparel industry with emphasis on production and distribution and current national and international problems.

5853* Fashion Merchandising Workshop. Prerequisite: consent of instructor. Current trends in **merchandising** policies and procedures. Management level problems approached through in-store observations and and activities. Collaboration with retail executives.

5810* Problems In Clothing, Textiles and Merchandising. 1-3 credits, maximum 6. Prerequisite: consent of instructor and Head of Department. Individual and group investigations **and** discussions of special problems in the various phases of clothing, textiles and merchandising.

5923* Marketing Aspects of the Clothing and Textiles Industry. Prerequisite: consent of instructor. Survey of recent developments in the marketing of fashion goods. Emphasis on current issues in fashion merchandising.

8103* Fashion Theories and Concepts. A theory-oriented **approach** to the study of fashion in relation to consumption patterns. Influences on adoptive stages, dimensions of fashion cycles, recurrence of styles in clothing and other products.

6810* Advanced Problems in Clothing, Textiles and Merchandising. 1-6 credits, maximum 6. Prerequisites: consent of instructor and Head of Department. Intensive individual or small-group study of problems in various areas of clothing, textiles and merchandising for **advanced** graduate students who are working toward doctorate degrees.

COMPUTING AND INFORMATION SCIENCES (COMSC)

1112 (S)Role of Computers In Modern Life. History of computing; types of computers; programming; description of selected **applications;** computers in everyday life, including **data banks and privacy; social implications.**

2113 (A)Computer Programming I. Lab 2. Prerequisite: MATH 1513. Programming in a high-level programming language. Introduction to algorithms, problem-solving tech**niques, and** structured programming. Examples of **applications** from various areas such as business, science or engineering.

2123 (A)Computer Programming II. Lab 2. Prerequisite: 2113. Continuation of 2113 using one or more high-level programming languages. Nonnumerical algorithms, string processing, programming style and documentation. Introduction to internal searching and sorting methods; linear linked lists.

3113* Introduction to Computer Organization. **Lab** 2. Prerequisite: 2123. Description of computer systems or subsystems from the viewpoint of elementary logic functions and logic devices. Number representations for arithmetic operations. Internal and external codes used for data representation. Control and organization of functional units; memory, processor, input-output and control.

3204* Discrete Mathematical Structures. Prerequisites: 2113, and MATH 2713 or MATH 2265. Discrete mathematical structures and their applications. Applications to computing and information sciences emphasized. Sets of strings, computability, elementary **graph theory, Boolean** algebra, elementary circuit design and elementary probability theory. Same course as MATH 3204.

3223* Numerical Methods for Digital Computers. Prerequisites: 2113 and MATH 2365, or consent of instructor. Digital computer approximate solutions of algebraic and transcendental **equations,** solutions of linear and nonlinear equations, functional approximations, least squares curve-fitting and allied topics. Practical programming experience in applications of these techniques.

3333* Procedures and Algorithmic Processes. Prerequisite: 2123 or consent of instructor. Description and programming of non-numeric problems. The concept of an algorithm in narrative, symbolic and flow-chart form. Application of iterative and recursive algorithms and elementary data structures. PL/I is the principal programming language used.

3443* Introduction to Computer Systems. Lab 2. Prerequisite: 2123. Functional and register level description of computer systems. Programming in assembly language, addressing techniques, macros, subroutine linkage, input-output operations. Introduction to file processing operations and auxiliary storage devices.

3883 Social Issues In Computing Sciences. Prerequisites: junior standing, 9 credit hours COMSC, ENGL 3323, or concurrent enrollment. 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.

4103* Computer Programming For Business. Prerequisite: 2113 or GENAD 3143. Primary emphasis on developing computer programs for business applications using the COBOL language. File structures, file updating techniques, sorting, report writing, magnetic tape and disk file handling. Same course as GENAD 4103.

4113* Methods of Computer Science for Science and Engineering. Prerequisites: one year of calculus and senior or graduate standing, or consent of instructor. For graduate and advanced undergraduate students requiring a one-semester treatment of computing topics. No background in computing topics assumed. Comprehensive treatment of the FORTRAN programming language with emphasis on numerical applications. Number systems and finite arithmetic, iterative processes, program structuring, secondary storage, sequential files, direct-access files, numerical methods, sorting and searching. Program libraries and systems of programs. Data structures topics including stacks, queues, list structures and sparse matrices.

4223* Management Information Systems. Prerequisites: 2113, ECON 3213, and ACCTG 2203 or 3103. The design and operation of management information systems. The total systems concept, real-time systems and current development in management information theory.

4253* Introduction to Numerical Analysis. Prerequisites: 2113 or 4113, MATH 2613 and MATH 3013. Computer arithmetic and rounding errors; numerical methods and error analysis associated with interpolation, least square approximation, roots of equations, integration, finite differences and ordinary differential equations, systems of linear algebraic equations. Same course as MATH 4253.

4263* Microcomputer Software. Lab 2. Prerequisite: 3443 or ELEN 3213. Principles of software design for microcomputers. Use and limitations of machine languages, assembly languages, and high-level languages; familiarity with system utilities, operating systems, and editor for microcomputers; programmed I/O and interrupt drive I/O; applications of microcomputer software.

4333* Digital and Analog Computer Methods. Prerequisite: 2113 and MATH 2613. Digital and analog computer solutions of differential equations of science and engineering. Eigenvalue and transform methods, quadrature techniques for numerical integration, Runge-Kutta and predicorrector methods in digital computer solutions. Programming and scaling of analog computers for the solutions of differential equations.

4343* Data Structures and Information Processing. Prerequisite: 3333. Storage, structures, data and information structures, list processing, graphs and graph processing, searching, sorting.

4363* Organization of Programming Languages. Prerequisites: 3333 and 3204. Programming language constructs. Run time behavior of programs. Language definition structure. Control structures and data flow. Examples from ALGOL 60, ALGOL 68, APL, SNOBOL 4, LISP and RPG.

4423* File Structures. Prerequisite: 3333. 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.

4443* Compiler Writing I. Prerequisite: 3443 or consent of instructor. 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.

4570* Special Topics In Computing. 1-3 credits, maximum 5. Advanced topics and applications of computer science. Typical topics include operating systems, multiprocessor systems, programming systems or various mathematical and statistical packages. Designed to allow students to study topics not provided in existing courses.

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.

5070* Seminar and Special Problems. 1-3 credits, maximum 9. Prerequisite: consent of instructor. Designed to allow students to study advanced topics not provided in existing courses.

5113* Computer Structure and Programming. Prerequisite: graduate standing in computer science or consent of instructor. Computer architecture, computer control, arithmetic and logical operations. Machine instructions, indexing, addressing, linkages and input-output. Assembly, macro and emulation-simulation systems.

5213* Logic of Digital Computers. Prerequisite: graduate standing in computer science or consent of instructor. Boolean algebra and formal logic; functions, mapping, truth tables and minimization. Number coding and binary arithmetic. Registers and counters. Parity methods, storage organization and computer architecture.

5313* Formal Language Theory. **Prerequisites: 4343** or consent of instructor. Formal language theory applied to procedure-oriented languages. Recursive and nonrecursive parsing algorithms. Application of finite state algorithms to lexical analysis.

5323* Computer Operating Systems. Prerequisites: COMSC 4343, and MATH 4513, STAT 4013 or STAT 4113. Bath-process programming systems; characteristics, services **and** limitations. Input-output processing and interrupts. Time sharing and multiprogramming systems. Storage and file management. System accounting, user services and utilities.

5333* Compiler Writing Ii. Prerequisite: 4443. Advanced theory and practice of compiler writing techniques. Compiler writing systems. A formal approach to computer languages.

5413* Data and Storage Structures. Prerequisite: 4343 or consent of instructor. Advanced data structures and their application in recursive and iterative al orithms. Static and dynamic data structure representations and processing algorithms. Dynamic and virtual storage management.

5423* Information Organization and Retrieval. Prerequisite: 4343 or consent of instructor. Storage, classification and retrieval of information; data bases, errors, multikey files, indexing; dynamics of file reorganization; search strategies.

5513* Numerical Analysis I. Prerequisite: 4253 or MATH 4253. Algorithms and error analysis; solutions of equations; interpolation and approximation theory. Same course as MATH 5513.

5523* Theory and Techniques of Optimization I. Prerequisites: FORTRAN, MATH 3013 or consent of instructor. Theoretical and computational aspects of large-scale linear and nonlinear optimization problems. Implementation of existing algorithms and the design of new algorithms pertinent to important problem structures including linear quadratic, general nonlinear, integer and mixed integer programs. Model formulation of practical industrial-type optimization problems.

5533* Theory and Techniques of Optimization II. Prerequisite: 5523. Continuation of 5523.

5543* Numerical Analysis II. Prerequisites: 4253 or MATH 4253 and MATH 4653. Discrete variable methods in ordinary differential equations including single-step and multistep methods. Iterative techniques for numerical solution of partial differential equations. Same course as MATH 5543.

5553* Numerical Analysis III. Prerequisites: MATH 3013, COMSC 4253 or MATH 4253. Theoretical and computational methods associated with matrix algebra, linear algebraic equations and algebraic eigenvalue problems. Same course as MATH 5553.

5613* Automata and Finite State Machines. Prerequisites: 5313 or 5113 and 5213, or MATH 3113 and consent of instructor. 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.

5623* Computability and Decidability. Effectiveness, primitive recursivity, general recursibility, recursive functions, equivalence of computability, definitions, decidability, recursive algorithms.

5712* Computer Operations. Prerequisites: graduate standing in computer science and consent of instructor. Experience in the operation of computers and peripheral equipment.

6000* Research and Thesis. 2-15 credits, maximum 30. Prerequisites: graduate status 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.

6200* Advanced Topics in Computer Architecture. 2-6 credits, maximum 12. Prerequisites: 5113, 5213. Structure and organization of advanced computer systems, parallel and pipeline computers, methods of computation, alignment networks, conflict-free memories, bounds on computation time. *May* be repeated with change of topics.

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.

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; multi-user 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 Analysts of Algorithms. 2-6 credits, maximum 12. Prerequisite: 5413. Analysis of various algorithms. Sorting, searching, computational complexity, lower bounds for algorithms; NP-hard and NP-complete problems; parallel algorithms; proof of correctness of algorithms. May be repeated with change of topics.

6623* Algebraic Structures of Formal Grammars. Prerequisites: 5313, 5613. 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 Construction Drawing I. Lab 3. Fundamentals of light construction drawings; techniques of **architectural** drawings; methods of representing plans, elevations, sections, and **details and general print interpretation.**

1313 Materials of Construction. Structural and finish materials used in architectural construction, their properties, manufacture and application.

1323 Construction Procedures I. Lab 3. Prerequisite: 1313. Procedures, practices and methods of light and commercial construction. Basic foundation layout, framing and finish work.

2333 Construction Procedures II. Lab 3. Prerequisite: 1323. Principles, practices and methods of industrial and **heavy** construction. Precast concrete, earth quantities and productivity of equipment.

2343 Concrete and Asphalt Construction. Prerequisite: 2333. Production techniques for **placing and finishing** concrete. Design of concrete form work. Concrete testing techniques. **Theory and techniques** for placing masonry construction units. Field and **laboratory techniques and field procedures of asphalt construction.**

3253 Construction Drawing II. Lab 3. Prerequisites: 1213 and 2343. Fundamentals of commercial construction drawings; interpretation and quantity take-off of working drawings. Architectural, civil and structural drawings.

3263 Estimating I. 3253. Prerequisite: 2013. Quantity take-off with emphasis on excavation, formwork and concrete, masonry, rough carpenty and miscellaneous specialty items.

3345 Mechanical Principles. Lab 6. Designed to present mechanical concepts to nonmechanical students entering the Electrical Power program. Covers basic material science and principles of statics.

3353 Structures for Electrical Power. Lab 3. Prerequisite: 3345. Analysis of the behavior of structures used in the electrical power industry. Force and deformation analysis, foundation, types of structures and erection procedures.

3364 Structures and Foundations. **Lab** 3. Prerequisite: MECDT 3323. Fundamentals of analysis and design of structures and foundations. Study of methods of analysis of forces and deformations of determinate structures. Concrete and steel used in structures and **foundations.**

3453 Mechanical and Electrical Equipment of Buildings. Lab 3. Prerequisite: PHYSC 1214. Plumbing, heating, air conditioning and electrical systems as applied to residences and small commercial buildings.

3563 Construction Law and Insurance. Legal and insurance problems as they pertain to the construction industry.

4263 Estimating II. Lab 3. Prerequisite: 3263. Extensive use of actual contract documents for quantity take-off, pricing and assembling the bid. Several projects will be studied.

4273 Construction Planning and Scheduling. Lab 3. Prerequisites: 3263 and COMSC

2113. **Critical-path** methods of planning, scheduling and controlling construction projects. Includes **both** computer and noncomputer techniques. Same course as CIVEN 4273.

4283 Construction Organization and Management. Prerequisites: 3563 and 4273. Organizing **and** managing office and field staff. Authority and responsibility. Introduction to the construction manager concept. Principles of management applied to construction **contracting.**

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)

1232 Reading and Study Skills for College Student. Lab 2. Instruction and laboratory experience for the improvement of reading rate, vocabulary, comprehension and study skills. Graded on pass-fail basis.

2113 (S)The School In American Society. Prerequisite: sophomore standing. The school as a major institution in its political, economic and social setting. The nature and extent of **equality** of **educational opportunity** in the U.S. Socialization of students, social class and **education,** the poor and the schools, ethnic groups and their school experiences, the nature of **multicultural** education, mainstreaming (PL 94-142), the education of women, **financing** and governing the schools, and the nature of teaching.

2450 Observation and Participation In the Elementary School. 1-4 credits, maximum 4. Lab 3-12. Prerequisite: speech proficiency examination. Seminars, directed observation **and participation experiences in the elementary school. Develops an awareness of and** gives experience in meeting the mental, social physical and cultural differences among children.

3122* Utilization of Instructional Media. Familiarizes students with a broad range of instruc**tional media and** with principles and **techniques** related to their selection, utilization and **evaluation.**

3283* Foundations of Reading Instruction. Introduction to basic principles of reading instruction in the elementary school, including traditional and modern methodology and materials.

3450 Participation In the Elementary School. 1-4 credits, maximum 4. Lab 3-12. Prerequi site: 2450. Seminars, directed **participation** experiences in the elementary school. Devel**ops an awareness of and gives experience in meeting** the mental, social physical and cultural differences among children.

3710 Field Experiences In the Secondary School. 1-3 credits, maximum 3. Lab 2. Prerequisites: consent of instructor and completion of speech proficiency examination. 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.

3713* Structure and Utilization of a Mathematics Laboratory. lab 1. 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 and supervisors.

3823* Driver and Traffic Safety I. Prerequisite: valid driver's license. A basic course in traffic safety to familiarize the student with the components of the highway transportation system (driver, vehicle, roadway) and current efforts toward traffic accident prevention.

3853* Methods and Materials of General Safety Education. Safety problems in the home, school, **community;** safety education in the elementary, junior and senior high schools. Open to all elementary *and* secondary school teachers, safety supervisors and administrators. Taught by the self-paced methods.

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: consent of instruc-

tor. 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.

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.

4053* Teaching Geometry in the Secondary School. Prerequisite: consent of instructor. 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.

4113* Production of Instructional Non-Motion Media. Prerequisite: 3122 or consent of instructor. Planning and production of various non-motion media to coordinate with subject matter content. Such processes include overhead transparencies, 35-nun slides, audio recordings, graphics, synchro-systems, and programmed materials for devices to be used in independent learning. Individual problems and group projects.

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 Colonial period to the present.

4150* Mathematics In the Elementary School Curriculum. Lab 0-6. 1-4 credits, maximum 4. Prerequisites: admission to teacher education and MATH 2513. Purposes, selection and organization of content, teaching and learning procedures, and evaluation of outcomes in elementary school mathematics.

4190* Reading In the School Curriculum. 1-4 credits, maximum 4. Lab 0-6. Prerequisites: 3283, 4233 and admission to teacher education. The purposes, selection and organization of content, teaching and learning procedures and evaluation of outcomes in reading.

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.

4233* Diagnostic Teaching Of Reading. Prerequisite: 3283 or consent of instructor. Diagnostic procedures for reading instruction, including evaluation techniques, teaching strategis and tutoring experiences.

4250* Language Arts In the Elementary School Curriculum. 1-4 credits, maximum 4. Lab 0-6. Prerequisite: 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.

4320* Social Studies In the Elementary School Curriculum. Lab 0-6. 1-4 credits, maximum 4. Prerequisite: admission to teacher education. Purposes, selction and organization of content, teaching and learning procedures and evaluation of outcomes in elementary social studies.

4350* Science In the Elementary School Curriculum. 1-4 credits, maximum 4. Prerequisite: admission to teacher education. The purposes, selection and organization of content, teaching and learning procedures and evaluation of outcomes in elementary school science.

4363* Classroom Design and Management (K-3). Prerequisite: ABSED 3113 or FRCD 3213. Current early elementary practices, concentration on implications for the design and management of the physical, social, and cultural classroom environment. Special emphasis on cognitive learning.

4450 Internship In the Elementary Schools. **Lab** 3-36. 1-12 credits, maximum 12. Prerequisites: **admission** to teacher education, 2450, 3450, 4150, 4190, 4250, 4320 and 4350. Seminars and supervised student teaching in the elementary school. Develops awareness of and provides experience with mental, social, **physical** and cultural differences among adolescents.

4452* Kindergarten Education Methods. Prerequisite: admission to teacher education. The pu , methods of teaching, classroom design and management, classroom routine, and selection **and** organization of content in kindergarten education.

4473* Reading for the Secondary Teacher. Prerequisite: 3710 concurrent enrollment. Materials and procedures in the **teaching of reading in secondary schools for content area teachers.**

4560 Outdoor Education Competencies. **1-4** credits, maximum 4. Lab 1. Prerequisite: 2113 or LEIS 2413. **Development** of (teacher/leader) competencies in the content, methods, **philosophy, and** historical perpective of **contemporary** curricula using the out-of-doors as a multidisciplinary learning laboratory. Same course as LEIS 4450.

4720 Internship In the Secondary Schools. **Lab** 3-36. 1-12 credits, maximum 12. Prerequisites: **admission** to teacher education, 2113, 3710, ABSED 3113 or 3213, 4723. Supervised observation and student teaching in fields in which the student intends to qualify for teaching certification. Develops awareness of and provides experience with mental, social, physical and cultural differences among adolescents.

4723 Methods and Materials in the Secondary Schools. Prerequisites: 2113, ABSED 3113 or 3213 and admission to teacher education. Appraisal and organization of materials and study of various instructional modes appropriate for the field in which the student intends to qualify for teaching certification.

4852* Simulator and Multiple Car Methods in Driver Education. Prerequisites: 3823 **and** 3853. The **operation** and techniques of teaching driver education utilizing the driving simulators and the multiple car driving range. Laboratory experiences prepare instructors to teach beginning and advanced driving skills.

4913* (I)lMematlonal 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.

4923* Methods of Drive and Traffic Safety Education II. Prerequisites: 3823 and 3853. Prepares teachers and supervisors in the field of driver education. Actual in-car teaching experience with beginning driving students. Organization and administration of secondary school drive and traffic safety education programs.

4952* Chill Preparedness. Need for civil **preparedness,** civil defense services and the organization **and** administration of civil preparedness in communities, states and nation. Includes natural and man-made disasters.

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 4-6 hours if they write a thesis.

5023* Comparative Education. Prerequisite: graduate standing. 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 Secondary School. Prerequisite: consent of instructor. Current trends in methods, materials and classroom procedures as they are related to the teaching of foreign languages in the secondary school.

5053* Fundamentals of Curriculum Development. A study of curriculum **that includes philosophy, history, decision making, major concepts and terms.**

5113* Production of Instructional Motion Media. Prerequisite: 4113 or consent of instructor. A sequel to 4113. Planning and production of various motion media to coordinate with subject matter content. **Application** and production techniques of 8-mm and 16-mm film making and video tape recording in instructional experiences. Individual problems and group projects.

5122* Curriculum In the Secondary School. Curriculum in the **middle and high schools.**

5130* Advanced Studies in Children's literature. 2-3 credits, maximum 3. History of children's books against a world **background** of prevailing political, economic and social

factors influencing cultural patterns and values. Tools of research in children's literature; nature and direction of contemporary children's book publishing in the United States and abroad.

5133* Photomethods for Instruction. Prerequisite: 3122. For in-service teachers and graduate majors in instructional media. Utilization of photomethods in activities of research, investigation and reporting in a variety of content fields. Topic selection from basic **photography** skills, photomicrography, photo modifying and photo copying.

5143* Language Arts in the Curriculum. Content and current issues in the language arts. Materials and methods for teaching the communication skills.

5173* Kindergarten-Primary Curriculum (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. Prerequisite: 4152 or equivalent. Identification of specific learning disabilities in school mathematics. Selection of appropriate remedial measures. Completion of a case report.

5280* Workshop in Science Education. 1-4 credits, maximum 4. Develops and/or implements elementary and secondary science programs.

5322* Social Studies In the Curriculum. Aims, selection and organization of content, materials and methods. Special attention given to the outcomes of teaching and learning.

5350* The Visual Arts In the Curriculum. 1-3 credits, maximum 6. Lab 2. Prerequisite: 4213 or consent of instructor. 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. Prerequisite: 3283, 4233 and 4190 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 and Secondary Levels. Prerequisite: 3283, 4233 and 4190 or 4473; or consent of instructor. Examination of the developmental reading curriculum at intermediate, middle school and secondary levels including evaluation of teaching methods and materials.

5463* Diagnosis and Treatment of Reading Problems. Prerequisite: 5423 or consent of instructor. 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 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* College Reading Instruction. **Open to graduate** students majoring in reading. Instructional **materials and** techniques for the teaching of **reading-study skills to college students. Applicable to secondary and adult reading.**

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.**

5732* Seminar in Education. Prerequisites: graduate standing and 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.

5753* Audiovisual Communication Strategies. **Lab 2. Prerequisites: 3122 or 4113 and AB-SED 5613. For students majoring in audiovisual education, curriculum development, supervision and administration. Gives students skills in the organization and curricular integration of audiovisual systems. Some of these systems are electronic student response systems, mediated individual learning tasks, multimedia presentation and large class instruction, visual literacy's role in learning, instructional communications models, microteaching and utilization of instructional television.**

5773* Administration and Supervision of Audio-Visual Materials. Prerequisite: 3122 or permission of instructor. 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 audio-visual programs.**

5882* Institutional History of Education. **History** of elementary, secondary, **and** higher education in Western Civilization with emphasis upon the **development** of the American **educational institution.**

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, pholosophies and points of view in elementary school education.**

6133* Theory to Practice In Education. Prerequisite: graduate standing or 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, evaluations, etc.

6152* Art In the School Curriculum. **Art education programs of the elementary and secondary schools in relation to the total curriculum. Aims, content and methods considered. 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 or consent of instructor. 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* Practlcum. 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.

DISTRIBUTIVE EDUCATION (DISED)

2010 Career Exploration In Distribution and Distributive Education. 1-2 credits, maximum 2. Marketing and distribution concepts and occupational information within the framework of career exploration and decision-making. The modular design used to provide a variety of exploratory experiences in career decision-making, self-assessment and learning about the occupations, work environments and skills involved in marketing and distribution.

3010 Observation and Participation in School Program. l credit, maximum 2. Roles and responsibilities of business teacher or distributive education coordinator, ovservation and participation in teaching/learning activities. Same course as BUSED 3010.

3253* Curriculum In Distributive Education. Prerequisite: MKTG 3213. Provides the technical competencies in distributive education curriculum design demanded of distributive educators who prepare students for careers in retailing, wholesaling or service selling fields.

3453* Organization and Administration of the Distributive Education Program. Prerequisite: CIED 2113. Designed to develop the competencies needed by the distributive education teacher-coordinator to organize and administer a comprehensive distributive education program general or specialize employing the cooperative or project (simulated) plan of instruction.

4243* Principles and Philosophy of Vocational Business and Distributive Education. Prerequisite: senior standing. Basic principles and philosophy underlying the organization and development of vocational programs in business and distributive education with special attention directed toward federally aided programs in these areas. Same course as BUSED 4243.

4253* Methods of Teaching Distributive Education. Prerequisites: CIED 2113 and ABSED 3213. An intensive study of the three strategies used by distributive education teacher-coordinators to prepare persons for careers in marketing, including general and specific classroom instruction, on-the-job and simulated laboratory experiences and student organizations.

4490 Student Teaching In Distributive Education. 1-7 credits, maximum 10. Prerequisites: ABSED 3213, CIED 2113, consent of Head of Department; previous or concurrent enrollment in 4243 recommended. Observation and student teaching under guidance of a skilled critic teacher. Student must enroll during each semester of his senior year. All courses taken during spring semester of student teaching are block-scheduled to provide for full-time teaching experience in high schools. The fall semester offering is for 1 credit, including observation and procedures for student teaching, information on teaching licensure/certification, etc. Spring semester offering is for 6 credits, which includes the full-time teaching *experience.*

5000* Thesis. 1-6 credits, maximum 6. Prerequisites: graduate standing and consent of Head of Department.

5220* Seminar. 1-3 credits, maximum 6. Prerequisites: graduate standing and consent of instructor. Designed to develop technical marketing competencies needed by the distributive education teacher-coordinator to direct learning experiences needed in a general or specialized distributive education program such as DE Fashion Marketing, DE Recreation and Tourism, DE Hotel and Lodging or DE Transportation. Same course as BUSED 5220.

5330* Field Problems in Distributive Education. 1-3 credits, maximum 4. Prerequisites: graduate standing and consent of Department. Studies of specific problems related to distributive education; work conducted in absentia; conferences and reports required.

5350* Problems and Methods in Distributive Education. 1-3 credits, maximum 4. Prerequisites: graduate standing and consent of Head of Department. Intensive study of problems related to the **cooperative** and project (simulated) plans of instruction.

5660* Distributive Education Workshop. 1-2 credits, maximum 6. Prerequisites: graduate standing **and** experience as teacher-coordinator administrator or consent of Head of Department. Intensive study of instructional, supervisory and administrative problems in distributive education.

6153* Improvement of Instruction In Merchandising. Prerequisites: graduate standing and consent of Head of Department. Designed to develop the instructional competencies needed by a distributive education teacher-coordinator in a general or specialized distributive education program.

ECONOMICS (ECON)

1113 (S)The Economics of Social Issues. An issues-oriented approach to the study of economics. Basic economic principles introduced and developed through study of important social issuesfor 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.

2123 (S)Introduction to Economic Analysis. A theory-oriented approach to the study of economics. Elementary principles of price theory and national income theory developed systematically with emphasis on their use in analyzing economic issues and for recommending appropriate economic policy.

3010 Special Topics in Economics. 1-3 credits, maximum 9. Prerequisites: 2123 and consent 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: 2123 or consent of instructor. 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* Intermediate Microeconomics. Prerequisite: 2123. 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* Intermediate Macroeconomics. Prerequisite: 2123. 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: 2123. Introduction to 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)Pubiic Finance. Prerequisite: 1113 or 2123. Introduction to 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* Labor Problems. Prerequisite: 2123. Union organization and structure, union-management relations, collective bargaining, labor markets, social insurance and public policy.

3523* (S)Poverty and Economic Insecurity. Prerequisite: 3 credit hours in economics or sociology. Problems, programs and proposals for dealing with poverty and economic insecurity.

3613* (I)International Economic Relations. Prerequisite: 3 credit hours in economics. Principles of foreign trade and finance; international economic organizations; the foreign economic policy of the U.S.

3713* Government and Business. Prerequisite: 1113 or 2123. Study and application of methods of measuring the extent of monopoly power in American industries and *ways* of

evaluating the effects of this power on consumer welfare. An introduction to U.S. antitrust laws, their enforcement and landmark court decisions under these laws.

3813* (I,S)Development of Economic Thought. Prerequisite: 3 credit hours in economics or consent of instructor. The ideas of great economists with emphasis upon economic concepts **and** systems of thought in relations to social, ethical and political ideas under evolving historical **conditions.**

3823* Economic History of the United States. Economic development since about 1763; **particular emphasis on** the period since 1860. Same course as HIST 4513.

4010* Basic Studies In Economics. 1-6 credits, maximum 6. Prerequisites: 3 credit hours of economic principles, or consent of instructor. Economic concepts, theory, issues and problems. Limited to certified social science teachers and others with the consent of the Head of the Department of Economics.

4213* Introduction to Econometrics. Prerequisites: 2123, 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.

4313* Advanced Banking. Prerequisite: 3313. Central and commercial banking, including Federal Reserve **policymaking,** banking structure, capital adequacy and taxation of **banks. Friedman's proposals** for monetary and banking reform.

4413* State and Local Government Finance. Prerequisites: 1113 or equivalent. 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. Prerequisites: 3513 or MGMT 4113 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.

4523* Manpower Analysis and Planning. Introduction to the manpower field, dealing with the problems, issues and experience of public and private programs for equipping people (especially the disadvantaged) for gainful employment. Investigation of various sources of data **and** techniques for the planning of meaningful manpower programs. Same course as GEOG 4523.

4643* (I)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* Economics of Regulated Industries. Prerequisite: 2123. Direct government regulation of U.S. industries and its effects on consumer welfare and economic efficiency. Problems and consequences of regulation by independent commission in specific U.S. industries, e.g. airlines, trucking, natural gas and communications.

4823* (I,S)Economlc Systems. Prerequisite: 2123. Comparative analysis of the economic **theory and institutions of capitalism, socialism, communism and facism.**

4913* Urban and Regional Economics. Prerequisite: 2123 or consent of instructor. An analysis of urban and regional economics; the spatial aspects of poverty, land use, the urban environment and rural industrial development.

4923* United States Economic Development. Prerequisite: 2123. Changing patterns of human **and** material resource utilization in the United States. Market forces and structural **and institution changes that have affected the economy's growth.**

5000* Research and Thesis. 1-6 credits, maximum 6. Prerequisite: graduate standing. Workshop for the exploration and development of research topics. Research leading to the master's thesis.

5010* Research In Economics. 1-3 credits, maximum 10. Prerequisites: graduate standing and consent of chairman, Economics Graduate Studies Committee. Supervised research **under a workshop-type** arrangement for Ph.D. thesis proposals, M.S. research reports **and other approved purposes.**

5013* General Studies In Economics. Prerequisite: graduate standing. Economic principles and problems from the general education point of view rather than that of economics as a discipline. Credits may be applied only toward the degree of Master of Science in business and public administration, Master of Science in education or Doctor of Education.

5113* Managerial Economics. Prerequisites: 3113 and graduate standing. Economic theory applied to business decision making; demand and cost analysis for forecasting; production planning; product-line pricing; inventory control; capital budgeting.

5123* Microeconomic Theory I. Prerequisite: graduate standing. Contemporary price and allocation theory with emphasis on comparative statics.

5133* Macroeconomic Theory I. Prerequisite: graduate standing. Theory of national income, employment and the price level from the point of view of comparative statics.

5143* Macroeconomic Theory II. Prerequisite: graduate standing. Theory of national income, employment and the price level from the point of view of dynamics. Growth models.

5163* Microeconomic Theory II. Prerequisite: 5123 or consent of the instructor. Comtemporary price and allocation theory with emphasis on dynamic models. Welfare economics.

5213* Mathematical Economics. Prerequisite: graduate standing. Mathematical concepts especially useful to an understanding of economic theory.

5223* Introduction to Mathematical Economics. Prerequisites: 3113, 5213 or equivalent. Activity analysis, linear and nonlinear programming and related techniques applied to the problems of general economic equilibrium and dynamic analysis.

5233* Advanced Mathmaticai Economics. Prerequisites: 5233, MATH 2265 or consent of instructor. A mathematical approach to the theory of economic equilbrium growth, cycles and imperfect competition.

5243* Econometric Methods. Prerequisite: consent of instructor. Application of econometric techniques to economic problems: theory and estimation of structural economic parameters.

5253* Advanced Econometrics. Prerequisite: 5243 or consent of instructor. Theory, principles of estimation and quantitative applications involving complex systems of structural relationships of economic phenomenon.

5313* Monetary Economics I. Prerequisite: graduate standing. Contemporary issues in monetary theory and policy. Demand for money and supply of money theory, interest rate theory and issues in monetary policy.

5323* Monetary Economics II. Prerequisite: graduate standing. Intensive analysis of classical monetary theory and individual research on selected problems in monetary economics. The ideas of Patinkin, Wicksell, Fisher and Keynes.

5413* Economics Of the Public Sector I. Prerequisite: graduate standing. Allocation and distribution effects as well as incidence of governmental budget policies.

5422* General Studies In Economics. Prerequisite: graduate standing. Financing governmentfederal, state and local; emphasis on problems and issues involved in financing state and local government in Oklahoma. Credits may be applied only toward the degree of Master of Science in education or the degree of Doctor of Education.

5433* Economics of the Public Sector II. Prerequisite: graduate standing. Fiscal policy as a means of promoting economic stabilization and growth.

5533* Manpower Analysis. Prerequisite: graduate standing. Introduction to the manpower field; recruitment, training, motivation and utilization of human resources both within employing units and throughout the economy. Applications of basic concepts, data, tools and techniques of analysis to selected manpower problems. Same course as OAED 5533.

5543* Labor Market Theory and Analysts. Prerequisite: graduate standing. 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.

5553* Human Resource Utilization and Planning. Prerequisite: graduate standing. Contemporary problems in productive employment and planning for the uses of human resources. Manpower planning problems, methods, programs and policies. Evaluation and application of planning principles for the development and implementation of meaningful manpower programs. Same course as GEOG 5553.

5613* International Economics I. Prerequisite: graduate standing. International finance; theory and policy relating to foreign exchange and world monetary relations; the framework of international credit and foreign investments.

5623* Economic Development I. Prerequisite: graduate standing. Characteristics and prob-

lams 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 Economics II. Prerequisite: graduate standing. 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. Prerequisite: graduate standing. 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. Prerequisite: graduate standing. 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. Prerequisite: graduate standing. Theories of imperfect competition; **the market** structures **and conduct associated** with imperfect competition and the **implications** for market performance; the empirical evidence concerning these.

5813* History Of Economic Thought. Prerequisite: graduate standing. Economic theories from the 18th century until the present with emphasis on the origin and improvement of **analytical tools.**

5903* Regional Economic Analysis and Policy. Prerequisite: graduate standing. Selected topics in **location** theory, regional economic growth and policies toward regional development in the U.S.

5913* Urban Economics. Prerequisite: graduate standing. 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. Prerequisite: graduate standing. **Intensive analysis of selected problems in economic** policy. Individual research, seminar reports **and** group discussion of reports.

6113* Seminar In Economic Theory. Prerequisite: graduate standing. Microeconomics.

6123* Seminar In Economic Theory. Prerequisite: graduate standing. Macroeconomics.

6520* Seminar In Manpower Analysis. 1-4 credits, maximum 4. Prerequisite: graduate **standing.** Problems in manpower research led by staff members and outside experts. **Research papers and** reports required of each student. Same course as OAED 6520.

6813* Seminar in Economics Systems. Prerequisite: graduate standing. Selected topics **dealing with the economic theory and institutions of capitalism, socialism, communism, and fascism. Individual research, seminar reports, and group** discussion of reports.

6910* Seminar In Regional Economic Analysis and Policy. 1-3 credits, maximum 6. Prerequisite: **graduate** standing. Selected problems in regional economics for advanced students. **Individual** research and seminar 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. Graded on pass-fail basis.

4110* Teacher Education Seminar. 1-6 credits, maximum 6. Prerequisites: ABSED 4223, 3202, CIED 2113, 2450, 3710 and admission to teacher education. Deals with critical issues in **education and** in teacher education. May include simulation, small-group in**struction and field-based experiences. Reports and major** topical paper required.

4920 Teacher Education Practicum. 1-9 credits, maximum 9. Prerequisites: admission **to teacher education plus 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.**

5113* Women In Education. Methods, practices, and materials prevalent in educational insti**tutions** at all levels in the United States **and** their ultimate effect on females and males **both as individuals and as members of society. Legal remedies and** guidelines that corn-

bat discrimination by sex; sex-role stereotyping of men and women as reflected in education.

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. Prerequisites: advanced graduate standing and 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. Prerequisites: advanced graduate standing and 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 (EARED)

4221* Community Education: A Synopsis. An Overview of community education through classroom and field based experiences. Introduces the philosophy, organization, roles, publications and models of community education.

4622* Teachers and the Law. An analysis of school-related areas out of which litigation arises, focusing especially on the legal rights and responsibilities of teachers, administrators and pupils and the generally applicable principles of law.

5000* Thesis Or Report. 1-10 credits, maximum 10. Prerequisite: consent of instructor. For students writing a Master's thesis, a Master's report or a Specialist report.

5633* Community Education. Prerequisite: graduate standing. Purpose, organization and administration of community education and its various components.

5813* Fundamentals of Public School Administration. Prerequisite: graduate standing. The scope and function of public school administration.

5833* Fundamentals Of Public School Finance. Prerequisite: graduate standing or consent of instructor. For graduate students preparing for the principalship or the superintendency, as well as others interested in public school finance.

5853* Educational Systems, Design and Analysis. Prerequisite: graduate standing and 5 credit hours of statistics. Current research literature in educational administration, both common school and post-secondary studies. Substantial application of statistical and research skills to educational 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.

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. Prerequisites: graduate standing and consent of instructor. A study of research and best practice in the organization and administration of educational organizations.

6263* Supervision. Prerequisites: graduate standing and teaching experience or consent of instructor. The place of supervision in the improvement of instruction; a study of fundamental principles and procedures.

6333* Advanced Public School Business Management. Prerequisite: 5833 or consent of instructor. School business management as a function of educational administration.

6363* Educational Finance: A National Perspective. Prerequisites: 5833 or consent of instructor. Theory and practice of financing American public education.

6393* School Personnel Administration. Prerequisites: graduate standing and consent of instructor. 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. Prerequisites: graduate standing and teaching or administrative experience, or consent of instructor. 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. Prerequisites: graduate standing and consent of instructor. Legal aspects of education with special reference to Oklahoma. Separate sections for **common schools** and high education. Consideration of PL 94-142, section 504 of the Rehabilitation Act of 1973, and other pertinent Oklahoma enactments; attention directed to multi-cultural legal provisions.

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.

6572* School Housing. Prerequisites: 6363 and 6453, or equivalent. Established standards **and** research in school housing; validity of old and new standards.

6603* Organizational Theory In Education. Prerequisites: 6243 and consent of instructor. Selected organizational typologies, conceptualizations and theoretical frameworks as they relate to organizational behavior and behavior of personnel in organizations.

6613* Organizing, Developing and Administering Community Education. Prerequisites: graduate standing and consent of instructor. 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 conununity education programs are explored.

6622* The School Community Survey. Prerequisite: consent of instructor. Basic principles **and survey techniques,** which are then applied in the field.

6650* Problems In Educational Administration. 1-4 credits, maximum 8. Prerequisites: graduate standing and 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. Prerequisite: graduate standing. 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. Prerequisites: teaching or administrative experience and consent of instructor. 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. Prerequisite: consent of instructor. 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. Prerequisites: graduate standing and teaching experience or consent of instructor. Enables public school and higher education personnel to analyze instructional and/or administrative problems.

6753* Development and Organization of Higher Education. Prerequisite: consent of instructor. A basic study of higher education for college teachers and administrators. History and development of higher education, studies of objectives and functions of institutional types and of students and faculty. Organization and administration of higher education.

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* Curriculum Development In Higher Education. Prerequisite: consent of instructor. Curriculum for colleges and universities, including basic definitions and concepts, theo-

retical views, historical perspectives, internal and external influences, processes for planning, evaluating, and revising, examples of distinctive curricula and future projections.

6850* Directed Reading. 1-4 credits, maximum 6. Prerequisite: consent of instructor. Directed reading for students with graduate standing.

6870* Seminar. 1-4 credits, maximum 10. Prerequisites: graduate standing and 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 staff. 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 Education Specialist degree. Designed to help the student carry out an acceptable field study or research problem. Credit is given upon completion of the written report.

EDUCATIONAL PSYCHOLOGY

(See Applied Behavioral Studies in Education)

ELECTRICAL ENGINEERING (ELEN)

2211 Digital Computing for Engineers. FORTRAN compiler language, philosophy of automatic computer programming and selected numerical methods oriented toward the solution of engineering problems on the digital computer.

3012* (L)Measurements and Instrumentation. Prerequisite: ENGSC 2613. Basic electrical and electronic measurement and instrumentation techniques and devices. The operating principles and application of meters, bridges, oscilloscopes, and transducers. Data processing and reduction techniques.

3022 (L)Electrical Engineering Laboratory. Lab 4. Prerequisite: 3012, 3613, concurrent enrollment in 3313. Experiments in electromagnetic fields, transmission lines, and electronics. Students demonstrate basic electromagnetic laws, work with a slotted-line transmission-line measurement system and determine properties of coaxial cable. In the electronics part of the course, students compare characteristics of bipolar junction and field-effect transistors, construct and test amplifiers and test clipping and clamping circuits.

3213* Microcomputer Principles and Applications. Lab 2. Introductory course in microcomputers. Digital logic elements and number systems, memory components and organization, microprocessor and microcomputer system architecture, assembly language programming and software development and interfacing techniques.

3313* Electronic Fundamentals and Applications. Prerequisite: ENGSC 2613. Solid-state, discrete-component electronics: diodes and transistors, clipping and clamping circuits, power-supply filters and linear low-frequency amplifiers.

3613* Fundamentals of Electromagnetic Fields. Lab 2. Prerequisites: ENGSC 2613. Maxwell's equations and their application to engineering problems in electrostatics, magnetostatics, plane wave propagation, transmission line theory and applications, wave guides; radiation and antennas.

3713 Introduction to Network Analysis. Prerequisites: ENGSC 2613 and MATH 2613. Elements of electric network analysis. Simple transients in RL and RC circuits, and complex frequency response including resonant network forms, magnetically coupled circuits and two-port networks. Introduction to Fourier series and integral methods applied to electrical networks and systems.

3723 Introduction to Dynamic Systems. Prerequisites: ENGSC 2613, MATH 2613 and ENGSC 2122. 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.

6001* 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.

4103* Energy Conversion I. Lab 2. Prerequisite: 3723. Physical principles of electromagnetic and electromechanical energy conversion, and their application to conventional transformers and machines to develop network and phasor models; steady state performance.

4133* Direct Energy Conversion I. Prerequisite: senior standing. Growth rates and the energy dilemma. Energy storage and its role. Thermoelectrics, photovoltaics, thermionics, magnetohydrodynamics and fuel cells present status and future prospects for these techniques. Possibilities of developing environmental energy sources such as solar and wind energy to benefit humanity and to provide viable alternatives to fossil fuels to satisfy the energy requirements of the future.

4153* Power System Analysis. Prerequisite: senior standing. Power system component models from circuit theory. Formulation and solution of the load flow model and the optimum economic generator allocation problem utilizing computer methods.

4253* Logic of Digital Systems I. Lab 2. Prerequisites: 3213 or consent of instructor. Electronic characteristics of digital systems. Boolean functions, truth functions, optimization of logic networks. Multiple-output circuits, binary arithmetic systems. Design using SSI, MSI, and LSI components, ROM and PLA applications in logic design. Analysis and design of clocked sequential networks; combinational and sequential design comparison. Introduction to error-detecting and correcting codes. Laboratory experience in implementing combinational and sequential logic designs.

4263* Digital Computing and Control Machines. Lab 2. Prerequisite: 3213, 4253. Applications of minicomputers and microcomputers in instrumentation and control; comparison of minicomputer and microcomputer capabilities; data acquisition and formating, introduction to direct digital control of engineering systems, fundamentals of microprogramming and algorithms for signal analysis in direct digital control.

4303* Pulse, Digital and Switching Circuitry. Lab 1. Prerequisite: 3313. Theory of digital and switching electronic circuits and devices. Logic circuits, counting circuits, and waveshaping circuits. Switching characteristics of solid-state devices.

4313* Linear Electronics Circuit Design. Prerequisite: 3313. Class A and B small-signal, push-pull power, complementary symmetry, differential and operational amplifiers, utilizing field-effect transistors, bipolar transistors, tunnel diodes and integrated circuits. Emphasis on amplification in electronic devices, design and analysis of wide-band amplifier circuitry.

4353* Communication Electronics. Prerequisite: 3313. Tuned voltage and power amplifiers, oscillators and mixers, modulation and detection, and parametric amplifiers.

4413* Introduction to Control Systems. Prerequisites: 3723 or MAE 3723; MATH 3013. Properties of feedback control systems, mathematical models of basic components, state-variable models of feedback systems, time-domain analysis, stability, transform analysis, frequency-domain techniques, root-locus, design of single-input-output systems and simple compensation techniques.

4423* Nonlinear and Digital Control Systems. Lab 2. Prerequisite: 4413. Nonlinear control systems; phase plane analysis. Liapunov stability criteria, describing functions; signal-modulated systems, sampled-data control and difference equations, Z-transform analysis, introduction to optimization of control systems and computer simulation of control systesm.

4513* Signal Analysis. Prerequisite: 3723. Deterministic signals. Fourier transforms and their properties, impulse response, convolution and autocorrelation. Analysis of modulation systems. Tradeoffs between bandwidth and signaling time. Sampling theorem.

4613* Microwave Engineering, Antennas and Propagation. Prerequisite: 3613. Engineering aspects of the transmission, radiation and propagation of microwave energy. Design theory of waveguides, waveguiding systems, antennas and aspects of atmospheric propagation. Passive microwave devices such as attenuators, directional couplers and resonators. Microwave antennas; electromagnetic horns, parabolic reflectors and log-periodic structures. Atmospheric propagation; propagation in a horizontally stratified atmosphere.

4623* Plasma Dynamics and Microwave Electronic Devices. Prerequisite: 3613. Plasma phenomena and their application to practical devices. Devices which relate to microwave power generation. Phase space, distribution functions, momentum transfer, Boltzmann

equation, motion of charged particles in electromagnetic waves, hydromagnetic waves in plasmas, pinch effect, etc. Electron beams, klystrons, plasma, traveling wave amplifiers and oscillators.

4703* (L)Network Analysis. Lab 2. Prerequisites: 3713, 3723. Network analysis, introduction to network synthesis, design of passive and active filters, integrated-circuit operational amplifiers as filter elements, computer-aided network analysis and design.

4713* Introduction to Network Synthesis. Prerequisite: 4703. Network functions and their realiability, driving-point synthesis, passive and active network synthesis.

4813* Introduction to Solid-State Engineering. Prerequisite: senior standing or consent of instructor. Semiconductor properties of primary value in electrical engineering, band structure, Fermi statistics, intrinsic and extrinsic materials, hole-electron equilibrium kinetics and transport through steep and shallow PN junctions. Design of diodes, transistors, FET's and unijunctions. Integrated circuit principles.

5000* Thesis Or Report. 1-6 credits, maximum 6. Prerequisite: approval of major professor. A student studying for 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.

5103* Energy Conversion II. Prerequisite: 4103. Dynamic model of rotating electromechanical energy converters in terms of the generalized machine concept. Time-invariant transformations are utilized to reduce the complexity of the model and to obtain the steady-state response.

5113* Power System Analysis by Computer Methods. Prerequisite: graduate standing. 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* Power System Security and Reliability. Prerequisite: graduate standing or consent of instructor. Basic concepts for evaluating power system reliability and security. Static and spinning generating capacity, transmission system, composite system, interconnected system, and dc transmission system reliability evaluations. The concept of power system security and the factors influencing it. For students with little or no background in probability and statistics.

5153* Direct Energy Conversion II. Prerequisite: graduate standing or consent of instructor. Energy conversion techniques and applications; thermoelectrics, 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.

5213* Microcomputer System Design. Prerequisites: 3213 and 4253. Design, construction, programming, debugging and documentation of microcomputers interfaced to peripheral devices. Electronics considerations for incorporating different families of IC's and discrete components as needed. Specialized software to integrate the computer and its peripherals. Experimental opportunities provided.

5253* Digital Computer Design. Prerequisite: 4253. Analysis and design of digital computers. Arithmetic algorithms and the design of the arithmetic/logic unit (ALU). Serial and parallel date processing; control and timing systems; microprogramming; memory organization alternatives; input/output interfaces. Experimental opportunities available.

5263* VLSI Digital Systems Design. Prerequisites: 4253, and 5253 desirable. 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.

5313* Solid-State Electronics I. Prerequisite: graduate standing or consent of instructor. 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* Solid-State Electronics II. Prerequisite: 5313 or consent of instructor. Continuation of 5313. Devices and integrated circuits as applied in pulse circuits, modulation, demodulation and digital networks.

5413* Control Systems I. Prerequisite: 5713 or consent of instructor. Analysis, design and optimization of analog and digital control systems. Concepts of controllability and observability. Specification of optimum performance indices. Utilization of constraints in fixed configuration compensator design. Systems parameter identification from measured data. Adaptive and optimal control problems. Computer techniques in design and optimization.

5513* Introduction to Stochastic Systems. Prerequisite: 4513 or consent of instructor. The mathematical theory underlying communication, control and estimation in the presence of noise. State-space formulation of the theory. Response of linear systems to stochastic processes. Nonstationary random process.

5523* Estlmatlon Theory. Prerequisite: 4513. Optimal estimation theory including linear and nonlinear estimation of discrete and continuous random functions. Wiener and Kalman filter theory included.

5533* Modem Communication Theory. Prerequisites: 4513, and 5513 or STAT 4033. 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.

5613* Foundations of Electrodynamics I. Prerequisite: 3613. A 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.

5653* Application of Electromagnetc Theory I. Prerequisite: consent of instructor. Intermediate-level treatment of applications of classical electromagnetic theory; cavity resonators, waveguides, refraction and scattering, surface waves, antennas, and radiation. Sufficient mathematical sophistication to equip the student for "state-of-the-art" research in the area.

5713* Mroductlon to System Theory. Prerequisite: graduate standing or consent of instructor. State-space techniques of engineering systems analysis. Application of matrix methods to systems modeled by linear vector differential or difference equations. Develops controllability and observability conditions and eigenvalue/eigenvector assignment procedures.

5723* Nonlinear Systems Analysis I. Prerequisites: 5713 or consent of instructor. 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.

5753* Digital Processing of Speech Signals. Prerequisite: graduate standing. 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. Prerequisite: graduate standing. 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* Environmental Systems Theory. Prerequisite: graduate standing or consent of instructor. A synthesis of the engineering concept of systems theory and the ecological principles of natural science. Mathematical modeling and computer simulation of environmental systems with complex nutrient and material cycles and energy flows. Aimed toward enabling the professional engineer to assess the environmental impact of large-scale engineering projects. Also useful to ecologists with mathematical backgrounds who desire an introduction to modeling natural systems.

5783* Random Systems Modeling and Analysis. Prerequisite: graduate standing or consent of instructor. 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.

5813* Solid-State Engineering. Prerequisite: graduate standing or consent of instructor. Lattice structure and extended energy-band concepts in solids (electrons, holes, photons, **phonons).** Brillouin zones. Thermodynamic statistics. Excitation and transport mechanisms in gases and solids (diffusion and drift currents, recombinations). Boltzmann transport equation. Irreversible thermodynamics as applied to the thermo-electric effect and magnetic fields. Engineering superconductivity.

5853* Modern Solid-State Devices. Prerequisite: 5813 or consent of instructor. Solid-state microwave devices, including Gunn effect, electro-acoustic amplifier, hot carrier devices, engineering superconduction, Josephson junction, superconducting switching. Solid-state traveling-wave devices, maser and laser amplifiers and oscillators and plasma devices.

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 advances in the state of the art.

6123* Special Topics in Power Systems. Prerequisite: 5113. Selected relevant current topics related to power system operation and planning.

6213* Digital Process Control and Simulation. Prerequisite: 4413 or consent of instructor. Advanced analog and digital simulation techniques as applied to selected systems of linear and nonlinear differential equations; simulation of physical systems. Principles of process control by digital computers included.

6413* Digital Control Systems. Prerequisite: 5413 or consent of instructor. 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, or consent of instructor. 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* Introduction to 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.

6550* Topics in Statistical Communication Theory. 1-3 credits, maximum 6. Prerequisite: 5513. Advanced topics chosen from recent developments, including: learning and adaptive systems, optimal adaptive estimation theory, decision theory applied to engineering problems, modulation and detection theory and analysis and processing of seismic data.

6613* Foundations of Electrodynamics II. Prerequisite: 5613 or consent of instructor. Quantum electrodynamics; matrix formulation of quantum mechanics, quantization of electromagnetic radiation and interaction between radiation and matter. Applications to optical radiation, laser amplifiers, noise, parametric devices, and accoustical electrodynamic phenomena.

6653* Applications of Electromagnetic Theory II. Prerequisite: consent of instructor. Applications of quantum electrodynamics. Topics of current interest with sufficient mathematical sophistication to equip the student for state of the art research in the area.

6713* Advanced Topics In Network Synthesis. Prerequisite: 5753 or consent of instructor. 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.

6813* Solid-State Techniques. Prerequisite: 5813 or consent of instructor. Device fabrica-

lion; wafer preparation, etching and masking techniques, alloying, bonding, testing, Epitaxial techniques, special topics.

ELECTRICAL POWER TECHNOLOGY (EPT)

3103 Introduction to Electrical Power. Lab 3. Prerequisites: junior standing and trigonometry. Overview of the electrical industry with selected topics and laboratory to familiarize the student with electrical power systems. Technical language and symbology of the industry; surveying as applied to the needs of electrical power.

3135 Electrical Principles. Lab 6. DC and AC circuit theory for non-electrical students entering the EPT program. Ohm's law, Kirchoff's circuit law, loop and node equations, wye-delta and delta-wye transformations, magnetism reactances and impedance and single-phase AC network solution methods.

3214 Transformers and Three-Phase Circuits. Lab 3. Prerequisite: basic electricity course. Various types of single-phase and three-phase transformers. Characteristics, classification, connections, loading and regulation of transformers. Balanced and unbalanced connections and measurement techniques in polyphase systems.

3224 Power Circuits and Machinery. Lab 3. Prerequisite: 3102. Balanced operation of polyphase electric circuits, DC and AC machinery and power transformers. Laboratory includes connections, testing and terminal behavior of operating electric circuits, machines and transformers. Control of both DC and AC machinery.

3233 Computer Techniques in Electrical Power. Lab 3. Prerequisites: basic electricity; calculus corequisite. Use of a minicomputer to analyze electrical power circuits. Programming of the PDP-l1 will be done in BASIC. Some interfacing to I/O devices.

3243 Introduction to Electronics. Lab 3. Prerequisite: 3135 or basic electricity. Electronics devices and circuitry for non-electronic/electrical major entering the EPT program. Solid-state device characteristics, power supplies and introduction to amplifiers.

4003 Nuclear Power. Lab 3. Sustained nuclear chain reaction. Reactor kinetics and shielding. Measurements of nuclear properties of fuels and moderators.

4114 Power Transmission and Distribution. Lab 3. Prerequisite: 3214. Transmission line configurations, electrical characteristics of transmission lines, electrical insulation, percent and per unit quantities and symmetrical components.

4124 Swltchgear and Protective Relaying. Lab 3. Prerequisite: 3214. Types of switchgear and protective devices discussed as to construction, use, testing, installation and maintenance.

4134 Control Circuits and Systems. Lab 3. Prerequisites: 3224 and basic electronics. Operational amplifiers, synchros and digital concepts in control and analog to digital converters. Analysis techniques such as Laplace transforms and control systems modeling using both physical variables and block diagram techniques.

4211 Special Problem Design. Lab 3. Prerequisite: 3233. Problems will be assigned on an individual or overall group basis. Problems will be solicited from industry to establish a "real world" frame of reference.

4224 Advanced Topics and Senior Projects. Lab 3. Prerequisites: 3224 and basic electronics. Electric energy systems planning, operation, control and protection. Laboratory devoted to the senior project requirement for EPT majors. Project may be hardware as approved by the adviser.

4234 Solid State Power Electronics. Lab 3. Prerequisite: 4134. Solid state electronic devices such as thyristors, power switches, rectifiers and switched DC sources. AC voltage controllers, three-phase controllers and controlled rectifier circuits. Choppers, inverters, cycloconverters, cycloinverters, and uninterruptable power supplied will be studied.

ELECTRONICS ENGINEERING TECHNOLOGY (EET)

1104 (L)Fundamentals Of Electricity. Lab 3. Elementary principles of electricity covering basic electric units. Ohm's law, Kirchoff's law, circuit solutions, network solutions, magnetism, inductance and capacitance.

1112 (L)Electronlc Devices and Amplifiers. Lab 3. Co-requisite: 1104. Solid-state components as used in elementary amplifier circuits; brief description of power supplies.

1213 Essentials of Electricity. Lab 2. Prerequisite: MATH 1513; Co-requisite; MATH 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.

2224 (L)Electronic Amplifiers I. Lab 3. Prerequisite: 1112; co-requisite: 2244. The theory and **application** of amplifiers using bipolar and FET transistors. RC coupled, direct-coupled and transformer-coupled circuits. Bias stabilizing and feedback techniques.

2244 (L)Clrcult Analysis I. Lab 3. Prerequisites: 1104 and MATH 1715; co-requisite: 2224. Transient analysis of electric circuits. The use of network theorems. Introduction to resonant circuits and filters and AC power including three-phase circuits.

2303 Instruments and Measurements I. Lab 3. Prerequisites: 2224 and MATH 2373. Electrical and electronic measurement techniques. Principles and applications of meters, bridges, oscilloscopes and attenuators.

2544 Pulse and Digital Techniques. Lab 3. Prerequisite: 2224. Electronic circuits used in digital control and computation. Pulse generation, Boolean algebra and logic circuits.

2633 Microcomputer Principles and Applications. Lab 3. Prerequisites: 2544 and COMSC 2113. Introduces microcomputers from a hardware point of view, combining a study of machine language programming and microcomputer hardware in a highly **laboratory-oriented** presentation. Emphasizes interfacing the microcomputer as a programmable controller of external systems and devices.

2634 Communication Circuits and Systems. Lab 3. Prerequisite: 2224. Receiver and transmitter circuits and systems, introduction to elementary antennas, modulation and detection systems, oscillators and tuned amplifiers.

2731 Electronic Design. Lab 3. Prerequisites: 2303 and 2634. Laboratory projects for modern electronics engineering technicians. Circuit test, development and fabrication in wired and printed form.

3104 Fundamental of Electronics. Lab 3. Prerequisites: 1213 or consent of instructor. Introduction to 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: 2544, COMSC 2113 and MATH 2373. Application of elementary switching functions and Laplace transforms to electronic circuit analysis. Circuit analysis in the S-plane, transfer functions and computer applications.

3153 Data Communications. Lab 3. Prerequisites: 2633 and 2634. Data communications **including** multiplexing concepts, sampling techniques, encoding techniques. Telemetry, digitized voice TTY and bulk transmission systems.

3234 Nondestructive Testing. Lab 2. Commonly used nondestructive testing in industry; **radiography. Magneflux, liquid** penetrant, ultrasonic **and** eddy current testing.

3354 Electronic Amplifiers II. Lab 3. Prerequisite: 2224. Advanced topics in amplifiers, bias stabilizing, stability of feedback amplifiers, DC amplifiers, differential amplifiers and **operational amplifiers.**

3363 Data Acquisition and Control. Lab 2. Prerequisite: 2633. Data acquisition and the control of **automatic** test equipment through the IEEE 488 BUS. Transducers D/A and A/D converters, multiplexers, and sample/hold circuits included. Use of a microcomputer in controlling test equipment. Silicon-controlled rectifiers as power-control devices.

4263 Electronic Digital Systems. Lab 3. Prerequisite: 2633. Microcomputer and minicomputer systems from a technological point of view. Use of both minicomputers and microcomputers in controlling I/O devices. Students required to develop interface circuitry in a project setting to meet assigned specifications. Programming of a PDP/11 in an assem**bly language.**

4314 Control Circuits. Lab 3. Prerequisite: 3113. Components, principles and techniques basic to electronic control systems. Feedback control theory, transducers, servos and motors.

4654 Microwave Techniques. Lab 3. Prerequisite: 2634. Communication principles and measurement techniques in the UHF and microwave spectrum, coaxial and waveguide transmission liens, antenna systems and signal transmission, modulation and detectors, oscillators and amplifiers, introduction to signal transmission and modulation methods.

4832 Senior Projects. Lab 3. Prerequisites: 16 credit hours of upper-division electronics courses. The synthesizing element in the electronics study plan. Pertinent topics from the first 3 years reviewed and integrated into a senior design project.

ENGINEERING (ENGR)

1111 Introduction to Engineering. Advisement, counseling and enrollment procedures; methodology in solving engineering problems; engineering ethics and practice.

1212 Introduction to Engineering II. Prerequisite: 1112. Continuation of 1112.

1311 Introductory Engineering Graphics. Principles, techniques and skills of graphics as used in engineering.

1412 Introductory Engineering Computer Programming. Programming to solve problems typical of practice in engineering. Techniques and methods.

1501 Women in Engineering Seminar. Prerequisite: consent of instructor. Opportunities to meet and talk with established women engineers. Potential problems faced by women in engineering and topics of particular interest to women students in engineering.

2100 Orientation Projects. Lab 2-6. 1-3 credits, maximum 3. Prerequisite: pre-engineering status. Enrollment in independent study or small groups. Projects to assist students with special needs to adjust to engineering curriculum.

2113 (N)Science and Technology in a Modern Society. Prerequisite: MATH 1314 or MATH 1513 or equivalent. Concepts and ideas in science and technology relevant to participation in decisions in our technological age.

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 (N)Applied Acoustics. Prerequisite: 45 credit hours. Nonmathematical approach to elementary acoustics in speech and hearing. Noise, architectural and musical acoustics. Equipment for measuring, recording and reproduction of sound.

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.

5010* Studies In Engineering Instruction and Research. 1-3 credits, maximum 6. Prerequisite: current or expected appointment as a graduate teaching or research assistant. Formalizes the participation of the teaching and research assistant in the procedures and seminars necessary for satisfactory performance of duties. Not to be used on study plans toward a degree in the Graduate College. Graded on pass-fail basis.

ENGINEERING SCIENCE (ENGSC)

2114 Statics and Strength of Materials. Prerequisites: PHYSC 2014 and MATH 2265. Resultants of force systems, static equilibrium of rigid bodies and statics of structures. Shear and bending moments, deformation and displacements in deformable bodies.

2122 Elementary Dynamics. Prerequisite: 2114. Dynamic equilibrium of particles and bodies. Work-energy and impulse momentum principles.

2213 Thermodynamics. Prerequisites: CHEM 1515, PHYSC 2014, MATH 2265. 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 2365. 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 and Heat Transfer. Prerequisites: MATH 2365 or concurrent enrollment and CHEM 1515, PHYSC 2014. Fluid statics, laminar and turbulent momentum transfer and convective heat transfer at introductory level. Dimensional analysis. Flow analysis of real fluids with the Bernoulli equation. Conduction and radiation of heat; heat exchanger analysis.

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 English for Graduate International Students. Lab 2. Sentence structure, **paragraphing,** idiomatic usage, punctuation, vocabulary, pronunciation and documentation. Graded on pass-fail basis.

1013 Freshman Composition for International Students. 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.

1113 Freshman Composition. The fundamentals of expository writing with **emphasis on structure, development and style.**

1323 Freshman Composition (Second Half). Prerequisite: 1013 or 1113. Expository composition with emphasis on technique and style through intensive and extensive readings.

1413 Freshman English Honors. **Prerequisites: advanced-standing** credit or an A or B in 1113 and **acceptable** ACT scores. Individually directed writing growing from discussions of books and ideas. Class size limited. This course may be substituted for 1323.

2333 Introduction to Technical Writing and Professional Report 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.

2400 Special Problems In Language and Literature. 1-3 credits, maximum 9. Prerequisite: **6 hours of English. Specialized readings and independent studies.**

2413 (H)Introductbn to Literature and Critical Writing. Prerequisite: 6 credit hours of **English.** The short **story, the novel and** poetry. Written critical exercises and discussion.

2423 (H)Introduction to New Media. Prerequisite: 6 hours of English. Literary **forms in television and film.**

2513 (H)Introduction to Creative Writing. Prerequisite: 6 credit hours of English; 2413 is **a** desirable but not a required preparation. Literary composition with emphasis on techniques and style through readings and writings in fiction, poetry and drama.

2553 (H)Literary Tradition I. Prerequisite: 6 credit hours of English. The thought and culture expressed in English and American literature from the Renaissance to the Romantic Period. Some techniques for analyzing prose style included.

2663 (H)Literary Tradition II. Prerequisite: 6 credit hours of English. The advent and effects of romantic **and evolutionary thought** and technology expressed in English and American literature from the Romantic Period to the present. Some techniques for analysis included.

3010 Fundamentals of English. **Taken by** audit only. Restricted to those failing grammar or essay portions of STEP test or the English Essay Proficiency test. Grammar, mechanics and/or writing of expository compositions.

3100 Intermediate Creative Writing. 1-3 credits maximum 9. Prerequisite: 9 credit hours of English. Directed readings and practice in writing the short story/poetry/drama with special attention to techniques.

3113 (H)Themes In Literature. Prerequisite: 9 credit hours of English. Major social issues, movements or directions and their influence on literature; archetypes, myths and recurring themes as expressed by literary forms.

3153 (H)Crltlcism. Prerequisites: 9 credit hours of English. Origins, development theory and craft of criticism.

3200 Special Problems In Language and Literature. 1-3 credits, maximum 9. Prerequisite: **9 credit hours of English. Specialized** readings and independent study.

9323 Intermediate Technical Writing and Professional Report Writing. Prerequisites: 60 credit hours or 45 hours with an overall GPA of 3.25 including 1113 and 1323 or 1113 with A or B and recommendation of student's college. 2333 is recommended but not required as a prerequisite. Applied writing in areas of specialization with selected classes

organized for specific disciplines. Intensive practice in professional writing modes, styles, research techniques and editing for specialized audiences and/or publications.

3333 (H)The Short Story. Prerequisite: 9 credit hours of English. Origins, development, theory and craft of the short story.

3343 (H)Poetry. Prerequisite: 9 credit hours of English. Origins, development, theory **and** craft of poetry.

3353 (H)Film as Literature. Prerequisite: 9 credit hours of English. Film and literature as narrative forms.

3413 History *of* the English Language. Prerequisite: 9 credit hours of English. The growth of the English language.

3523 (H)Llterary Tradition III. Prerequisite: 9 credit hours of English. Poetry produced in England by the oral, heroic society and the Christian, feudal society leading to the Renaissance. Some reference to and review of subsequent English and American literature with techniques for prosody included.

3773 (H)Drama. Prerequisite: 9 credit hours of English. Origins, development, theory and craft of drama.

3883 (H)Shakespeare. Prerequisite: 9 credit hours of English. Major plays and selected criticism.

3893 (H)Llterature of Minority or Ethnic Groups. Prerequisite: 9 credit hours of English. The literary expressions of minority/ethnic groups in the U.S.A.

4013* English Grammar. Prerequisite: 3413. The traditional terminology and concepts of English grammar leading or evolving into the several current systems of descriptions.

4023* Language and Linguistics. Prerequisite: 3413. A number of linguistic problems: the new grammars, psychological and geographical aspects of language; methods of descriptive linguistics; modern American language and dialect.

4113* Advanced Creative Writing. Prerequisite: 2513 and 3100. Advanced work with the major genres by means of student practice and composition.

4223* (H)Readlngs In the Novel. Prerequisite: 9 credit hours of English. Genre development. May be based in 18th, 19th or 20th Century, English or American: for example the 18th Century British Novel, The American Novel. Major figures and their works.

4233* (H)Readlngs in Poetry. Prerequisite: 9 credit hours of English. Genre development. May be based in one or several literary periods, English or American: for example Romantic Poetry, Major American Poets, Modern Poetry. Major figures and their works.

4243* (H)Readings In Drama. Prerequisite: 9 credit hours of English. Genre development. May be based in one or several literary periods, English, American or Continental: for example Tudor and Stuart Drama, Restoration Drama. Major figures and their works.

4263* Aesthetics of Film. Prerequisite: 9 credit hours of English. Origins, development, theory and craft of film.

4313* (H)Period Studies Amerlcan.Prerequisite: 12 credit hours of English. Historical development. May be based in one or several literary periods or historical contexts: for example The American Renaissance, American Realism, Contemporary Prose and Poetry. Major figures and their works.

4343* (H)Period Studies English. Prerequisite: 12 credit hours of English. Historical development. May be based in one or several literary periods or historical contexts: for example The Renaissance, The 18th Century, The Victorian Age. Major figures and their works.

4423* (H)Literature in Cultural Context. Prerequisite: 12 credit hours of English. Selected major writers with special emphasis on intellectual and cultural interrelationships.

4453* (H,I)Transnational Literature. Prerequisite: 9 credit hours of English. Literary influence and expressions. May include African, Indian *or* Asian authors writing in English or South American or Continental authors in translation.

4520* Special Problems In Language and Literature. 1-6 credits, maximum 9. Prerequisite: 12 hours of English. Specialized readings and independent studies.

4523* Internship: Technical Writing and Professional Report Writing. 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 and Professional Report 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.

4703* (H)Chaucer. Prerequisite: 3413 or 3523. The Canterbury Tales in Middle English.

4713* (H)Milton. Prerequisite: 12 credit hours of English. The more notable minor poems, prose selections and the major poemsParadise Lost, Paradise Regained and Samson Agonistesstudied critically in context of the 17th Century.

4733* (H)Single Author/Work. Prerequisite: 9 credit hours of English. The works of a single author such as Hawthorne, Coleridge, Faulkner or a single work and selected criticism such as The Bible, The Prelude, Moby Dick, Ulysses.

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.

5033* Seminar in Creative Writing. Writing in the various genres at a professional level.

5063* Single Author/Work. The works of a single author such as Spenser, Shakespeare, Pope, Nabokov or a single work and selected criticism such as Hamlet, Huckleberry Finn, Pound's Cantos.

5073* Old English Poetry. Prerequisite: 5023. Beowulf in Old English and selected criticism.

5163* Middle English Literature. Major works in Middle English.

5210* Seminar/Directed Study. 1-6 credits, maximum 9. Specialized readings/independent studies.

5283* Special Problems in Teaching English. Materials and methods of instruction in language or literature.

5293* Interdisciplinary Uses of English. Basic methods of interdisciplinary study with emphasis on multiple uses of literature.

5543* English Literature of the 16th Century. Selected writers and their works, themes and literary developments of the 16th Century.

5553* English/American Literature of the 17th Century. Selected writers and their works, themes and literary developments of the 17th Century, English or American.

5563* English/American Literature of the 18th Century. Selected writers and their works, themes and literary developments of the 18th Century, English or American.

5573* English/American Literature of the 19th Century. Selected writers and their works, themes and literary developments of the 19th Century, English or American.

5583* English/American Literature of the 20th Century. Selected writers and their works, themes and literary developments of the 20th Century, English or American.

6000* Dissertation. 1-6 credits, maximum 20. Ph.D. dissertation.

6033* Studies In Creative Writing. Prerequisite: 5033. Development of individual projects in a chosen literary genre.

6210* Seminar/Directed Study. 1-6 credits, maximum 9. Specialized readings/independent studies.

6223* Studies In Fiction. Selected work in fiction.

6233* Studies In Poetry. Selected work in poetry.

6243* Studies in Drama. Selected work in drama.

6253* Studies in New Media. Selected work in new media.

6263* Studies In Literary Criticism. Selected work in literary criticism.

ENTOMOLOGY (ENTO)

2001 (N)Introduction to Entomology. Lab 4. Basic morphology, physiology and development in lecture and insect order recognition in the laboratory.

2201 Insect Control Concepts. Lab 4. Prerequisite: 2001. A survey of methods of insect control, application equipment and techniques.

3002 Livestock Entomology. Lab 4. Prerequisite: 2001. Economic importance, biology and control of pests affecting domestic animals.

3021 Insect Pests of Stored Products. Lab 4. Prerequisite: 2001. The biology, damage and control of insect pests of stored products.

3023 (N)Apiculture. Lab 2. Biology and products of the honey bee; principles of beekkeeping.

3111* Horticultural Insects Indoor Plant Pests. Lab 4. Prerequisite: 2001 and 2201. Identification, habits and control of insects attacking indoor ornamental plants.

3112 (N)Hortlculturai Insects. Lab 2. Prerequisites: 2001, 2201. Identification, habits and control of insects attacking ornamentals, fruits and vegetables.

3332 Field Crop Insects. Lab 2. Prerequisite: 2001, 2201. Life histories, ecology and control of insects injurious to field and forage crops.

3462 (N)Forest Insects. Lab **4.** Prerequisite: 2001. The biology and control of insects injurious to shade tree, forest and forest products.

3551 (N)Insect Behavior. Prerequisite: 2001. Behavior and social organization of insects.

3562 (N)insect Family Classification. Lab 4. Prerequisite: 2001. Biology of the orders and common families of insects as well as order and family recognition and methods of collecting and preserving insects.

4012* Insect Control. Lab **4.** Control of insect pests of agriculture. Brief survey of insecticides, application equipment and techniques. Designed for vocational agriculture students.

4043* Insect Physiology. Prerequisite: a course in organic chemistry and 9 hours biology. Functions of the organ systems of insects. Lecture-demonstration of selected insect physiology techniques.

4123* Household and Structural Pests. Lab 4. Prerequisite: 2201, 3562 or consent of instructor. Classification and practical work on control of insects and rodents in dwellings, warehouses and other commercial establishments.

4223* (L)Insect Ecology. Lab 2. Prerequisites: 2001, plus one course in ecology. Interrelations of insects with their environment. Population ecology of insects and environmental contamination problems of insect control.

4333* Literature and History of the Zoological Sciences. Prerequisite: 2001 or BISC 1602 or equivalent. Mechanics of the library, use and preparation of bibliographies, preparation of a scientific paper and taxonomic indices and literature.

4523* Principles of Insect Pest Management. Lab 2. Prerequisite: 3112 or 3332 or 3562. Modern concepts of pest regulation and the influence of alternatives on the agroecosystern and economics of crop production. Identification of economically important insect pests in the Southwest.

4644* Insect Morphology. Lab **4.** Prerequisite: 3562. Insect development and morphology.

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: 3562 or consent of instructor. Biology and control of insects affecting public health.

4913* Pesticides In the Environment. Prerequisite: BISC 1402, CHEM 1225. A discussion of pesticides (chiefly fungicides, insecticides, herbicides and nematocides), including potential movement, degradation, fate and significance in the environment. Same course as AGRON 4913 and PLP 4913.

5000* Thesis. 1-6 credits, maximum 6. Research in entomology.

5005* Acarology-Araneology. Lab 4. Prerequisite: consent of instructor. Basic concepts of the biology, behavior, development and classification of spiders, ticks and mites.

5224* Classification of Immature Insects. Lab 6. Prerequisite: 3562. Classification, collecting and preservation of immature forms.

5330* Advanced Systematic Entomology. 1-5 credits, maximum 5. Prerequisite: 5464. Special problems in advanced systematic entomology.

5464* Systematic Entomology. Lab 4. Prerequisite: 3562 or equivalent. Principles, theories, rules and procedures associated with classification and comparative biologies of terrestrial insects.

5484* Advanced Biology and Classification: Aquatic Insects. Lab 4. Prerequisite: 3562. Biology and classification of aquatic insects. Provides an understanding of the identification, ecology, behavior and biological importance of such insects.

5512* Biological Control Prerequisite: 4523 or consent of instructor. Principles nd 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. Prerequisites: AGRON 3553 and consent of instructor. **Insect population management** by host plant resistance.

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.

5753* Insecticide Toxicology. Prerequisite: organic chemistry, 15 hours biology or consent of instructor. 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: graduate standing in entomology or consent of instructor. Written and oral reports and discussion of recent developments in entomology.

6000 Research and Thesis. 1-10 credits, maximum 30. Prerequisite: M.S. in entomology or permission of staff. Independent investigation under the direction and supervision of a major professor.

6100 Advanced Insect Physiology. 1-5 credits, maximum 5. Prerequisite: 4043 or permission of instructor. Special problems in advanced insect physiology.

ENVIRONMENTAL SCIENCES (ENVIR)

5000 Thesis. 1-6 credits, maximum 6. Prerequisite: graduate standing. Research leading to master's thesis.

5103* Environmental Problem Analysis. 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 Sciences. 1-3 credits, maximum 6. Prerequisite: graduate standing. Intensive analysis of selected environmental problems, individual research, seminar reports and group discussion of reports.

6000 Research and Thesis. 1-15 credits, maximum 30. Prerequisite: graduate standing. Research leading to doctoral thesis.

FAMILY RELATIONS AND CHILD DEVELOPMENT (FRCD)

1113 (S)Human Sexuality and the Family. Sexual development emphasizing personal adjustment and interaction with family and culture.

2113 (S)Child and Family Development. The child from conception through adolescence and his or her development within the family setting with emphasis on principles of growth and dynamics of behavior. Directed observation of children

3012 Home Economics for Men and Women. Focus on functioning in a contemporary society as a citizen, a family member and a professional; personal and family relationships; and consideration of consumer and economic resources. For nonmajors.

3013 (S)individual Development and the Family System. Prerequisite: 6 credit hours in FRCD, sociology or psychology. Factors impacting upon the individual as he or she develops within a family unit. Emphasis on human development, individual behavior and relationships. Application to personal experience

3112 Parent-Child Relationship. For parents, teachers or others who expect to be responsible

for young children. Increases understanding of the needs and feelings of both the developing child and the adult caregiver. A wide variety of philosophies and techniques explored out of which individuals can devise their own comfortable, effective parenting styles.

3143 (S)Marriage. Consideration of courtship and marriage with special emphasis on building a **healthy** paired relationship; communication and decision making; and coping with such problems as money, sex, role taking, in-laws and children.

3213* Child Development and Guidance: Early Childhood. The physical, social, **emotional and cognitive development** of the young child. The utilization of this **information in creating appropriately nurturant environments and devising effective guidance strategies.** Directed **observation** in preschool laboratories.

3220 Early Childhood Education Practlcum. 1-4 credits, maximum 4. Participation in the Child Development Laboratories. Experiences related to guidance, activities and program planning.

3233 Introduction to Early Childhood Education. Educational programs focusing on children's **physical,** emotional, social, creative and intellectual development. Program planning techniques emphasized.

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* Early Childhood Education: Play, Art and Music. Prerequisite: course in child development. Consideration of appropriate experiences in the areas of play, art and music for children under six. Observation and participation with children in the Child Development Laboratories **and other groups.**

3333* Child Development and Guidance: Adolescence. Development of the adolescent **physically, socially, intellectually** and emotionally with emphasis on the search for identity, heterosexual development, vocational choice and interpersonal relations. Observation of adolescents.

3403* Early Childhood Education: Literature and Language Arts. Prerequisite: 3213 or **equivalent.** Consideration of **appropriate** experiences in the areas of literature and language arts. Experiences with nursery school, kindergarten and other children's groups.

3503* Early Childhood Education: Science, Mathematics, and Social Studies. Prerequisite: 3213 or **equivalent.** Study of appropriate experiences in physical and natural sciences, mathematics and social studies.

3613* Professional Services for Children and Families. Study of **selected services for children and families.**

3753* (S)Family and Human Development. An adult-centered course emphasizing development and relationships of family members through the stages of family life.

3810 Field Experiences. 1-4 credits, maximum 4. Observation and participation in programs for children, youth, adults and families. Carried on under supervision of FRCD faculty members or their designated representatives.

4023* Parent-School Community Relationships. Prerequisite: seniors or **graduate standing.** Effective ways for the home, school and the community to work together to provide for the **optimum development** of young children, including children from other cultures **and** ethnic groups.

4133* Organizing and Administering Educational Programs for Young Children. Prerequisite: background in child development and early childhood education. Housing and equipment, financing, staff, program, records, health protection, community relations, school planning and organization.

4252* History and Philosophy of Early Childhood Education. Prerequisite: 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**

4343* Early Childhood Education: Program Planning. Prerequisites: 3303, 3403, 3503. Daily and long-range curriculum development for children under six with relation to age needs, individual development and equipment and physical facilities.

4420* Preschool Teaching. 2-5 credits, maximum 7. Prerequisites: 3213, 3303, 3403, 3503,

4343, and preregistration with Director of Child Develoment Laboratories. Preschool teaching with responsibility in nursery school-kindergarten groups.

4463* Child Development and Guidance: Infancy and Toddlerhood. Development and behavior of infants and toddlers. Directed experience with children of this age.

4533* Adulthood: Middle Years. Study of the unique characteristics of life between young adulthood and the later years. Special emphasis on physical, intellectual, personal, family and career development in middle age.

4543* Adulthood: Later Years. Analysis of the aging process. Interrelation between physical, psychological and social development in later years.

4673* Family Relationships. Focus on family interraction and behavior with consideration of support services in communities which serve families.

4743* (L)Introduction to Research Methodology in Family Relations and Child Development. Lab 2. Scientific literature and the research process in family relations, child development, and early childhood education.

4793* (f)The Family In International and Intercultural Development. A family ecosystem model used to link family behavior in developing communities to environmental change. Changing roles of family members in the home, community and market economy.

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.

5030* Teaching Human Development and Family Life. 1-3 credits, maximum 3. Prerequisite: 3753 or 4673. Content and teaching aids in teaching family relationships in secondary schools or colleges.

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.

5213* Child Behavior and Development. Consideration of theory and significant areas of research contribute to the understanding of child behavior and development.

5222* Resource Materials for Family Relations. Materials identified and developed for use in family life education by those engaged as group leaders, religious educators and those involved in continuing education.

5242* Family Crises and Resources. Crises and special problems encountered in family living; individual and community resources pertinent to them.

5253* Early Childhood Education: Curriculum. Consideration of appropriate learning experiences in various curriculum areas for young children.

5323* Marriage and Family Living. Prerequisite: 3753 or equivalent. Advanced course in marriage and family relationships with emphasis on research and theory related to interpersonal relationships and dynamic processes of adjustment.

5360* Individual, Marriage, and Family Counseling. 2-3 credits, maximum 3. A survey and evaluation of individual, marriage and family counseling methods with analysis and treatment of interpersonal relationship problems through study of case materials. Classroom experience includes simulation of counseling processes.

5470* Developments and Innovations in Family Relations, Child Development and Early Childhood. 1-3 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. Limited to 3 credits in an area.

5520* Family Relationships and Child Development Workshop. 1-6 credits, maximum 8. Units of study for leaders in family life education and related fields.

5750* Seminar In Child Development and Family Relationships. 1-3 credits, maximum 8. Current research in child development and family relationships. Critical study of classic and current research.

5810* Problems in Child Development, Family Relationships and Early Childhood Education. 1-3 credits, maximum 9. Directed individual study in family relations, child development and early childhood education.

5880* Early Childhood Education: Administration. 2-3 credits, maximum 3. Administration

of programs for young children including consideration of information base for decision-making, aspects of effective organizational functioning and evaluation of policies and procedures.

5883* Philosophy and Critical Issues in Early Childhood Education. A review of the contribution of early and contemporary educators to early childhood education. Current problems and critical issues.

5983* Theories of Child Behavior and Development. Prerequisite: 6 credit hours at graduate level in child development or related areas. Major theories and supportive research which contribute to the understanding of child behavior and development.

5993* Theories of Family Relationships. Prerequisite: 6 credit hours at graduate level in family relationships. Theoretical configurations and current concepts with supportive and controversial writings and research.

6810* Advanced Problems in Family and Child Studies. 1-3 credits, maximum 9. Individual or group study of a significant aspect of family and child studies.

6873* Advanced Research Methods in Family Relations and Child Development. Prerequisite: one course in research methods and in statistics. Research design and analysis of data appropriate to the areas of family relations and child development.

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* Basic Finance. Prerequisites: ACCTG 2203 and ECON 2123, or consent of instructor. 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 or consent of instructor. 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 or consent of instructor. 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.

3813 Trust and Estate Management. Prerequisites: 3113, ACCTG 2203, BUSL 3213 or consent of instructor. Overview of trust and estate management from the point of view of a trust officer in a commercial bank. Emphasizes the need of financial managers for an understanding of problems, patterns and trends in trust and estate management.

4113* Financial Markets and Institutions. Prerequisite: ECON 3313. Money and capital markets, flow-of-funds and non-bank financial intermediaries.

4213* International Financial Management. Prerequisite: 3113 or consent of instructor. 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* Introduction to Investments. Prerequisite: 3113 or consent of instructor. 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 or consent of instructor. 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.

4553* Selected Topics in Finance. Prerequisite: 3113. Advanced topics in finance. Topics are updated each semester.

4613* Risk Management. Prerequisite: 3613 or consent of instructor. Elements of corporate risk control and management.

5123* Investment Theory and Strategy. Prerequisite: graduate standing. Selected investment topics and advanced portfolio management techniques.

5243* Financial Systems. Prerequisite: graduate standing. Supply and demand factors influencing flow-of-funds, relationship of money and capital market to financial institutions, factors influencing development and change.

5353* Theory and Practice of Financial Management. Prerequisite: graduate standing. Concepts and theories applicable to the financial administration of a firm. Cases, problems and readings to illustrate various financial problems and techniques of solution.

5460* Seminar in Finance. 3-6 credits, maximum 6. Prerequisites: graduate standing and consent of instructor. Advanced research with emphasis on theoretical problems and solutions. Selected topics covered.

5513* Cost-Benefit Analysis. Prerequisite: 5353 or consent of instructor. Theoretical and applied aspects of profit and nonprofit financial decision-making; relationship of cost-benefit analysis to PPBS (planning programming budgeting systems). Cost-benefit ratios and internal rates of return, appropriate discount rates, constraints and externalities.

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.

FIRE PROTECTION AND SAFETY TECHNOLOGY (FIRET)

1013 Introduction to Loss Control and Risk Management. Lab 3. Basic concepts and methodologies from the fields of fire protection, occupational health, occupational safety and radiation health.

1213 Fire Safety Hazards Recognfiion. 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 preengineered systems. Operational capabilities and utilization requirements of fire detection and signaling systems. Fire detection and suppression applied in practical laboratory problems.

1413 Fundamentals of Ionizing Radiation. Lab 3. Radioactivity, half-life, emission of particulate and electromagnetic radiation and action of radiation in various types of materials. Use of the Geiger-Mueller counter for detecting ionizing radiation.

1684 (L)Industrial Loss Prevention. Lab 3. Prerequisite: 1213 or consent of instructor. Specific industrial processes, equipment, facilities and work practices for detecting and controlling potential hazards.

2013 Electrical Safety Codes. Lab 3. Prerequisites: EET 1213, MATH 1613. Safety-oriented design, installation, operation and maintenance of electrical power distribution systems based on current electrical codes and safety standards.

2143 (L)Structural Designs for Fire and Life Safety. Lab 3. Prerequisite: GENT 1113. 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.

2153 Fire Protection Management. Prerequisites: 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 Automatic Fire Suppression Systems. Lab 3. Prerequisites: 1373 and MATH 1613. Detailed current standards for selection, design, installation, operation and maintenance of automatic fire suppression systems. Laboratory problems on applicable technological principles.

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.

3023 Occupational Safety Techniques. Lab 3. Prerequisite: 3013. Occupational facilities, equipment and operations and their inherent hazards. Directed towards worker, machine and environmental control.

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.

3213 (L)Industrial Hygiene Instrumentation. Lab 3. Prerequisites: PHYSC 1114, CHEM 1515. Description, operation and application of quantitative instruments in general use in industrial hygiene.

3222 Industrial Security Applications. Safeguarding of industrial property, personnel and **proprietary information.**

3233 Radiological Safety. Lab 2. Ionizing radiation problems; detection and measurement, shielding and exposure-limiting, radiation health aspects, storage, handling and disposal.

4123 Advanced Fire/Safety Problems. 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.

4224 Elements of Industrial Hygiene. Lab 3. Prerequisites: CHEM 1515 and junior standing. Toxic or irritating substances, physical, biological, ergonomic and other occupational stress factors causing employee illness or discomfort. Environmental pollution sources and controls.

4333 System Safety Management. Lab 3. Prerequisites: prior or concurrent enrollment in all other fire/safety subjects. Fire/safety techniques to recognize, evaluate and control potential occupational hazards. Critical path, LAD, PERT and human factors concepts.

FOOD, NUTRITION AND INSTITUTION ADMINISTRATION (FNIA)

1113 (N)Basic 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.

2113 Introductory Food Preparation and Management. Lab 3. Selection, preparation, management and service of food.

2123 Fundamentals of Dining Room Management. Lab 3. Prerequisites: 2113, sophomore standing or consent of instructor. Organization and management of dining room service systems. Lectures, demonstration and laboratory experiences, encompass American, French, Russian, banquet service, beverage service and tableside cookery. Laboratory conducted in various settings on campus. Same course as HRAD 2123.

3133 (L)Science of Food Preparation. Prerequisites: FNIA 2113 or HRAD 1113, organic chemistry. Application of scientific principles to food preparation.

3213 Institution Organization and Management. Prerequisites: junior standing, a course in economics. Function and methods of management as related to the hospitality and food service industries. Same course as HRAD 3213.

3222 Nutrition of Children. Prerequisites: 1113 or consent of instructor. Principles of nutrition and nutrition education applied to children.

3333 Nutrition and Dietetics. Prerequisites: 1113, organic chemistry, PHSIO 3004 or concurrent enrollment or consent of instructor. Food nutrients, their digestion, absorption and metabolism.

3440 Hospitality Work Experience. 2-4 hours, maximum 4. Supervised experience in an approved work situation related to a future career in the hospitality industry. Same course as HRAD 3440.

3442 Community Nutrition. Prerequisites: a course in nutrition or consent of instructor. Nutrition applied in community education and foods-related programs. Study of existing programs and field work in various agencies.

3443 Man and His Food. Issues involved in man's food choices such as food availability, food costs, controls on the food supply, food fads and food safety. Open to all University students.

3543 (S)Food and the Human Environment. Impacts of social, cultural, religious, economic, technological, political, educational, demographic and other factors which influence food availability, production, processing, distribution and consumption of food for people of the world.

3553 Institutional Purchasing. Lab 2. Prerequisite: 2123 or concurrent enrollment or consent of instructor. Marketing conditions, with special emphasis upon purchasing discounts, cooperative buying, quality evaluation, consignments, paid advertising, product comparison, profits through purchasing of food, linens and supplies. Guest lecturers and demonstrations will be utilized. Field trip required. Same course as HRAD 3553.

3652 Food Conservation and Preservation. Lab 3. Prerequisites: 3133, organic chemistry, microbiology, or consent of instructor. Modern methods and principles of food conservation and preservation including freezing techniques; laboratory experience with different methods.

4013* (L)Experimental Foods. Lab 6. Prerequisite: organic chemistry. Experience in sensory evaluation of the quality of foods and the use of experimental techniques for product development.

4123* Diet Therapy. Lab 2. Prerequisites: a biochemistry course or concurrent enrollment, 3333. Use of diet as a therapeutic measure in certain diseases and metabolic disturbances.

4223* Nutrition In the Life Cycle. Prerequisites: one to two courses in nutrition. Nutritional needs of individuals from conception through old age. Conceptual approach to nutrition education for various age groups.

4333 Food, Beverage and Labor Cost Controls. Prerequisites: ACCTG 2203, junior standing or consent of instructor. Food, beverage and labor cost control systems associated with hospitality industry operations. Same course as HRAD 4333.

4363* Quantity Food Production Management. Lab 5. Prerequisites: 2123, 3133, 3553, a course in accounting or mathematics or consent of instructor. Organization, purchasing, preparation and service of food for large groups. Same course as HRAD 4363.

4372* Creative Teaching of Nutrition. Prerequisites: a course in nutrition, junior standing or permission of instructor. Techniques for development and presentation of nutrition information that will motivate people of various ages to improve their food habits. Identification and development of teaching aids.

4573* Institution Organization and Management. Lab 3. Prerequisites: FNIA or HRAD 3553, 4363. 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.

4641* Readings in Food and Nutrition. Recent advances in food and nutrition. Open to all upper-division University students.

4693* Institution Administration. Lab 3. Prerequisite: 4573 or concurrent enrollment. Supervised administrative responsibilities in food services and related institutions such as hotels. Same course as HRAD 4693.

4733* Community Nutrition. Lab 1. Prerequisites: 1113 or equivalent. Utilization of principles of management, educational process, communication, counseling and change process to work with public health care team and community groups.

4850* Special Unit Course In Food, Nutrition and Institution Administration. 1-3 credits, maximum 6. Special units of study in this Department.

5000* Research In Food, Nutrition and Institution Administration. 1-6 credits, maximum

6. Prerequisites: graduate standing and approval of adviser. Individual research and thesis that will fulfill the requirements for the master's degree.

5012* Advanced Institutional Purchasing. Lab 2. Prerequisite: 3552 or equivalent or consent of instructor. Marketing conditions with special emphasis upon problems involved in **food purchasing** for institutions.

5113* Investigational Cookery. Prerequisites: 4013. Food science, food quality and physical characteristics of food.

5230* New Findings In Nutrition. 1-3 credits, maximum 6. Prerequisite: graduate standing. A seminar-type course in various aspects of nutrition of current interest.

5233* Quantity Food Development. Lab 5. Prerequisites: graduate standing and 4363 or equivalent. Experimental approach to methods in quantity food production as related to time factor, institution equipment and proportions of ingredients.

5343* Food Service Systems Management I. Prerequisite: 4573 or equivalent. Organization and management of food service systems.

5373* Advanced Child Nutrition. Lab 6. Prerequisites: 3333 and consent of instructor. Child nutrition problems and their application to the feeding of children. Critical study of scientific literature.

5462* Food Service Layout and Equipment. Prerequisite: HRAD 4472. Food service layouts **and specifications for institutional equipment.**

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.

5593* Food Service Systems Management II. Prerequisite: 5343. Consideration of advanced administrative problems. Case studies in food service systems.

5613* Organization and Management of School Lunch Rooms. Lab 2. Prerequisite: 4363 or equivalent experience in operation of school lunchrooms and consent of instructor. Organizing equipment and operation of school lunchrooms. Special problems required.

5650* Advanced Food Conservation and Processing. 2 credits, maximum 2. Lab 3. Prerequisites: 4013 and consent of instructor. Recent advances in food processing in relation to quality of product and conservation of food nutrients.

5673* Food Service Systems Manpower Management. Lab 3. Prerequisite: graduate standing or consent of instructor. Principles and practices of management in the procurement, development, maintenance and utilization of an effective and satisfied working force in food service systems.

5743* Experimental Methods in Food and Nutrition Research. 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* Administrative Dietetics. Prerequisite: acceptance for Administrative Dietetic Internship. Aspects of organizing and managing food services. Affiliations in hospitals, school lunch, and other food operations. Structured to meet requirements of the American Dietetic Association. 40 hours lab each week in University residence halls, Student Union and affiliated units.

5850* Food, Nutrition and Institution Administration Workshop. 1-3 credits, maximum 4. Prerequisite: graduate standing. Selected phases of food nutrition and institution administration.

5870* Problems in Food, Nutrition or Institution Administration. 1-4 credits, maximum 6. Prerequisites: graduate standing and consent of instructor. Newer problems and methods in food, nutrition or institution administration; animal experimentation or other research.

5960* Food, Nutrition and Institution Administration Seminar. 1 credit, maximum 2. Prerequisite: graduate standing. Individual reports and group discussion of recent scientific literature in food, nutrition and institution administration.

FOREIGN LANGUAGE (FLANG)

3000 (I)Specialized Study in a Classical Language. 1-5 credits, maximum 16. Prerequisite: consent of instructor. Instruction and/or tutorial work in a classical language.

3500 (1)Specialized Study in a Modem Foreign Language. 1-5 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 or minor program.

4000 (I)Specialized Studies in Foreign Language and Literature. 1-6 credits, maximum 9. Lab 1-9. Prerequisite: consent of instructor. Individual guided study, tutorial or seminar on specially selected topics in a foreign language or literature.

FORESTRY (FOR)

1122 Introduction to Forestry. A preview of forestry subjects, including forest resources, agencies, industries and practices.

1222 Forest Graphics. Lab 4. Types of maps and map-making processes; map scales and symbols; map reading and interpretation; the organization, preparation and presentation of field data; land description; compass reading.

2134 Dendrology. Lab 4. Prerequisite: BISC 1402. Identification, taxonomy and distribution of forest trees and shrubs of the United States; their environmental requirements and utilization.

2413 Forest Ecology. Lab 3. Prerequisite: BISC 1303. Ecological knowledge applied to the producing of forests. Impact of major environmental factors on sites. Identification of sites with respect to biologic and economic potential and resource management classes.

2523 Forest Measurements. Lab 2. Prerequisites: MATH 1715, and STAT 2013 or concurrent enrollment. Measurements of forests, forest products, standing trees and growth; the application of statistical methods to forest inventory data.

2643 Forests and Forestry. Forest practices on small woodlands; measurement of land area and products, silvicultural practices, reforestation, environmental concepts, management, economics and harvesting. Designed for nonmajors; majors may not receive credit.

3008 Forestry Field Practices. Prerequisites: 2413 and 2523. Eight-week field session. Timber harvesting systems, protection organizations and equipment, silvicultural practices, and the timber, recreation, watershed, wildlife and range resources on public and industrial forest lands. Wood product manufacturing facilities. Measurement of land areas, standing trees and forest products. Forest mensurational techniques. Emphasis varies with camp location.

3222* Regional Silviculture. Prerequisite: 2413. Silviculture applied to the **important species and forest types of the United States.**

3333* Forest Protection. Character and extent of damages to the forest resource and its environment by destructive agents. Emphasis on man, weather, animals. Insect and disease controls and fire.

3443* Forest Genetics and Regeneration. Lab 2. Prerequisite: 2413. Mechanisms of inheritance; development of natural populations, types of genetic variance. Variation patterns in forest trees and genetic improvement systems. Seed development; nursery practices and artificial regeneration.

3554* Wood Properties. Lab 2. Structure, properties, identification of wood; treatment of forest products.

3643* (N)Forest Environment and Related Resources. The interrelationships and uses of the soil, wood, water, wildlife, range resources and recreational environment for man's benefit.

3772* Timber Harvesting. Methods, equipment and economics of harvesting forest crops.

3882* Aerial Photogrammetry. Lab 3. Prerequisite: MATH 1613. Use of aerial photographs in natural resources fields. Study of scale, parallax, planimetric mapping and photo interpretation.

3993* Forest Economics and Finance. Prerequisite: AGEC 1114. Economic factors and analytical methods influencing decisions in forest resource management; factors affecting the production of wood products; arithmetic of interest and investment criteria; economics of nonmarket goods.

4113* Forest Products. Prerequisite: 3554. Production, distribution and uses of major forest products.

4223* Timber Management. Lab 2. Prerequisites: 3008 and 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: 4223 and COMSC 2113. Applications of mathematical and statistical models in solving forest resource management problems. Integrated case studies to synthesize economic, mathematical, biological, political and administrative principles.

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. Prerequisite: senior standing or consent of instructor. Forest recreation and the agencies involved in administering such areas; their policies and management programs and their impact on the recreation resource. Emphasis will be on the public sector but the private sector also covered.

4563* Tree Physiology. Prerequisites: 3554 and BISC 1303, 1402. The physiology of growth, development and responses of woody plants with particular consideration of the influence of genetic and environmental factors on physiological processes in trees; application of physiological principles in predicting the effects of silvicultural practices on tree growth response.

4573 Recreation Design. Prerequisites: BISC 1114 or 1402 and upper-division standing, and some background in recreation, natural resources or design. Design concepts development for large-scale recreation areas based primarily upon natural resource analysis. Same course as HORT 4573.

4601* Contemporary Issues in Forest Policy. Prerequisites: senior standing and consent of instructor. Current issues in forest policy, public land allocation and use, alternatives for nonindustrial private forest lands, current legislation pertaining to forest resources, etc. A reading/discussion format and is scheduled in the evenings at participants' homes. Enrollment limited.

4813* Forest Watershed Management. Prerequisite: senior standing. Hydrologic process and characteristics of forest and range watersheds; management principles and techniques for improving water yield and quality; watershed protection and rehabilitation.

5000* Research and Thesis. 1-6 credits, maximum 6. Prerequisite: graduate standing. Open to students working for a Master of Science degree in forest resources.

5003* Forest Ecosystems Analysis. Lab 2. Prerequisites: 3008, STAT 2013, appropriate computer science orientation and consent of instructor. An integrated approach to problem-solving and decision-making in multiple-resource forestry. Analysis of forestry **data** using problems in forest ecology, forest genetics, forest economics and forest management Team-taught.

5010* Graduate Seminar. 1 credit, maximum 2. Prerequisite: graduate standing. 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 Forest Problems. 1-3 credits, maximum 3. Prerequisite: graduate **standing.** Individual problems in advanced forestry subject-matter appropriate to students with capability at the master's level.

5032* Advanced Timber Management. Prerequisite: graduate standing. Case studies exemplifying biological and business principles for managing timberlands. Public and industry policies and objectives for timber management.

5043* Forestry Research Methods. Prerequisite: graduate standing. 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.

5143* Economics of Multiple Use of Forests. Prerequisite: 3993 or consent of instructor. Application of capital theory, production economics, welfare and conservation criteria **and** related developments in theory and analytical models to decision-making in the management of public and private forests for combination of timber, water, wildlife, range, recreation and other environmental values.

5423* National Recreation Areas. Prerequisite: graduate standing. History and administration of the national parks, monuments, shrines, forest and seashore recreation areas, as well as state and private facilities. Studies of important recreation regions, foreign parks, preserves and reservations.

5533* Recreation and Man's Cultural Heritage. Prerequisite: graduate standing or consent of instructor. The role of historical restorations, "folk" museums, national monuments and "living" historical experiences as they relate to recreation and the cultural heritage of man; Williamsburg, Tyrone Palace, Natches Trace, Fort Ticonderoga, the Alamo, the C. and O. Canal, the Perry Monument and others. Emphasis is placed on man's need to associate with his past in the present total environment.

5643* Management of Recreational Lands. Prerequisite: graduate standing or consent of instructor. The use of the forest and associated land and water for recreational purposes. The relationship of man, as a recreationist, to the natural environment. Manipulation of plant and animal communities for outdoor recreation objectives and policy problems arising from recreational demands.

5753* Forest Genetics. Prerequisites: 3443 and ANSI 3423 or AGRON 3553. Patterns in forest tree populations; estimation and application of genetic parameters to developing improved tree populations. Development of selection indices and experimental design as related to applied tree breeding programs.

5762* Forest Tree Breeding. Prerequisite: 3443. The application of silvicultural and genetic principles to the commercial production of genetically improved forest trees.

FRENCH (FRNCH)

1115 (I)Elementary French I. Lab 1 1/2. Pronunciation, conversation, grammar, reading.

1225 (I)Elementary French II. Lab 1 1/2. Prerequisite: 1115 or equivalent.

2112 (H,I)Intermediate Reading and Conversation I. Lab 1. Prerequisite: 1225 or equivalent competence. (May have been gained in high school.) Reading and discussion of French texts. May be taken concurrently with other 2000-level French courses.

2113 (H,I)Intermediate Conversation and Composition I. Lab 1. Prerequisite: 1225 or equivalent competence. (May have been gained in high school.) Oral and written practice of modern French. May be taken concurrently with other 2000-level French courses.

2222 (H,I)Intermediate Conversation and Composition II. Lab I. Prerequisite: 2113 or equivalent competence. (May have been gained in high school.) May be taken concurrently with other 2000-level French courses.

2223 (H,I)Intennedlate Reading and Conversation II. Lab 1. Prerequisite: 2112 or equivalent competence. (May have been gained in high school.) May be taken concurrently with other 2000-level French courses.

3013 French for Reading Requirements I. Prerequisite: graduate standing or consent of instructor. Translation.

3023 French for Reading Requirements II. Prerequisite: 3013. Translation.

3203 (H,I)Advanced Composition and Conversation. Lab I. Prerequisite: 20 hours of French or equivalent. May be taken before or after 3213.

3213 (H,I)Advanced Grammar and Conversation. Lab I. Prerequisite: 20 hours of French or equivalent. May be taken before or after 3203.

3273 (H,I)Twentieth Century French Novel. Prerequisite: 20 credit hours of French or equivalent. Major works and their literary and historical backgrounds.

3463 (I)Advanced Diction and Phonetics. Lab I. Prerequisite: 20 credit hours of French or consent of instructor. Required course for teacher certification. French speech sounds and intonation patterns, with practice to improve the student's pronunciation.

4113 (H,I)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.

4153 (H,I)Survey of French Literature I. Prerequisite: 20 credit hours of French or equivalent. The development of French literature to 1800 in selected representative texts.

4163 (H,I)Survey of French Literature II. Prerequisite: 20 credit hours of French or equivalent. The development of French literature from 1800 to the present in selected representative texts.

4263 (H,I)Nineteenth Century French Novel. Prerequisite: 20 credit hours of French or equivalent. Major works and their historical and literary backgrounds.

4333 (H,I)Backgrounds of Modem French Civilization. Prerequisite: 20 credit hours of French or equivalent.

4483 (H,I)Introduction to French Poetry. Prerequisite: 20 credit hours of French or **equiva**lent. Selected poems from all periods; poetic development in France.

4550 (I)DIrected Studies in French. 1-3 credits, maximum 9. Lab 1-2. Prerequisite: 20 credit hours of French or equivalent. Individual or group study of French language or literature.

4573 (H,I)Modern French Theatre. Prerequisite: 20 credit hours of French or equivalent. Analysis of French plays from the 19th and 20th centuries.

GENERAL ADMINISTRATION (GENAD)

2113 Introduction to Business Communication. **Basic writing skills as they apply to business communications.**

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.

3143* Business Data Processing Concepts. Prerequisite: 50 credit hours. Business data processing concepts and terminology designed to provide an orientation to the field and serve as a framework upon which to base further study. Computer hardware/software components, file structures and an introduction to computer programming in a business-oriented language

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.

3413* Consumer Issues In American Society. Prerequisites: ECON 1113 or 2123. The role of consumerism and its influence on business policies; the development of public and **nonpublic** consumer protection efforts; and personal and family financial planning and decision making, including budgeting, savings and investments, credit, buying problems and insurance.

4103* Computer Programming for Business. Prerequisite: 3143 or COMSC 2113 or equivalents. Primary emphasis on developing computer programs for business applications using the COBOL language. File structures, file updating techniques, sorting, report writing, magnetic tape and disk file handling. Same course as COMSC 4103.

4113* Management of Information Processing. Prerequisite: 3143 or equivalent. A study of managerial problems related to the acquisition, utilization and control of computerized information processing systems in business organizations. Conducting feasibility studies, contracting for hardware, software and services; information processing alternatives for the **small businessman.**

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.

4433* Business, Government and the Consumer. Prerequisite: ECON 1113 or 2123. Existing consumer protection programs, consumer legislation and consumer representation in local, state and federal governments, including methods of teaching.

4523* Data Communication Systems. Prerequisites: 4113 or equivalent. 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.

5113* Seminar in Administrative Communication. Prerequisite: graduate standing. Understanding and application of valid and relevant communication principles and theories. Designed to develop management-level personnel who can effectively and effeciently use **oral** and written communications as administrative tools **to organizational functioning.**

GENERAL ENGINEERING (GENEN)

5000* Thesis. 3-6 credits, maximum 6. Prerequisites: graduate standing and 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. 3-6 credits, maximum 6. Prerequisites: graduate standing **and approval of major professor. Thesis or report.**

6000* Research and Thesis. 1-30 credits, maximum 30. Prerequisite: 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)

1031 Personal and Occupational Guidance. Orientation in job requirements of engineering technician **occupations.** Personality development and leadership training. **Graded on** pass-fail basis.

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.

1113 Essentials of Mechanical and Architectural Drafting. Lab 3. **Mechanical and architectural** drafting conventions and practices in business and industry. **Fundamental** drafting skills **and** techniques; Interpretation and utilization of **graphic media and engineering** drawings in effective technological communications.

1153 Technical Drawing. Lab 6. Drawing and drafting room practices, **procedures** and techniques. Interpretation of typical industrial drawings. Students with two years high school or one year **practical** drafting **may** substitute an advanced course in **Mechanical** Design **Technology** with the consent of their adviser.

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.

1320 Technological Problems. 1-3 credits, maximum 6. Prerequisite: consent of instructor and adviser. Problems in **applied technology** of particular interest to currently **employed technicians.**

1432 Welding Processes. Lab 3. Welding processes, their basic principles, and the changes in mechanical properties that occur in welded structures. Application of oxygas, metal arc, inert gas and other welding processes. Problems affecting the strength and other mechanical properties of welded structures.

1525 Technical College Algebra and Trigonometry. Application of algebra, **vector algebra and trigonometry using problems encountered in technical subjects.**

2050 Advanced Technological Problems. 1-4 credits, maximum 6. Prerequisite: consent of instructor and adviser. Problems in applied engineering science which 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.

2334 Machine Tool Processes. Lab 6. Set-up procedures on standard machine tools for turning, milling and grinding. Programming and operation of numerical control machines.

2543 (L)Applied Metallurgy and Heat Treating. Lab 3. Prerequisite: 1103. Mechanical

properties of ferrous metals as modified through controlled cooling processes. The nature of metals, methods of microexamination, effect of alloys and principles of heat treating metals.

2633 Welding Applications. Lab 3. Prerequisite: 1432. The applications of various welding methods to the fabrication of welded structures. Weldability of metals, selection of filler material, surfacing materials and the techniques required to make and test welds.

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.

2772 Motion and Time Study. Lab 3. Prerequisite: sophomore standing. Developing procedure for effective utilization of effort in industrial operations; analyzing job situations with stop watch, motion picture camera and other motion economy equipment.

2812 Statistics. Fundamental statistical measures, elementary probability, histograms, cumulative curves, linear correlation and regression, analysis of variance, estimation and significance tests.

3112 Principles of Supervision. Basic supervisory action within an organized managerial **structure. Leadership at** the front-line supervisor level.

3343 Physical Metallurgy of Ferrous Metals. Lab 3. Prerequisite: 2543. Ferrous metals to include alloy steel, cast irons, high strength steels and steels for special applications. Includes atomic theory, dislocation theory, corrosions, micro-structure and heat treatments influencing the mechanical properties of ferrous metals.

3573 Machine Tool Planning and Production. Lab 3. Prerequisite: 2334. Requirements for construction of a machine part or system. Includes sequence of operations, product flow charts, material costs, machinability and fabrication costs. Machining process set up and tested by actual production on machine tools to verify calculated costs.

4050 Advanced Technological Problems. 1-4 credits, maximum 6. Prerequisite: junior standing and consent of Department Chairman. Special problems in a technology area.

4303 industrial Machine Processes. Lab 3. Prerequisites: 1103, 1222, and MATH 1613. Removal of metals to produce a useful product. Engine lathes, milling machines, tape-controlled machines, electrical spark discharge, grinders and other metal-removal machines. Use of written plan sheets and testing of actual production methods. Cost factors.

4453 Physical Metallurgy of Nonferrous Metals. Lab 3. Prerequisite: 2543. Nonferrous metals to include aluminum, magnesium, copper, refractory metals, titanium, and ceramics; methods of heat treatment and design applications of nonferrous metals.

4554 Advanced Metallurgical Problems. Prerequisites: 3343 and MECDT 4004. Problems in metallurgy; failure analysis, heat-treating problems and selection of metals for structural and environmental conditions.

GENETICS (GENE)

3003* Heredity and Man. Study of human heredity; the impact of genetics on human endeavor.

5100* Introductory Graduate Genetics. 1-3 credits, maximum 3. Prerequisites: one course in genetics, graduate standing or consent of instructor. Advanced studies in classical, population and/or molecular genetics. Course content varies with instructors.

GEOGRAPHY (GEOG)

1113 (S)Introduction to Geographic Behavior. 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 (N,L)Physical Geography. Distribution and analysis of natural features of the earth. Landforms, soils, minerals, water, climates, flora and fauna. Emphasis on man-environment relations where appropriate.

2013 (N)Descriptive Meteorology. Physical elements which cause and influence weather. Nonmathematical survey.

2113 Field Observation and Mapping. Lab 2. Collecting and compiling data for weather, climate, land-use, social, economic, land-capability and cadastral maps.

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.

3012 Geographic Instructional Applications. Prerequisite: 60 credit hours, or 45 hours with a 3.25 GPA, including 1113. Techniques and strategy for teaching basic geographic concepts and skills.

3013* (N)Blometeorology. Interrelationships of meteorology to botany, zoology, agriculture, forestry, transportation, air pollution, etc.

3023* (N)ClimatolOgy. Characteristics and distribution of world's climate. Patterns and associations of temperature, precipitation, pressure and winds. Field trips.

3113 (N)Introduction to Oceanography. History of the science, origin and structure of the basins, geomorphology of the floor, circulation, tides, waves, sediments, life in the ocean and interaction of the ocean and atmosphere.

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.

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.

3253* (S)Conservation of Natural Resources. Problems and corrective methods of conservation of land, water, forests, wildlife, minerals and people.

3363 (I,S)Geography of Africa. General patterns of population and cultural heritage in Africa; focus on elements and patterns that contrast with Western civilization.

3513* (S)Political Geography. Major political structures and geopolitical implications of location, shape, area, culture and natural environment of nations and states. Spatial analysis of voting behavior.

3523 Techniques of Geographical Analysis. Lab 2. Prerequisites: 1113 or 1114, and STAT 2013. Systematic introduction to basic techniques for modern geographic study and research. Data acquisition from field and secondary sources, quantitative techniques for data organization and analysis, and descriptive analytic cartography and graphics.

3533 Concepts of Geographical Analysis. Prerequisites: 1113, 1114 and STAT 2013. Concepts related to spatial structures, distributive processes, networks, interaction and areal associations. Analysis of the utility and goals of geographic inquiry.

3613 (S)Geography Of the United States. A geographic analysis of the United States with emphasis on regional variations of social, economic and physical phenomena.

3633* Regional Analysis and Planning. An introduction to methods of examining and analyzing regions. Examination and interpretation of the spatial, social and ecological aspects of regional planning. Same course as ZOOL 3633 and SOC 3633.

3653* Geography of Oklahoma. Geographic interpretation of physical, economic, historical and scenic features.

3723* (I,S)Geography of Western Europe. Location and analysis of natural, economic and cultural features of Western Europe.

3733* (I,S)Geography of East Europe and USSR. A regional analysis encompassing cultural, economic and physical features.

3743* (I,S)Geography Of Latin America. Areal distribution and analysis of physical, cultural and economic features of Middle and South America.

3753* (I,S)Geography Of Asia. Systematic interpretation of significant spatial patterns of man and natural environment. (Exclusive of USSR.)

3813* (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.

3913* (S)Social Geography. Significance of spatial patterns of religion, language, ethnic groups and other cultural characteristics. Spatial aspects of social issues, problems and policies in the United States and the world.

4010 Undergraduate Cooperative Education Internship. 1-9 credits, maximum 9. Prerequisite: consent of Departmental adviser. Practical experience in **applying** geographical concepts to societal problems. Students work with both agency representatives and faculty members.

4113* Advanced Physical Geography. Lab 2. Emphasis on one or several specialized topics **from the broad area of physical geography.**

4123* Geographic Aspects of Urban Planning. Prerequisites: 3123 or consent of instructor. **Spatial** aspects of **urban planning:** development of **planning** theory, various planning **tools, and specific problem areas such as urban renewal and urban transportation.**

4163* Advanced Economic Geography. Prerequisite: 3163. Emphasis on one or several specialized topics from the **broad** areas of economic geography.

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 (LS)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* Cartography. Lab 2. Prerequisite: 3523, 3533 or consent of instructor. Analysis and **production** of maps **and** other visual devices. Map reproduction, computer maped air **photo interpretation.**

4323* Computer Cartography. Lab 2. Use of **packaged** computer programs to produce maps **on both** the printer **and** the plotter.

4333* (L)Remote Sensing. Lab 2. Prerequisites: 3523 or FOR 3882 or GEOL 2021 or 4021. 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.

4523 Manpower Analysis and Planning. Introduction to the manpower field, dealing with the problems, issues **and** experience of **public** and private programs for **equipping people (especially the disadvantaged) for gainful employment. Various sources of data and techniques for the planning of meaningful manpower programs. Same course as ECON** 4523.

4640* Geographic Regions. 1-9 credits, maximum 9. Local and foreign regions.

4910* Topics In Geography. 1-6 credits, maximum 9. Specialized physical, social and **methodological topics in geography.**

4923* Applications of Geographic Analysis. Prerequisite: 3523. Research application of concepts, **methodologies,** skills and **techniques** to problems relating to the student's specializations. Designed to reinforce and synthesize knowledge and skills learned in separate courses by geography majors.

4930* Readings In Geography. 1-3 credits, maximum 9. Directed readings on selected topics, **regions or methods in geography.**

5000* Thesis. 1-6 credits, maximum 6. Open only to students working on master's degree in **geography.**

5010* Graduate Cooperative Education Internship. 1-9 credits, maximum 9. Prerequisite: **consent of Departmental adviser. Practical experience in applying geographical concepts** to societal problems. Emphasis on programs in planning and geographic education.

5013* Advanced Geographical Analysis I. Lab 2. Prerequisites: 3533 and one course in statistics. Library, field techniques, questionnaires and data processing in geographical research contexts.

5023* Advanced Geographical Analysis II. Lab 2. Prerequisite: 5013. Application of models **to geographic problem solving.**

5033* Geographic Education. Prerequisites: EAHED 6753 and 6813 **or concurrent enrollment. 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.**

5113* Remote Sensing of the Physical and Cultural Environment. Lab 2. Prerequisites: **undergraduate** course in remote sensing and one course in statistics. Advanced interpre-

tation and **analysis** of remotely sensed data on physical and cultural features of the earth's surface.

5303* Geographic Methodology. Prerequisite: 9 credit hours of geography. The nature of **geography** and its relation to other fields of study. The scientific validity of concepts and **questions** used in **contemporary** geographic research. Strategies for development, synthesis, communication and use of the geographic body of knowledge.

5340* Field Techniques In Geography. 1-3 credits, maximum 6. Prerequisite: 6 credit hours of geography or consent of instructor. Collection and analysis of field data. Field trips.

5430* Special Studies in Regional Analysis. 1-6 credits, maximum 6. Prerequisite: 3533. **Application of geographical analysis to selected regions.**

5450* Seminar In Geography. 1-6 credits, maximum 15. Prerequisite: graduate standing in **geography or consent of instructor.** Specialized topics in geography.

5510* Research Problems In Geography. 1-3 credits, maximum 9.

5553* Human Resource Utilization and Planning. Contemporary problems in productive employment and planning for the uses of human resources. Manpower planning problems, methods, programs and policies. Evaluation and application of planning principles for the **development** and implementation of meaningful manpower programs. Same course as ECON 5553.

5613* Advanced Quantitative Methods In Geography. Prerequisites: 5023, STAT 4013. The **application** of selected quantitative techniques to complex geographic problems, with emphasis on the use and interpretation of available computer programs. Students **develop** their own problems and data sets in order to gain practical experience with one or more of the **techniques.**

GEOLOGY (GEOL)

1014 (N)General Geology. Lab 1. Geological principles and earth history. For nonmajors. No credit for students with credit in 1114.

1114 (N)Physical Geology. Lab 2. Composition and structure of the earth and the modification of its surface by internal and external processes. Emphasis upon mineral resources, sources of energy and environmental aspects of geology. Field trips required. No credit for students with credit in 1014.

1124 Physical Geology for Petroleum Technologists. Lab 3. Composition and structure of the earth, chiefly as related to oil and gas. Emphasis on basic stratigraphic and structural-geologic principles **applied** to oil exploration and production. Field trips required. No credit for students with credit in 1014 or 1114.

1224 Historical Geology. Lab 3. Prerequisite: 1014 or 1114. Study of earth history, with major emphasis on **mountain-building,** development of continents and oceans and evolution of **animals and** plants. Field trips required.

2021 Map and Airphoto Interpretation I. Lab 3. Prerequisites: 1114, 1224 or consent of instructor. **Recognition** of land forms and other geologic features on topographic maps **and** air **photos and** interpretation of geologic maps.

2254 Mineralogy. Lab 3. Prerequisite: 1114 or consent of instructor. Introduction to crystal**lography and systematic study** of mineral groups and their genesis. Emphasis on identification of minerals **by physical and** chemical properties.

2364 Elementary Petrology. Lab 3. Prerequisite: 2254. Origin, occurrence and classification of rocks with emphasis upon hand-specimen identification.

3014 Structural Geology. Lab 3. Prerequisites: 1224, MATH 1613 and PHYSC 1114. Behavior of earth materials during various deformational processes and analysis of the resulting structural features. Field trips required.

3023* Geology for Engineers. Lab 3. Prerequisite: junior standing in engineering. Physical **geology** with emphasis on applications to civil engineering. Field trips required.

3034* Stratlgraphy. Lab 3. Prerequisites: 1224, 2364. 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.

3104* Systematic Invertebrate Paleontology. Lab 3. Prerequisite: 1224. Morphology and **stratigraphic importance of invertebrates.** Field trips required.

3124 Advanced Geology for Petroleum Technologists. Lab 3. Prerequisite: 1124 or equivalent. Principles and techniques of solving problems in structural and stratigraphic entrapment of oil and gas. Emphasis on interpretation of subsurface data and maps, including well logs and various kinds of maps. Field trips required.

3546* Field Geology. Lab 6 weeks. Prerequisites: 2364, 3014 and 3034. Six weeks of field methods in geology including mapping by pace and compass, plane table and aerial photographs. Required of all geology majors.

4010* Geology Colloquium. 1 credit, maximum 8. Prerequisites: junior standing or above and permission of Departmental counselor. Lectures, demonstrations and field trips of timely interest in geology.

4021* Map and Airphoto Interpretation II. Lab 3. Prerequisites: 2021, 3014, 3034, or consent of instructor. Interpretation of aerial geology using topographic, geologic, and geophysical maps, aerial photographs and remotely sensed imagery.

4023* Petroleum Geology. Lab 3. Prerequisite: 3014 and 3034. Origin, migration and accumulation of petroleum, requirements for source rock, reservoir rock and traps. Structure and stratigraphy of selected oil fields. Field trips required.

4074* Geomorphology. Lab 3. Prerequisite: 3014 and 3034, or consent of instructor. Study of land forms (and related unconsolidated deposits) and processes that form them, using topographic maps, airphotos, remotely sensed images, soils maps and field techniques. Field trips required.

4213* Global Tectonics. Prerequisite: 3014 and 3034, or consent of instructor. Major concepts of global tectonics. Emphasis on major structural features of North America, Caribbean region, South America, and Eastern Asia. Field trip required.

4414* Optical Mineralogy. Lab 6. Prerequisite: 2254. Study of the optical properties of nonopaque crystals by transmitted light using the petrographic microscope. Mineral identification using oil-immersion and thin-section methods.

4454* (L)Hydrogeology. Lab 3. Prerequisite: 3034 or consent of instructor. Physical groundwater systems. Realistic problems to acquaint students with ground-water occurrence and movements, water quality and exploration techniques. Geologic, geophysical, hydraulic, electronic data processing and modeling techniques used to define a groundwater system and to construct and analyze a water budget. Field trips required.

4564* Sedmentology. Lab 3. Prerequisite: senior standing or consent of instructor. Sediments, sedimentary processes and sedimentary environments, geometry and internal features of sediments. Field trips required.

4663* Economic Geology Metals. Lab' 3. Prerequisite: 2364. Descriptive geology, origin, exploration, economics and utilization of metallic mineral deposits. Field trips required.

4673* Economic Geology Nonmetals. Lab 3. Prerequisite: 2364. Descriptive geology, origin, exploration, economics and utilization of nonmetallic minerals and rocks. Field trips required.

4754* Engineering Geology. Lab 3. Prerequisite: 4074 or consent of instructor. The effective application of geology to civil engineering, heavy construction and certain aspects of agricultural, irrigation, military and mining engineering. 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.

5000* Thesis. 1-6 credits, maximum 6. Prerequisite: approval of graduate committee. Work toward master's thesis in geology.

5100* Problems in Hydrogeology. 1-4 credits, maximum 4. Prerequisite: 4454. Advanced problems in hydrogeology with emphasis on quantitative methods.

5150* Problems In Engineering Geology. 1-3 credits, maximum 3. Prerequisite: 4754. Advanced problems in engineering geology with emphasis on problem solving.

5203* Advanced Structural Geology. Lab 3. Prerequisite: 3014 or consent of instructor. The theoretical and experimental approach to structural geology with emphasis on rock mechanics; includes correlations between stress field, rock type and deformational style. Field trips required.

5254* Clay Mineralogy. Lab 3. Prerequisite: 2254 or consent of instructor. Structure, composition, origin and occurrence of clay minerals. Identification of clay minerals by *X-ray* diffraction and optical methods.

5304* Applied Geophysics. Lab 3. Prerequisite: PHYSC 1214. Principles of **exploration** geophysics with emphasis upon shallow exploration techniques, especially those applicable to **hydrogeology** and engineering geology.

5354* Optical Petrography. Lab 3. Prerequisite: **4414.** Identification and study of rocks by means of the **petrographic** microscope; emphasis on igneous and metamorphic rocks and the processes that form them.

5364* Sedimentary Petrography. Lab 3. Prerequisite: **4414.** Systematic classification of clastic and nonelastic marine and nonmarine sedimentary rocks. Recognition of evidence of depositional environments and diagenesis, using petrographic methods.

5403* Geochemistry. Prerequisites: 2364 and general chemistry, or consent of instructor. Application of chemical principles to geological processes. Chemical sedimentation, ore solutions, wall-rock alteration and eH-pH diagrams.

5450* Problems In Economic Geology. 2 credits, **maximum 6. Prerequisite: permission of instructor. Individually designed problems** in economic geology.

5503* Environmental Geology. Prerequisites: 1114 and 4074, or consent of instructor. Application of principles of geology to environmental studies and to land and resource planning and development. Methods of acquiring, compiling and transferring geologic information for the purposes described above, with emphasis upon environmental geologic mapping. Field trip required.

5710* Advanced Studies In Geology. 1-4 credits, maximum **4.** Prerequisite: permission of conversation and grammar.

GERMAN (GRMN)

1115 ELEMENTARY GERMAN I. Lab 1 1/2. Pronunciation, conversation, grammar, reading.

1225 ELEMENTARY GERMAN II. Lab 1 1/2. Prerequisite: 1115 or equivalent.

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.

2113 FIRST READINGS IN GERMAN. Prerequisite: 1225 or equivalent competence. (May have been gained in high school.) Selections from German newspapers and other contemporary material.

2222 INTERMEDIATE CONVERSATION AND COMPOSITION II. Lab 1. Prerequisite: 1225 or equivalent competence. (May have been gained in high school.) Practice in free composition, conversation and grammar.

2223 (H,I)Introduction to German Literature. Prerequisite: 1225 or equivalent competence. *(May* **have been gained in high school.) Reading and analysis of prose, drama and poetry; literary appreciation.**

3013 German for Reading Requirements I. Reading in the humanities and 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.

3333 (H,I)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.

3453 (I)Advanced Diction and Phonetics. Lab 1. Prerequisite: 15 credit hours of German or equivalent. Required course for teacher certification. German speech sounds and intonation patterns. Practice to improve the student's pronunciation.

3803 (H,I)Advanced Conversation. Lab 1. Prerequisite: 20 credit hours of German or equivalent. Colloquial speech forms and sentence structure. Practice in brief public address in German.

3813 (H,I)Advanced Grammar and Composition. Lab 1. Prerequisite: 20 credit hours of German or equivalent. Practice in original composition in German. Problematic points of German grammar and stylistics.

4153 (H,I)Survey of German Literature I. Prerequisite: 20 credit hours of German or equivalent. German literature from the beginning to 1785.

4163 (H,I)Survey of German Literature II. Prerequisite: 20 credit hours of German or equivalent. German literature from 1785 to the present.

4513 (H,I)The Age of Goethe. Prerequisitef 20 credit hours of German or equivalent. Principal figures of German Classicism and Romanticism.

4523 (H,I)19th Century German Theatre. Prerequisite: 20 credit hours of German or equivalent. Kleist, Buchner, Grillparzer, Hebbel, Hauptman and others.

4533 (H,I)l9th Century German Novelle and Lyric. Prerequisite: 20 credit hours of German or equivalent. Prose and lyric from Romanticism to Naturalism.

4543 20th Century German Literature. Prerequisite: 20 credit hours of German or equivalent. Main currents in German literature from Naturalism until present day.

4550 (I)Studies in German. 1-3 credits, maximum 9. Prerequisite: 20 credit hours of German or equivalent competence. Reading and discussion of vital subjects in German.

GRADUATE (GRAD)

5880* Graduate Traveling Scholar. 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.

5990* Graduate Research and Teaching Practicum. 1-6 credits, maximum 12. Graded on pass-fail system. Prerequisite: graduate standing. Graduate-level instructional program in research and teaching techniques and procedures.

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.

HEALTH (HLTH)

2602 First Aid. American National Red Cross standard first aid.

2603 (S)Personal and Community Health Science. Knowledge, attitudes and practices related to self-direction of health behavior in both personal and community health programs.

2633 Care and Prevention of Athletic Injuries. Symptoms of common athletic injuries, their immediate treatment and care. American National Red Cross first aid included.

2654 Applied Anatomy and Kinesiology. The structure and movement of the human body.

3613 Community Health Programs. Structure and function of health agencies and programs in the total community.

3622 First Aid Instructor. Lab 1. Prerequisite: 60 credit hours, or 45 hours with a GPA of 3.25, including Standard First Aid Certificate. Theory and practical experiences leading to First Aid Instructor's certificate.

3623 School Health Programs. Prerequisites: 60 credit hours or 45 hours with GPA of 3.24, including 2603. The identity and relationships of school health instruction, services and environments.

3633 School and Community Health Service. Nonteaching services including screening appraisal and referral systems in both the schools and communities.

3643* Methods in School and Community Health Education. Conceptual and value approach to health education through a variety of teaching methodologies.

4603* Energetic Aspects Of Exercise. Prerequisite: PHYSIO 3113 or equivalent or consent of instructor. Facts and principles of nutrition as related to exercise metholism, including facts and fallacies of diets, pre-game meals and aids.

HEALTH, PHYSICAL EDUCATION AND LEISURE (HPELS)

3010 Health, Physical Education and Leisure Sciences Workshops. 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.

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.

4480 Internship. 4-16 credits, maximum 16. Prerequisite: Last semester-senior year status. Supervised field work experiences in health, **physical** education or leisure services.

5000* Thesis or Report. 1-6 credits, maximum 6.

5003* History and Philosophy of Physical Education. **The history and philosophies of physical education** beginning with ancient Greece and continuing **through modern Europe** and America.

5010* Seminar. 1-2 credits, maximum **4.** Selected topics from the profession not covered in other courses. Presentation and critique of research proprls and results.

5013* Introduction of Research In Health, Physical Education and Leisure Sciences.

5020* Health and 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.

5033* Social Aspects of Play and Sport. Effects of social behavior on the movement of man and the influence of play, fitness and sports activity on social change.

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 HPELS; future needs and **program innovations.**

5053* Research Design in Health, Physical Education and Leisure. Prerequisite: 5013 or concurrent enrollment. Development of research in the areas of **health, physical education** and leisure. Organization and administration of research in HPELS; statistical analysis of research results.

5123* Principles of Movement Education. Prerequisites: HLTH 2654, PHSIO 3113, **and** ABSED 4223. Mechanical, anatomical, **physiological,** sociological and **psychological** principles which should govern curriculum planning and construction in movement education.

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 man throughout history. Same course as SOC 5443.

5513* Organization and Administration of School Health Education.

5523* Critical Issues in Health. **Investigation of current school, community and national** health problems.

5533* School Health Curriculum. **Knowledge and experience in curriculum development and evaluation.**

5543* Health Education In the Community. **Health** education in the community setting through various nonschool agencies in conjunction with actual medical care facilities.

5553* Sex Education in the Schools. Techniques, methods and theories concerning sex education.

5723* Curriculum Development In Physical Education.

5733* Motor Learning. Research in psychology and physical education relevant to the understanding of the nature and basis of motor skill learning.

5743* Blomechanics of Humans In Motion. Prerequisite: HLTH 2654. Kinetics and kinematics of humans in motion.

5753* Laboratory Assessment of Human Work Capacity. Prerequisite: PHSIO 3113 or equivalent. Instruction and practice in use of modern laboratory facilities, equipment and techniques used in the evaluation of human work capacity.

5763* Organization and Administration of Health and Physical Education In Colleges and Universities.

5773* Corrective Physical Education. Prerequisite: HLTH 2654. Prevention, detection and correction of remediable physical defects.

5783* Advanced Applied Anatomy and Kineslology. Prerequisite: HLTH 2654. Structure and movement of the human body with emphasis on the relationship of physical activity to musculoskeletal and neurological factors.

5793* Mechanical Analysis of Physical Education Activities. Prerequisite: HLTH 2654 or equivalent. Application of physical laws to physical education activities.

5853* Stress Testing and Exercise Prescription. Lab 2. Prerequisite: PHSIO 3113 or **equivalent.** Theory and practice in resting and exercise EKG, stress test protocols and exercise prescription.

6010* Independent Study In Health, Physical Education and Leisure Services. 1-6 credit hours, maximum 6.

HISTORY (HIST)

1103 (S)Survey of American History. Meaning, vitality, and uniqueness of United States history since 1492 through a thematic examination of our nation's past. Satisfies, with POLSC 2013, the State law requirement of 6 credit hours of history and government before **graduation.** No credit for students with prior credit in HIST 1483 or 1493.

1483 (S)Amerlcan History to 1865. From European background through Civil War. Satisfies, with POLSC 2013, State law requirement of 6 credit hours of history and government before graduation. No credit for students with credit in HIST 1103.

1493 (S)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 2013, State law requirement of 6 credit hours of history and government before graduation. No credit for students with credit in HIST 1103.

1713 (H,I,S)Survey Of Non-European History. Development of civilization in Asia, Africa, Latin America and Oceania. Political, cultural and technological developments in the Third World to the present.

1723 (H,I)Survey of European History. Developments of Western institutions and civilization from Greek origins to the present. The rise of cities and national states and the heritage of the western tradition.

2322 (H,I)Oklahoma History. Establishment of Indian Territory; allotments and homesteads, **biographical** studies, study and appreciation of historical literature. Required of all candidates for teacher's licensure/certification in social studies.

3013* (H,I)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,I)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,I)Ancient Rome. Political, social, economic and cultural history of the Roman Republic and Empire.

3153* (H,I)Russla 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,I)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,I)Byzantlum, Islam, and the West, 325-1000. Economic, social, political, cultural and religious developments in the three areas which succeeded Imperial Rome.

3233* (H,I)Medieval Europe, 1000-1350. High and Late Middle Ages in the West with emphasis on political, social, economic and intellectual development.

3243* (H,I,S)Renaissance and Reformation, 1350-1618. Social, cultural, intellectual, political, economic and religious developments which led to the flowering of modern western civilization.

3253* (H,I)Absoiutism, Enlightenment, and Revolution 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,I)Modern Europe, 1815-1914. Impact of modernization on the character of European society. Factors that transformed the Continent into a battle ground in the 20th century.

3273* (H,I)Modern Europe Since 1914. Origins, character and impact of the first World War; emergence and consequences of the totalitarian state; nature of political and intellectual terrorism. Effects of worldwide economic depression; dilemmas of modern democracies; political collapse of Europe as a consequence of World War II.

3283* (H,I)England to 1688. Rise of the English nation and development of English institutions.

3293* (H,I)England Since 1688. British expansion and influence throughout the world. Social, economic and political development in Great Britain and her dominions.

3333* (I)History of the Second World War. Problems leading to World War II with their international implications and consideration of the war years.

3403* (H,I)East Asia to 1800. Traditional Chinese civilization and its impact on Japan, Korea and Southeast Asia.

3413* (H,I,S)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,I)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,S)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* (H,I)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.

3510 History and Social Change. 1-4 credits, maximum 6. A modular self-pacing, contract-graded course dealing with topics of historical interest and social relevance.

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)Jackson to the Civil War, 1828-1860. Period of sectional conflicts and territorial expansion culminating in the Civil War.

3653* (S)Civil War and Reconstruction, 1860-1877. Causes, decisive events, personalities and consequences of the disruption and reunion of the United States.

3663* (S)Gilded Age and the Progressive Era, 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)America Since 1919. The United States since the 1920's with emphasis upon the 1920's, the depression, the New Deal, World War II and its aftermath; retreat from imperialism in the 1920's to world leadership in the 1950's.

3743* (S)Trans-Appalachlan West. Settlement and development of the frontier east of the Mississippi River including the French and Spanish provinces, British occupation, Indian resistance and American conquest through the Jacksonian Era.

3753* (S)Trans-Mississippi West. Emergence of the modern West from Spanish and French settlement and exploration, the Rocky Mountain fur trade, the settlement of Texas, Oregon, California, and Utah, the mining, ranching and farming frontiers, the Indian Wars and transportation.

3763* (S)American Southwest. Southwestern states of Texas, Arizona, New Mexico and California from the Spanish colonial period to the present. Mining, ranching, farming frontiers, Indian wars of the Apache, Comanche and other southwestern tribes, and the emergence of the modern Southwest.

3773* (S)Old South. Social, political and industrial conditions in the South before the Civil War.

3783* (S)New South. Recent history and major current social and economic problems of the southern regions of the United States.

3793* (H,S)Indians In America. American Indian from Columbus to the present, emphasizing tribal reaction to European and United States cultural contract and government policy.

3923* (H,S)Science in Society. Impact of science on society and of society on science during selected periods of history.

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.

4143* American Agricultural History. Growth and development of the agricultural foundation of the United States, including the social, technological and economic contributions made by agriculture.

4163* (l)World Agricultural History. Impact 'of land and food throughout history. Agricultural problems from Biblical times to the current world food crises.

4253* American Foreign Relations to 1917. American experience in foreign relations from colonial times to World War I.

4273* American Foreign Relations Since 1917. America's emergence as the decisive factor in the world balance of power.

4443* (H)Religlous Faiths in America. Principal religious denominations in the United States and their impact on American life.

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 the black man in America and his 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.

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.

5000* Thesis. 1-6 credits, maximum 6.

5023* Historical Methods. Methods of historical research and the writing of 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/World History. 3 credits, maximum 15. Historiographical and bibliographical study of special areas of European/World history.

5220* Research Seminar In American History. 3 credits, maximum 15. Research in selected problems in American history.

5240* Research Seminar In European/World History. 3 credits, maximum 15. Research in selected problems in European/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 9. Gives the student opportunity to probe more deeply into 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.

HOME ECONOMICS (HEC)

1111 *Career* Exploration in Home Economics. Developing and applying concepts relating to individual values and goals to assist in career decision making. Required for all freshmen students in home economics.

4110* The Home Economist in the Contemporary World. 1-2 credits, maximum 6. Prerequisite: senior standing or consent of instructor. Field experiences related to issues affecting the family in contemporary society and the unique responsibilities of the home economist as they interface as agents of change.

5102* Methods of Home Economics Research. Prerequisite: graduate standing. Methods of research in various areas of home economics including types of research and such aspects as problem definition, design, sampling, data collection, data analysis, reporting and reviewing. This course or equivalent required of all graduate students in home economics.

5151* Interdepartmental Home Economics Seminar. Prerequisite: graduate standing. Analysis of current issues from the perspective of home economics. Application of research findings related to issues. Required of graduate students at master's and doctoral levels.

6000* Doctoral Thesis. 1-12 credits, maximum 30. Prerequisite: graduate standing and consent of major professor. Research in home economics for the Ph.D. degree under supervision of a Graduate Faculty member.

6180* Research Seminar. 1-3 credits, maximum 3. Prerequisite: graduate standing, graduate course in research methods or consent of instructor. Research in home economics with emphasis on problems involving a multidisciplinary approach. Methodological analysis of research. Development and evaluation of research focused on current problems.

6990* Seminar in Home Economics. 1-3 credits, maximum 3. Prerequisite: graduate standing and consent of instructor. Analysis of philosophy, critical issues, current developments and interrelationships among elements in home economics.

HOME ECONOMICS EDUCATION AND COMMUNITY SERVICES (HEECS)

2102 Professional Laboratory Experiences In Home Economics Education and Community Services. Lab 2. Prerequisite: sophomore standing. Realistic experiences in different professional career areas acquainting students with the diversity of responsibilities as applied to the variety of audiences served. A block of time required.

3313 Learning Principles and Curriculum In Home Economics. Lab 2. Prerequisites: 2102, CIED 2113, ABSED 3213 or FRCD 3333 and 20 credit hours required home economics courses. Principles of learning, instructional planning, instructional development and evaluation appropriate for educational program in home economics. Observations of various educational situations and practices in skill development.

4102* Philosophy of Home Economics Education. Basis for developing a philosophy for home economics education as related to chief functions of education in a democratic society.

4113 Home Economics: Professionalism, Issues and Actions. History and philosophy of home economics, current issues in home economics and strategies for professional involvement.

4203* Strategies for Teaching. Learning theories and strategies for planning, teaching and evaluating formal and nonformal programs. Not applicable for teaching licensure.

4210 Seminar in Vocational Home Economics. 1-4 credits, maximum 4. A study of the bases for vocational home economics, its diverse audiences and its relationship to all areas of vocational education.

4212* Extension Programs In Home Economics. Prerequisite: consent of instructor. Development, organization and methods of home economics public service programs.

4213* Media, Materials and Techniques in Home Economics Education. Lab 4. Prerequisite: 3313. Application of basic education principles to specific home economics subject matter through experiences with verbal and nonverbal communication, teaching techniques, audiovisual materials and a variety of teaching aids. Development of proficiency in the use of various media.

4333* Organization of School and Community Home Economics Programs. Prerequisite: senior or graduate standing. Responsibilities and activities of the home economics teacher in youth organizations, adult education, advisory councils, home experiences and other informal education activities. Includes observation of and participation in community-centered home economics programs serving various cultural and ethnic groups.

4353* Methods of Teaching Home Economics for Adults. Procedures in teaching, planning and evaluating programs in home and family life for adults from many cultural groups. Use of new materials and techniques, group and individual programs.

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.

4610* Supervised Field Experience In Home Economics Education and Community Services. 1-8 credits, maximum 8. Prerequisites: 3313 and consent of adviser. Practical experience in special programs such as extension, occupational instruction and communication.

4620* Seminar in Occupational Home Economics. 1-6 credits, maximum 6. Emphasis upon developing occupational programs, curriculum trends, job analysis techniques, coordination techniques, evaluation and/or current trends in occupational home economics.

4720 Student Teaching in Home Economics. 1-10 credits, maximum 10. Prerequisites: 2102, 3313, CIED 2113, ABSED 3213 or FRCD 3333, and 25 credit hours of home economics. Study and development of a philosophy and skills in home economics education through directed teaching experience in an approved vocational program. Emphasis on problems encountered in teaching, such as: selecting, supplementing, implementing and evaluating curriculum materials, adapting content and methods to multicultural backgrounds, developing effective discipline techniques and participating in selected community activities.

4750* Independent Study in Home Economics Education and Community Services. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Various units of work related to specific problems in home economics education.

4020* Program Planning. 2-4 credits, maximum 4. Program planning for persons teaching in formal or nonformal settings. Emphasis on needs of specific audiences identified by the class.

5000* Master's Thesis or Report. 1-6 credits, maximum 6. Prerequisite: consent of major adviser. Research in home economics for M.S. degree.

5103* Research Methods In Home Economics. Study of recent problem areas and techniques of home economics research, followed by experiences in identifying researchable problems, planning and selecting procedures for carrying out studies and interpreting findings.

5110* Home Economics Curriculum Development. 2-3 credits, maximum 3. Prerequisites: methods course or approval of adviser and instructor. Current methods of instruction and curriculum development in home economics programs serving a variety of audiences such as different groups, handicapped and disadvantaged.

5212* Administration and Supervision of Nonformal Education Programs. Prerequisite: graduate standing, concurrent enrollment in 5610 recommended. Contemporary theories on administrative skills, management process, managerial styles, and supervisory behavior as they relate to goal orientation, performance, productivity, and professional development in nonformal educational programs, such as, home economics cooperative and university extension.

5223* Contemporary Home Economics Education. Philosophy, subject matter trends and issues in home economics education.

5330* Teaching Consumer Education and Resource Management 1-3 credits, maximum 3. Prerequisites: ECON 1113, HDCR 2413 or equivalent or consent of instructor. Study of objectives, methods, materials and evaluation in teaching consumer education and resource management cooperatively planned and/or taught with HDCR.

5340* Supervision of Student Teaching In Home Economics. 2-3 credits, maximum 3. Prerequisite: teaching experience. Problems involved in the preparation of home economics teachers with emphasis upon the provision of learning experiences for student teachers.

5440* Teaching Human Development and Family Life. 2-3 credits, maximum 3. Prerequisites: FRCD 2113 and FRCD 3753 or equivalents. Study of objectives, methods, materials and evaluation in teaching human development and family life. Cooperatively planned and/or taught with FRCD.

5520* Independent Study In Home Economics Education and Community Services. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Directed study in areas of home economics education.

5610* Internship-Home Economics Education. 1-6 credits, maximum 6. Prerequisites: consent of Head of Department and graduate standing. Selected learning experiences relating to career goals in approved settings.

5663* Evaluation In Home Economics. Fundamental principles of evaluation; instruments for use in home economics.

5750* Home Economics Education Workshop. 1-6 credits, maximum 6. Intensive study of selected phases of home economics education.

5610* Seminar in Home Economics. 1-3 credits, maximum 3. Prerequisite: consent of instructor. Seminar centering on concerns of educators.

5990* Problems In Home Economics Education and Community Services. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Individual or group study of a definite aspect of home economics education.

6000* Doctoral Thesis. 1-12 credits, maximum 30. Prerequisite: consent of major adviser. Independent research for doctoral dissertation.

6103* Community and Adult Education Programs In Home Economics. Leadership procesaes in the development, implementation and evaluation of home economics programs serving various audiences with unique needs within communities.

6203* Research Design In Home Economics. **Study of research design, funding, computer assistance and experience in communicating research results.**

6283* Supervision of Home Economics. Prerequisite: professional experience or consent of instructor. Principles and problems of supervision at local, city and state levels.

6393* Administration of Home Economics. Study of principles, processes, techniques and issues in relation to administration.

6523* Home Economics in Higher Education. Examination of educational objectives and their implementation in home economics at the upper-division and graduate level.

6563* Evaluation Research Models. Prerequisite: 5103 or consent of instructor. Process of evaluation related to research purpose and design and to assess evaluation research models appropriate to home economics.

6750* Independent Study in Home Economics Education and Community Services. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Intensive study in selected areas of home economics education for advanced graduate students working toward doctorate degrees.

6810* Home Economics Education Seminar. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Critical study of problems and recent developments in home economics education.

HORTICULTURE (HORT)

1002 Home Horticulture. The practical application and use of horticulture around the home. Emphasis on planning and care of home grounds, the fruit and vegetable garden and selection, use **and** care of indoor plants.

1013 (N)Principles of Horticulture and Landscape Design. Lab 2. Horticultural principles and practices; basics of landscape design; characteristics and use of horticultural plants; scope and development of the horticultural industry.

2002 Landscape Delineation. Lab 6. Illustration techniques for presenting landscape concepts and designs.

2113 (N)Indoor Plants and Garden Flowers. Lab 2. Prerequisite: 1013. Identification, growth habits, cultural requirements and use of ornamental foliage and flowering plants for indoor garden environments. Tropical foliage plants, annual and perennial bedding plants and deciduous flowering shrubs.

2653 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. Open to nonmajors.

3002 Advanced Landscape Delineation. Lab 4. Prerequisite: 2002. The application of multimedia **presentation** and delineation techniques to more complex plans, drawings and programs.

3013 Arboriculture. Lab 2. Prerequisites: 3334 or FOR 2134, and AGRON 2124. Selection, planting, establishment, nutrition, pruning, pest and disease control and other maintenance considerations for trees, shrubs and vines.

3083 (L)Piant Propagation. Lab 1. Prerequisites: 1013, AGRON 2124 and BISC 1402. 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 2 Prerequisites: 2113 and BISC 1402 or consent of instructor. 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. Practical crop **production** stressing major crops.

3213 Fruit and Nut Production. **Prerequisite: BISC** 1402. Commercial production of fruits and nuts, with emphasis on pecan, apple, peach, strawberry, blackberry and blueberry. A two-day field trip is required.

3334* Landscape Plant Materials. Lab 2. Prerequisite: BISC 1114 or BISC 1402. The identification, **adaptation,** tolerance and use of trees, shrubs, vines and groundcovers in the landscape.

3433* Vegetable Production. Prerequisites: 1013, AGRON 2124 and BISC 1402. Commercial production and marketing of vegetable crops.

3544* Nursery. Production. Lab 2. Prerequisites: 3334, 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: 2653. Preparation, arrangement, care and marketing of floral products in the retail shop, advanced designing, pricing, wholesale purchasing and retail selling.

3673 (H,I)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.

3773 Landscape Design I. Lab 3. Prerequisites: 3334 and 2 hours of graphic arts, or consent of instructor. The theory of landscape design including site-structure relationships, space organization and use of construction and plant materials in design.

3883* Landscape Construction. Lab 6. Prerequisite: 3 credit hours of surveying. Site planning, grading and drainage, landscape construction and contract documents.

3893* Landscape Construction II. Lab 6. Prerequisite: 3883. Preparation of construction details, estimates and specifications for landscape architecture site development.

4013* Landscape Design II. Lab 3. Prerequisite: 3773. A continuation of 3773 with emphasis on larger projects and working drawings.

4023* Landscape Design III. Lab 6. Prerequisites: 3334 and 4013. Investigation of complex site developments with emphasis on land forms, simple structures and man.

4024* Landscape Architecural Design IV. Lab 8. Prerequisite: 4023. Design and development of large-scale sites with emphasis on arrangement and design of landscape elements as they relate to health, safety and welfare as well as functional and esthetic qualities.

4033* Landscape Planting Design. Lab 6. Prerequisites: 3334 and 3773. The use of plants in the landscape as esthetic and functional elements. Environmental enhancement by and for plants. Preparation of planting sketches, plans and specifications.

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.

4223* Fruit and Nut Physiology. Lab 2. Prerequisites: 3213, BISC 1402, and BOT 3463. Environmental, chemical and cultural factors affecting the flowering, fruiting, maturation and storage of fruit and nut crops.

4313* Commercial Flower Production and Marketing. Lab 2. 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.

4434* Landscape Analysis and Use. Lab 9. The inventory and analysis of natural and man-made landscape resources and their application to landscape utilization.

4573* Recreation Design. Prerequisites: BISC 1114 or 1402, upper-division standing and some background in recreation, natural resources or design. Design concepts development for large-scale recreation areas based primarily upon natural resource analysis. Same course as FOR 4573.

4670* Horticultural Seminar. 1-2 credits, maximum 2. Required of horticulture seniors, except those choosing landscape options. Topics in horticulture, career exploration and job placement.

4680 Landscape Design Assembly. 1 credit, maximum 4. Presentations by faculty and guest speakers dealing with various aspects of landscape design and landscape architecture. Individual investigations of specific areas of interest within the field.

4893* Landscape Architectural Construction ill. Lab 6. Prerequisite: 3893. A continuation of 3893 with emphasis on outdoor lighting, landscape irrigation systems and water features.

4990* Horticultural Problems. 1-6 credits, maximum 6. Prerequisite: consent of appropriate staff member. 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.

5024* Landscape Architectural Design V. Lab 8. Prerequisites: 4024 or acceptance into M.S. program. Complex landscape architectural project design at the community level including subdivision of land, park systems and land use relationships.

5025* Advanced Landscape Architectural Projects. Lab 12. Prerequisite: 5024. Investigation of a landscape architectural problem of major significance, preferably involving an interdisciplinary approach with students and/or faculty from related fields of study.

5110* Advanced Horticultural Problems. 1-12 credits, maximum 20. Selected research problems in horticulture, floriculture, landscape design; nursery production, olericulture, pomology.

5123* Horticulture Science. Prerequisites: BOT 3463 and BOT 3460 or equivalent or senior standing with consent of instructor. 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.

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)

1102 Orientation and Survey of Hotels and Restaurants. Acquaints new students with career opportunities and the scope, development and history of the mass feeding and housing industries.

1113 Introduction to Professional Food Preparation. Lab 3. Techniques and theories of food preparation including use and selection of equipment, sanitation and quality controls.

2123 Fundamentals of Dining Room Management. Lab 3. Prerequisites: 1113, sophomore standing or consent of instructor. Organization and management of dining room service systems. Lectures; demonstrations and laboratory experiences encompass American, French, Russian, banquet service, beverage service and tableside cookery. Laboratory conducted in various settings on campus. Same course as FNIA 2123.

3103 Institutional Furnishings. Furnishings other than mechanical equipment: furniture, textiles, rugs, linens, etc.

3111 Preprofessional Experience. Prerequisite: sophomore standing or preprofessional experience. The student's future professional role and responsibilities; business procedures; employer, employee and guest relationships in the hospitality industry. Work procedures and job performance evaluations; job applications and resumes.

3133 Science of Food Preparation. Lab 2. Prerequisite: 1113 or FNIA 2113, organic chemistry. Application of scientific principles on food preparation. Same course as FNIA 3133.

3213 Fundamentals of Hospitality/Food Service Systems Management. Prerequisites: junior standing, a course in economics. Function and methods of management as related to the hospitality and food service industries. Same course as FNIA 3213.

3363 Hotel-Motel Front Office Procedure. Lab 2. Prerequisites: junior standing, 6 credit hours in accounting. Various jobs in the hotel-motel front office and the procedures involved in registering, accounting for, and checking out guests. The organization, duties and administration of institutional housekeeping as related to the front desk.

3440 Hospitality Work Experience. 1-6 credits, maximum 6. Supervised experience in an

approved work situation related to a future career in the hospitality industry. Same course as FNIA 3440.

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 Institutional Purchasing. Lab 2. Prerequisite: FNIA 2123 or concurrent enrollment or consent of instructor. Investigation of marketing conditions, with special emphasis upon purchasing discounts, cooperative buying, quality evaluation, consignments, paid advertising, product comparison, profits through purchasing of food, linens and supplies. Guest lecturers and demonstrations utilized. Field trip required. Same course as FNIA 3553.

4103 Legal Aspects of Hotel and Restaurant Management. Research and problems concerning leasing and the legal responsibilities of innkeepers and restauranteurs. Labor relations, collective bargaining and O.S.H.A. restraints considered in relation to operations.

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.

4333 Food, Beverage and Labor Cost Controls. Prerequisites: ACCTG 2203, junior standing or consent of instructor. Food, beverage and labor cost control systems associated with hospitality industry operations. Same course as FNIA 4333.

4363 Quantity Food Production Management. Lab 5. Prerequisites: FNIA 2123, 3133, 3553, a course in accounting or mathematics or consent of instructor. Organization, purchasing, preparation and service of food for large groups. Same course as FNIA 4363.

4413 Hotel Operation Systems Analysis. Conceptional analysis of hotel operation systems such as food and beverage service, housekeeping, sales, properties management, personnel, accounting and front office. Investigation of inter- and intra-departmental functions.

4473 Institutional Food Service Layouts and Equipment. Prerequisites: 3103, 3473. Space allocations and equipment arrangements will be studied utilizing time and motion efficiency. Specification for institutional equipment.

4520 Independent Study in Hotel and Restaurant Administration. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Directed study of a specific problem and/or current trends in the **hospitality** industry.

4573 Institution Organization and Management. Prerequisites: 3553, 4363 or FNIA 3553, 4363. 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 FNIA 4573.

4693 Institution Administration. Lab 3. Prerequisite: 4573 or concurrent enrollment. Supervised administrative responsibilities in food services and related institutions such as hotels. Same course as FNIA 4693.

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.

HOUSING, DESIGN AND CONSUMER RESOURCES (HDCR)

2123 Graphic Design for Interiors. Lab 6. Design and visual communication techniques related to interiors.

2213 Contemporary Issues in Housing, Design and Consumer Resources. Contemporary issues affecting the near environment of the family ecosystem and its relation to quality of life, consumer rights and responsibilities, government policies, housing and design decisions and satisfactions.

2313 Housing for Contemporary Living. Lab 2. The house as a space for living, including the aesthetic, social and economic aspects of the housing environment in relation to needs, values and goals of individuals and families.

2413 (S)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.

3214 Interior Design Studio I. Lab 8. Prerequisites: 2123, 2313, 3243, 3343. Design **processes and techniques for presenting three-dimensional space graphically.**

3233 (H)Herltage of Interiors I. Residential architecture and furnishings prior to and **including** the 18th century with emphasis on the periods which have greatly influenced housing and interior design.

3243 Structure and Design. Lab 2. Prerequisite: 2123 and 2313. Relationship between systems, methods, techniques, materials, costs of residential construction and remodeling.

3253 Fundamentals of Lighting Design. Prerequisite: 3243. Basic principles of **light and** color, the seeing process and the sources, measurements and control of light

3303 Production Procedures and Professional Practice. Prerequisite: 2313. **Materials and procedures used in the production and marketing of interior furnishings.**

3343 Design and Space. Lab 2. Prerequisite: 2123 and 2313. Analysis of design with **emphasis** on the organization of furnishings in interior spaces.

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.

3413 (S)Famillies as Consumers. Prerequisite: junior standing. Economic decision **making** related to achieving maximum satisfaction from resources spent in the marketplace on housing, food, clothing, transportation, leisure and other dimensions of family marketplace interaction.

3423 Household Equipment. Lab 2. The selection, use and care of equipment in the home. **Based** on scientific **fundamentals** as **they** relate to consumer decisionmaking.

3433 Consumer Education and 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.

3820 Professional Internship. 1-6 credits, maximum 6. Lab 4. Prerequisite: 3303, consent of instructor. The student's future **professional** role and responsibilities, business procedures, **employer-employee** relationships and supervised experience in an approved work situation.

4113* Housing and Government Prerequisite: 3353. **The role of government in the production of housing in the United States.**

4140* Housing for Special Groups. 2-4 credits, maximum 4. Problems and alternative **solutions** for housing for special groups, e.g., the aging, children, the **handicapped,** low-income, women heads of families and single-person households. Includes field study or **design problem.**

4163* (I)Housing In Other CuRures. Housing and interior design and expressions of cultural beliefs, attitudes, family patterns and environmental influences.

4264* Interior Design Studio ii. Prerequisites: 3214 and 3303. Interior design including residential, nonresidential and contract. Use of blueprints, floorplans, renderings and specifications.

4294* Interior Design Studio 111. Prerequisite: 4264. Designing residential, nonresidential and contract interior spaces with complete drawings and specifications.

4323* (H)Herltage of Interiors 11. Prerequisite: 3233 or consent of instructor. Residential architecture and furnishings of the 19th and 20th centuries with emphasis on the periods which have influenced American housing and interior design.

4333 Consumer Law and Its Effect on the Family. Prerequisite: 3433. Statutory and common law as it affects the consumption process and family in society. Consumer implications and consumer economics of consumer welfare as it pertains to the law and the family unit. Consumer legislation, legislation pertaining to the family function, and basic skills *necessary* in managing the legal involvements of the individual and family unit.

4413* Work Environments and Human Performance. Planning kitchen and work areas for convenience, comfort and contribution to family living. Analysis of home lighting and utilities for work areas, application of time, motion and work simplification in planning work areas.

4420* Family Resource Management. 2-4 credits, maximum 4. Prerequisite: senior standing.

Exploration of the time, human, environmental and financial resources of the family. Practical application of management principles to the use of family resources through supervised experiences with attention to the development of professional competence as well as personal skills. All majors except those in home economics education enroll for a minimum of three credits.

4431* Consumer Service In the Equipment Field. Prerequisite: study of home equipment. Business procedures, professional responsibilities and public relations for the home economist in the equipment field.

4433* Family Economics. Prerequisite: senior standing or consent of instructor. The family as a consumer unit, its financial wellbeing and interrelationship with the market and the economy.

4443* Home Equipment Principles and Application. Lab 2. Prerequisite: 3423. Application of physical science principles in a study of selected major and small equipment used in the home. Each individual will complete a project.

4463* (S)Women in the Economy. Prerequisites: 2413 and ECON 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.

4473* Consumer and the Market. Prerequisites: 2413 and 3433. Social, economic and political implications of traditional, current and emerging marketplace practices from consumer perspective. Moral, ethical and social responsibility of business in relation to the profit motive in each segment of the market place.

4810* Analysis of Current Literature Including Research In Housing, Design and Consumer Resources. 1-2 credits, maximum 2. Analysis of current research in relation to housing, design and consumer resources.

4850* Special Unit Course in Housing, Design and Consumer Resources. 1-6 credits, maximum 6. In-depth study of specific areas of housing, design, and consumer resources.

5000* Master's Thesis. 1-6 credits, maximum 6. Prerequisite: graduate standing. Individual research relating to problems and thesis.

5233* Contemporary Interior Design Philosophies. Prerequisite: consent of instructor. Interior design philosophies of contemporary designers and trends in interiors.

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.

5250* Historic Interior Design. 1-4 credits, maximum 4. Prerequisite: consent of instructor. Influential periods of architecture and furnishings including historical preservation.

5263* Design Business Practices. Prerequisite: consent of instructor. Analysis of design business practices and procedures effecting client relations, marketing, legal framework. Capitalization and other business functions.

5343* Housing Environment In Relation to Human Behavior. Prerequisite: consent of instructor. Critical evaluation of selected research dealing with the effects of the housing environment on social, psychological and economic aspects of human behavior.

5360* Advanced Studies in Housing, Design and Consumer Resources. 1-6 credits, maximum 6. Investigation into special areas in the fields of housing, design and consumer resources. A maximum of 6 hours to be used by graduate students following Plan III for master's degree,

5413* Human Ecology of the Family. Prerequisite: 4420 or consent of instructor. The family as environment and within environment. Relation of values, goals, standards and decision-making in the management of family resources. The unique role of the family in the social and economic system.

5422* Home Management Administration. Prerequisite: 4420 or consent of instructor. Preparation for directing home management experiences in higher education.

5433* Family Financial Security. Prerequisites: 3433 or consent of instructor. Socioeconomic changes, public policies and programs and management practices related to family financial well-being.

5443* Contemporary Consumerism: Issues and Action. Prerequisite: consent of instructor. Consumerism and the consumer movement in today s society. Objective analysis of current and emerging consumer issues, claims of advocators and opposition and involvement and/or action by consumers, business and government.

5482* Experimental Problems In Home Equipment. Prerequisite: 3423 or consent of instructor. Techniques for investigations with home equipment.

5810* Problems In Housing, Design and Consumer Resources. 1-6 credits, maximum 6. Prerequisites: graduate standing and consent of instructor. Individual or group study of a definite aspect of one of the subject matter areas in the Department.

5830* Housing, Design and Consumer Resources Seminar. 1-6 credits, maximum 6. Prerequisites: consent of instructor. A selected group of current issues in housing, design and consumer resources.

6410* Independent Study in Housing, Design and Consumer Resources. 1-3 credits, maximum 6. Prerequisite: consent of instructor. Selected areas of housing, design or consumer resources for advanced graduate students working toward doctorate degree.

6813* Family Socio-Economic Issues and the Quality of Life. Prerequisite: consent of instructor. An analysis of social and economic trends and policy affecting resource use in household, consumer and leisure activities and the resulting quality of life.

6830* Housing, Design and Consumer Resources Seminar. 1-3 credits, maximum 6. Prerequisite: consent of instructor. Problems and recent developments in housing, design and consumer resources.

HUMANITIES (HUMAN)

1013 (H)Human Experience and the Humanities. With the theme of the human search for identity and meaning in life, guides students toward broader understandings of themselves and the world through a new appreciation of literature, art and music. Thematic approach; not available to students with credit in more advanced humanities courses.

2111 (H)Man and the Arts (Ancient and Medieval). Dominant themes of human self-expression as discovered through a comparative and integrated study of art and music from antiquity through the Middle Ages, with emphasis on the humanistic ideas which they embody. Designed as both a companion course to HUMAN 2113 and an independent enrichment general studies course. First eight weeks of the semester.

2113 (H)Western Humanities (Ancient and Medieval). Key ideas and values of Western culture as discovered in literature and the fine arts in their historical and philosophical contexts. Ancient Greek, Roman and Judeo-Christian traditions, and their synthesis in Medieval times.

2221 (H)Man and the Arts (Modem). Dominant themes of human self-expression as discovered through a comparative and integrated study of art and music from the Renaissance through the Twentieth Century with emphasis on the humanistic ideas which they embody. Designed as both a companion course to HUMAN 2223 and an independent enrichment general studies course. Second eight weeks of the semester.

2223 (H)Western Humanities (Modern). Key ideas and values of Western culture as discovered in literature and the fine arts in their historical and philosophical contexts. Renaissance, Enlightenment, Romantic and Modern periods.

2333 (H)American Humanities. An historical examination of American values and attitudes as expressed in artistic and popular culture.

3103 (H,I)Studies in African Cultures. Key ideas, values and achievements in African culture and tradition as found in literature, art and music, viewed in historical perspective.

3203 (H)Studies in Black American Culture. The cultural role of the black American: history and achievements, as revealed in a study of the black contribution in the fields of literature, music and the visual arts.

3303 (H)American Indian Humanities. How various Indian tribes view important aspects of the human experience and how such a view is reflected in Indian poetry, dance and music.

3403* (H,I)Aslan Humanities: India and Pakistan. Cultural heritage of India and Pakistan explored in story, sculpture, drama, ritual and music with a focus on the human hopes, purposes and assumptions which they reveal.

3503* (H,I)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.

3773 (H)Women In Western Civilization. Images of women in art and literature of the West,

approached within a historical context, with emphasis on works by women writers, artists **and composers.**

4013* (H)Perspectives on Death and Dying. Issues which 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.

4050* Studies in the Humanities. 1-6 credits, maximum 6. Seminars on selected problems in the fields of humanistic study. See class schedule booklet for current offerings.

4060* Studies in the Mid-Twentieth Century. 1-6 credits, maximum 6. Seminars on selected **topics in contemporary** humanities. See class schedule booklet for current offerings.

4113* (H,I)The World of IsiamCulturai Perspectives. The cultural heritage of the World of Islam explored through its expression in the art, architecture and literature of the Mus-lim peoples.

INDUSTRIAL ARTS EDUCATION (IAED)

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 Arta Education. Industrial arts education in a modern educational system, including the historical and philosophic bases for such programs. Purposes, objectives and functions of contemporary industrial arts programs in local schools. Participation in on-site observation experience in the common 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 programs.

3032* Industrial Arts for Elementary and Special Education Teachers. Lab 2. Educational projects and activities for stimulating student interest, developing and broadening student abilities, and generally enhancing the school program. Practical aspects of planning and implementing organized industrial arts activities in elementary and special education curriculums. Instruction in the selection, purchase, use and storage of basic tools and appropriate supplies.

3033 Wood Technology I. Lab **4.** Characteristics and uses of woods. Processes and techniques for teaching modern wood technology. Experiences directed toward learning and perfecting skills and safety habits associated with the use of woodworking machines.

3043 Wood Technology II. Lab 4. Advanced study of woods and wood applications. Designed to develop expertise in planning, constructing and finishing wood projects based upon scientific planning and research. Stresses skill development in advanced woodworking.

3102 Industrial Arts Design. Lab 3. History, fundamentals and theory of product design. Laboratory exercises in the design and development of industrial arts projects with applications for local school programs.

3223 Electronics. Lib 3. Prerequisite: 3023. Introduces the industrial arts teacher to electronic devices, circuits and systems with emphasis on industrial applications and an **understanding** of occupations in the electronics industries. A closely integrated laboratory provides relevant experience in practical applications.

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 programs.

3323 Manufacturing Processes. Lab 4. Methods and procedures for processing materials used in product manufacturing and development. Laboratory practical experience in processing materials with implications for industrial arts programs in local schools.

3333 Industrial Communication. Lab 4. Methods and techniques for the visual communication of information and ideas. Incorporates the elements of drafting, design, printing and photography into a total concept of modern industrial communications.

3550* Production Shopwork. 1-4 credits, maximum 4. Assembly line production procedures and techniques for products fabricated from wood and metals. Practical experience in simulating assembly line production.

3652* Internal Combustion Engines. Lab 3. Principles and theory of internal combustion engine operation. 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 education.

4012 Wood Technology III. Lab 3. Prerequisite: 3033. Practical production problems involving modern materials and production techniques used in construction. Emphasis on planning, layout and design, as well as terminology, estimating, production sequence, types of construction, hardware, surface decorations and installations of plastic laminates.

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.

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. Unique interests of participants pursued in selected areas by learning of special techniques of working in the areas of plastics, metals, ceramics, lapidary, leather and other areas of interest.

5023* Special Problems in Teaching Beginning Courses In Woodwork. Materials and processes necessary for use in elementary woodworking classes. Special emphasis on textbooks, courses of study, teaching methods, shop planning and selection of equipment. Small handwork projects designed and carried out in the shop.

5132* Special Methods of Teaching Industrial Arts. An in-depth analysis of problems associated with teaching industrial arts in the public schools.

5233* Special Problems In Machine Woodworking. Materials, processes, designing and cost accounting in the unit woodworking shop. Selection and use of appropriate machine equipment.

5342* Special Problems In Shop Maintenance. Procedures for systematic selection, installation and maintenance of shop equipment.

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.

5562* Design and Construction In Industrial Arts. Furniture and industrial arts design. History of design and its modern application to industrial arts.

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.

INDUSTRIAL ENGINEERING AND MANAGEMENT (INDEN)

2903 Industrial Systems Engineering. Prerequisites: MATH 2265 and FORTRAN. Overview of the **application** of engineering principles to the analysis and design of human activity systems. Elements of engineering systems management.

3302 Industrial Processes I. Prerequisite: ENGSC 3313. Manufacturing methods in a **wide variety of industries. Field trips to manufacturing plants.**

3312 Industrial Processes II/Numerical Control. Lab 3. Prerequisite: 3302. Continuation of 3302. Further study of industrial processes, including concepts of numerical control. **Field trips to manufacturing plants.**

3503* Engineering Economic Analysis. Prerequisite: MATH 2365 or MATH 2383. 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 2373 or 2713. Quantitative evaluation of investment alternatives for **non-engineering** majors. The role of interest in eco-**nomic 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.**

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 curricu-**lum.**

3703* Engineering Computations and Interactive Modeling. Prerequisites: ENGR 1412 **and** MATH 2265. Simulation and modeling of engineering systems by numerical and **approximation** methods utilizing the digital computer for analysis and design.

3802* Industrial Safety Engineering. The theory of safety engineering with **emphasis upon fundamental concepts in** the industrial environment.

3813* Work Measurement and Improvement. Lab 3. Prerequisite: STAT 4033 or concurrent enrollment. Methods used in determining the most effective utilization of effort in **human** activity systems. **Physiological** and **psychological** factors included with engineering concepts in the design and evaluation of work methods, environments, equipment **and standards.**

4010* Industrial Engineering Projects. 1-3 credits, maximum 6. Prerequisite: consent of **School** Head. Special undergraduate projects and independent study in industrial engineering.

4013* Operations Research I. Prerequisites: MATH 2613 and FORTRAN. Fundamental methods, models and techniques of operations research. Computational techniques of linear programming, integer and mixed integer programming and network models.

4023* Operations Research II. Prerequisites: MATH 2613, 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 or equivalent. Industrial quality **control including the theory of** statistical sampling and control.

4203* Facility Location and Layout/Material Handling Systems. Prerequisite: 2903 or 3603 or 3813. Basic theory and practice of facility location, facility layout and material **handling** systems design with emphasis on applications in widely varying industries. Design principles and analytical solution procedures with a concentration on modern practice including computerized approaches.

4323* Manufacturing Systems Design. Prerequisites: 3312, 3503, MAE 3033 and MAE 4333. The design of **manufacturable** products and manufacturing systems necessary for their manufacture, including equipment design and selection. Costs, product quality,

production cost estimating, manufacturing productivity, energy input requirements, tool engineering, jig and fixture design, maintenance and materials selection. Substantial systems design exposure through manufacturing systems design project.

4403* Industrial Labor Management. Employment, maintenance, utilization, supervision and compensation of industrial personnel.

4413* Industrial Organization Management. Prerequisites: 2903 and senior standing. Fundamentals of organization and management of human activity systems.

4613* Production Control. Prerequisite: 4013. Modern theory and practice of effective planning, analysis and control of production systems.

4913* Senior Design Projects. Lab 6. Prerequisites: 3312, 3503, 3813 and 4013. 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. Normally taken during student's last semester of undergraduate work. (Open only to students in the Professional School of Industrial Engineering and Management.)

4923* Energy Conservation and Management. Prerequisite: ENGSC 3213 or GENT 3433 or equivalent. Objectives, design, implementation and management of energy conservation and management efforts. Energy conservation, choice of energy source, safety and security of fuel storage, contingency planning and use of standby fuels. Application to homes, institutions, businesses, large buildings and industry. Energy conservation applications. Speakers from other schools and institutions utilized.

5000* Thesis. 1-6 credits, maximum 6. Prerequisite: approval of major adviser. A master's candidate enrolls for 2 credit hours for a report of from 3 to 6 credit hours for a thesis.

5013* Linear Programming. Prerequisities: 4013, 5093 and 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.

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/Dynamic Programming. Prerequisites: 4023 and 5093. 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.

5093* Quantitative Foundations for Industrial Engineering. Prerequisites: MATH 2613 and STAT 4033. 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.

5103* Advanced Industrial Quality Control. Prerequisites: 4103, STAT 4033, STAT 4013 and FORTRAN. Advanced topics in acceptance sampling and control charting by both attributes and variables. Statistically and economically based treatments of sampling plan and control chart design. Sampling under inspection and measurement errors. Experimental design and analysis of variance in quality control. Product liability prevention, value engineering, quality costs, military standards, quality manuals, metrology and **human factors.**

5133* Stochastic Processes. Prerequisites: MATH 2613 and STAT 4113, or consent of instructor. 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 5123 and MATH 5633.

5203* Advanced Facility Location and Layout/Material Handling Systems. Prerequisite: 3503, 4013 and 4203. Advanced methods for performing facility location, facility layout and material handling systems studies. Models developed for predicting and evaluating

performance of such systems. Extension of material covered in 4203 to include more analytical and computerized procedures. Case study and term project required. Some research for term project is needed.

5303* Computer-Aided Manufacturing/Advanced Manufacturing Systems Design. Prerequisite: 4323. Computer-aided design (CAD) and computer-aided manufacturing (CAM). Automation, including digital machine control, industrial robots, applications of microprocessors, and sophisticated manufacturing systems. Prototype systems design, implementation and testing as well as applicable systems engineering concepts.

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.

5403* Labor Union and Management Processes. Prerequisite: 4403 or graduate standing and consent of instructor. Contemporary labor/management issues as concerns engineers/managers in organizations. A brief review of labor/management relations; basic theories, relationships, objectives, practices and strategies of both labor and management in modern organizations.

5413* Theory of Systems Organization I. Prerequisite: 4413 or graduate standing with consent of instructor. A fundamental conceptualization of organizations and the management process. Basic concepts of creating and maintaining systems of human cooperation in formal organizations. Burdens inherent in organization and the creation of incentives to overcome burdens. Bases of specialization in organizations. The manager's role at all organization levels.

5433* Professional Activity Analysis and Incentive Determination. Prerequisite: 4403 or graduate standing and consent of instructor. Professional and managerial activities; evaluations of job contents and salary determination. Basic compensation theories and motivation factors including merit/performance rating.

5503* Advanced Engineering Economic Analysis. Prerequisites: 3503, 4013 and STAT 4033. Advanced engineering economic topics, including the theory of the firm. Development of depreciation strategies; corporate income tax structure and treatment. Classification of investments as conventional, nonconventional, pure and mixed. Deterministic evaluation of single and multiple projects. The reinvestment rate problem, capital budgeting and the separation theorem. Development and application of Weingartner's and Bernhard's horizon models. Goal programming. Preference ordering (utility) theory. Probabilistic evaluation of single and multiple projects including certainty equivalent and simulation models.

5602* Protect Management. Prerequisites: STAT 4033 and FORTRAN. Critical path methodology under conditions of certainty (CPM) and uncertainty (PERT). Network cost accounting and scheduling with limited resources. Modifications and extensions of network models. Extensive use of PERT simulation and PMS IV project management computer programs.

5613* Advanced Production Control. Prerequisites: 4013, 4023, and 4613. Quantitative, heuristic and computer methods applied to problems of production planning, work force balancing and capacity expansion. Mathematical and simulation models for optimal sequencing and scheduling of the flow of jobs or activities through complexes of manufacturing or service facilities. Assembly line balancing methods. Measures of effectiveness for operating systems. Design of computer-based systems for effective management control of operations.

5622* Forecasting and Time Series Analysis. Prerequisite: STAT 4033. Development and use of linear regression, moving averages, exponential smoothing and Box-Jenkins forecasting methods. Procedures for considering seasonal variations. Adaptive-control forecasting methods. Explanation of methods for evaluating and controlling forecasts.

5633* Inventory Theory. Prerequisite: 4023. Development and use of inventory models for known and/or stochastic demand. Periodic and continuous review inventory replenishment policies. Determination of an appropriate lot size. Consideration of quantity discounts, price change anticipation and various inventory carrying costs. Comparison of inventory policies.

5643* Network Modeling and Analysis. Prerequisites: 4013, 4023 and 5093. Presentation of a 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). Particular emphasis on the

use of GERT. 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 GASP IV and GPSS simulation languages.

5723* Information Systems for Management Decisions and Control. Prerequisite: 5903. Systems engineering methodology applied to the design of information systems for management of all types of organizations. Principles and techniques of data-base management systems. Telecommunications; interactive computing.

5733* Computer Graphics, Microcomputer Systems and Process Control. Lab 2. Prerequisites: 3703, ELEN 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 and STAT 4013. 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. Prerequisite: 3813. Modern theory and application of work measurement and improvement strategies for organizations.

5903* Systems Engineering and Management. Prerequisites: graduate standing and FORTRAN. Introduction to systems methodology. Identification of major recurring problems in the systems engineering process; problem definition, systems analysis, determination of systems requirements, evaluation of alternatives and procedures for implementation. Case studies from industry.

5913* Decision-Making Models for Multi-Objective Analysis. Prerequisites: 4013, 4023. Introduction to mathematical models for the designing and evaluation of complex systems in the areas of resource allocation, project development, regional economic analysis, energy procurement programs, ecological modeling and water resources planning. In a sequential manner, model components and decision variables are identified, intermodel flows and state transition functions formulated and criteria for system performance stated. Multiobjective methods, input-output models, mathematical programming, utility functions and simulation for decision making. Case studies will be covered to illustrate the above concepts and tools.

6000* Research and Thesis. 1-15 credits, maximum 30. Prerequisites: consent of School Head and approval of student's advisory committee. Independent research under direction of a member of the Graduate Faculty.

6023* Nonlinear Programming. Prerequisites: 5093 and FORTRAN. Theoretical and practical aspects of nonlinear optimization. Development and application of optimization techniques used for unconstrained and constrained problems; sequential search procedures, gradient methods, Newton methods and conjugate directions. Lagrange methods, quadratic programming, geometric programming, penalty and barrier methods and projection methods.

6043* Integer Programming. Prerequisites: 4013 or 5013, and 5093. Theoretical and practical aspects of integer and mixed integer optimization including network flows. Various mathematical concepts reviewed and applied to the development and application of integer and mixed integer techniques for solving unconstrained and constrained problems. These concepts include implicit numeration, branch and bound, cutting methods, diophantine equations, pseudo-Boolean methods and the out-of-kilter algorithm.

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.

6123* Analysis and Design of Queueing Systems. Prerequisites: 5093, STAT 4033 and FORTRAN. Corequisite: 5703. Modeling, analysis and design of Poisson and nonPoisson queueing systems, including infinite and finite population models, bulk arrivals and networks of queues. Decision models of queueing systems, including cost and aspiration level models. Transient analysis and special topics. Brief review of probability and transform methods.

6193* Reliability and Maintainability. Prerequisites: 5093, STAT 4033 and FORTRAN. Probabilistic failure models of components and systems. Detailed study of reliability mea-

sures 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.

6423* Theory of Systems Organization II. Prerequisite: 5413 or graduate standing with professional experience and consent of instructor. Theory and practice of management of organizations with concentration on modern management concepts. Brief history of management **philosophies;** detailed study of management precepts as developed by Herzberg, Liken, Maslow, Drucker et al. Application of modern theories to organizations of various kinds.

6513* Analysis of Decision Processes. Prerequisites: 5093, STAT 4113 or STAT 4203 and FORTRAN. Bayesian decision theory with application to optimal decision making in industrial engineering and allied fields. Extensive and normal form analysis. Sufficient statistics, noninformative stopping and conjugate prior distributions. Additive utility, **opportunity** loss (regret) and value of information. Terminal analysis, preposterior analysis and optimal sampling. Applications using Bernoulli, Poisson and normal processes.

6713* Continuous Systems Simulation/Systems Dynamics. Prerequisite: 5703 or consent of instructor. Continuous systems via simulation, using the DYNAMO and GASP IV simulation languages. Introduction to concepts of combined discrete and continuous simulation modeling. Simulation of large scale systems, particularly socioeconomic systems.

JAPANESE (JAPAN)

1250 (1) Elementary Japanese. 5 credits, maximum 10. Lab 1 1/2. Pronunciation, conversation, grammar and reading.

JOURNALISM (JM)

(See also Advertising and Public Relations, Mass Communications and Radio-Television-Film)

2113 Newswrlting I. Lab 3. Prerequisites: MC 1123; 30 wpm typing ability. News values, information gathering techniques, newswriting.

2123 Newswrltlng II. Lab 3. Prerequisite: 2113. Coverage of courts, local government and social problems.

3083 Advanced Reporting and Writing. Lab 6. Prerequisite: 3113. Evaluating news sources, reporting of public affairs and investigative reporting.

3113 News Editing. Lab 3. Prerequisite: 2123. Copyediting; design techniques for magazines and newspapers.

3213 Editorial Writing. Prerequisite: 3083. Editorial interpretation of social, economic and political events.

3522 Typography and Design. Lab 3. Prerequisite: APR 3483. Operations and materials used in printing; type, illustrations and other elements of layout; composition for advertisements, bulletins and other publications.

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.

4113 Feature Writing for Newspapers and Magazines. Prerequisite: 15 semester hours of English or Journalism, including 3083 for journalism majors. Newspaper features and special articles for business and trade journals; sources, materials, markets and other factors pertinent to nonfiction writing.

4233 Reviewing for the Press. Lab 3. Prerequisite: 15 credit hours of English or journalism, including 3083 for journalism majors. Contemporary newspaper and magazine reviewing of art, drama and dance.

4723 Journalistic Management. Prerequisite: senior standing. Business and editorial management of newspapers, magazines, radio and television stations, industrial, business and **farm publications.**

LATIN (LATIN)

1115 Beginning Latin. Grammar, vocabulary, translation practice.

2110 Intermediate Latin. 1-5 credits, maximum 10. **Prerequisite: Latin 1115 or equivalent. Grammar, vocabulary and translation.**

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, 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, game strategy for singles and doubles **play.** No credit for students with credit in 1252.

1252 Beginning Tennis. **Lab** 2. Theory and practice of basic skills, rules, terminology and game strategy for singles and doubles ***play.*** No credit for students with credit in 1242.

1262 Rebound Gymnastics. Lab 2. **Theory and practice** of tumbling, vaulting, trampoline and mini-tramp.

1272 Beginning Wrestling. Lab 2. **Theory** and practice of basic skills, strategies, training methods, equipment, rules and procedures of wrestling.

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, safety rules.

1322 Bowling. Lab 2. **Theory and** practice of **approaches,** deliveries, releases and mechanical principles involved in aiming and follow through.

1332 Body Mechanics. Lab 2. Theory and practice of **physical** fitness, posture, **body** mechanics in daily activities; figure improvement, weight control and nutrition, care of the **back and feet and relaxation.**

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.

2132 Bicycling. **Lab** 2. Theory **and** practice in the basics of bicycling, bike **touring and bike mechanics.**

2142 Canoeing and Kayaking. **Lab** 2. Prerequisite: LEIS 2372 or **equivalent. Theory and** practice of basic skills and techniques of canoeing **and kayaking** in **open water and whitewater.**

2152 Orienteering. **Lab** 2. **Theory** and practice in the sport of orienteering skills with **emphasis on problem-solving techniques through** the use of **topographic** maps and compass.

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.**

2242 Scuba and Skin Diving. Lab 2. Prerequisite: advanced swimming skills. **Theory and** practice of skills and techniques, selection of equipment, safety **procedures and physics** of SCUBA **and skin** diving.

2252 Dance Production. Lab 2. Prerequisite: 2312. **Advanced technique, composition and staging.**

2262 Intermediate Rebound Gymnastics. **Lab** 2. **Prerequisite: LEIS 1262 or equivalent. Theory and practice of intermediate** skills in tumbling, trampoline **and** mini-tramp; spotting techniques and safety skills.

2272 Beginning Ballet. **Lab** 2. Theory and practice of fundamental skills and techniques of **ballet.**

2282 Beginning Jazz Dance. Lab 2. **Theory** and practice of fundamental skills and techniques for the contemporary form of jazz dance.

2292 Beginning Tap Dance. **Lab** 2. Theory **and** practice of **fundamental skills and techniques for tap dance.**

2312 Modem Dance. **Lab** 2. Theory and practice of basic skills and knowledge relating to the creative **and** technical aspects of modern dance.

2322 Social Dance. Lab 2. Theory and practice of traditional social dances and **a variety of contemporary dances and mixers.**

2332 Folk, Square and Social Dance. **Lab** 2. **Theory and practice of folk, square and social dance; basic steps, terminology and etiquette.**

2342 American Square and Couple Dances. **Lab** 2. **Theory and practice of American dance activities; basic steps, terminology and etiquette of square, round, line and contra dancing.**

2352 Apparatus Gymnastics. Lab 2. Prerequisite: 1262. **Theory and** practice of **apparatus** gymnastic skills; balance beam, uneven **parallel** bars, rings, pommel **horse, parallel bars** and horizontal bars.

2362 Intermediate Fencing. Lab 2. Prerequisite: 1222 or **equivalent. Theory and** practice of advanced skills and strategy; techniques of electrical foil fencing; **officiating.**

2372 Intermediate Swimming. Lab 2. Prerequisite: 1212 or **ability** to swim 50 **yards** using 2 strokes. **Theory** and practice of strokes, diving **techniques and** water **safety** skills for the intermediate swimming level.

2382 Orienteering, Rappelling and Hunter Safety. Lab 2. **Theory and** practice of the **sport** of orienteering, interpretation of **topographic** maps and use of the compass; use **and** care of ropes; basic and advanced rappelling; **outdoor** living equipment selection; hunter safety. Same course as MILSC 1312.

2392 Basic Roller Skating. **Lab** 2. **Theory** and practice of **fundamental** skills **and techniques** of roller skating as **applied** to dance or figure skating.

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.

2512 Advanced Swimming and Life Saving. **Lab** 2. Prerequisite: 2372 or equivalent. Theory **and** practice of **advanced** swimming, lifesaving **and** water **safety skills.**

3430 Practlcum. 1-3 credits, **maximum** 3. Prerequisites: 60 credit **hours,** or 45 **hours** with **a** GPA of 3.25, including 2413 and 2422. **Supervised practical experience with leadership responsibilities for planning, conducting and evaluating activities and programs.**

3443 Camp Leadership. **Lab 2. Philosophy of camping with emphasis on leadership training for organized camp settings. Principles and concepts of program planning, development of camping and outdoor skills.**

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.**

4213 Methods of Teaching Swimming. Lab 2. Prerequisite: 2512 or equivalent. American Red Cross Water Safety Instructor's Certification.

4222 Swimming Pool Management. Prerequisites: 60 credit hours, or 45 hours with a GPA of 3.25, including 2232. Design, operation, programming and personnel management. May yield Oklahoma State Health Department Swimming Pool Operation Certificate.

4433* Leisure Services for Special Populations. Prerequisite: 60 credit hours, or 45 hours with a GPA of 3.25, including 2413, 3453 and 4463. Theory, principles and application of leisure services for special population groups. Analysis of needs, implications and evaluation of programs for special populations.

4443* Industrial Recreation Management. Prerequisite: 60 credit hours or 45 hours with a GPA of 3.25, including 2413, 3453 and 4463. Concepts of industrial recreation management with emphasis on programming for employee leisure services.

4450* Outdoor Education Competencies. Lab 16-32. 1-4 credits, maximum 4. Prerequisites: 2413 or CIED 2113. Development of (teacher/leader) competencies in the content, methods, philosophy and historical perspective of contemporary curricula using the out-of-doors as a learning laboratory. Same course as CIED 4560*

4473* Outdoor Recreation. Theory and practical application of outdoor recreation concepts with emphasis on philosophies, principles, policies, economics, trends and problems.

4483* Interpretive Services in Recreation. Prerequisite: 4473 or FOR 4553 or concurrent enrollment. 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.

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.

LIBRARY SCIENCE (LIBSC)

1011 The Use of Libraries/Learning Resources Centers. Orientation to the use of libraries/learning resources centers, including the special book and non-book features of the OSU library, basic materials and services.

3023 Management of School Libraries/Learning Resources Centers. Introduction to practical problems in library learning resources centers management; 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/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 non-print 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/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* Reading Guidance for Young People. Consideration of reading interests and style and content of books suitable for young people of junior high school to junior college age; examination and reading of books for recreational and informational use, practice in preparing book talks, annotations and other means of motivating reading.

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/ Learning Resources Centers. 1-6 credits, maximum 6.

Designed to meet individual and **group** needs of **library educational** media specialists, teachers and others, including 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.

5611 * Bibliography of Special Fields. Prerequisite: consent of instructor. **Introduction** to important **bibliographical** literature in selected subject areas and practice in **preparation** of subject **bibliographies.**

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: ACCTG 2203 and ECON 2123, or consent of instructor. An introduction to management principles and techniques of analysis. Decision making as applied to management systems, organizations, interpersonal relationships and pro**duction.**

3113* Management of the Public Organization. Applications of relevant management theory and tools of analysis to the problems of nonprofit organizations. Systems **analysis, planning-programming-budgeting** systems and cost-benefit analysis. Problems and examples are drawn from urban, government, military and educational **organizations.**

3123* Organizational Behavior and Management. Prerequisites: 3013, **and** SOC 1113 or PSYCH 1113, or consent of instructor. **Behavioral** science concepts **relevant** to the **study** of organizational and managerial behavior. Provides an understanding of the compo**nents and dynamics of organizational behavior essential to any manager. Managerial applications stressed.**

3223* Production/Operations Management. Prerequisites: MATH 1513, STAT 2023, **and** 3013 or **consent** of instructor. **Production/operations** management utilizing a **manage**ment 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.

4023* Management Science Methods. Prerequisites: 3223 and MATH 2713 or **consent** of instructor. Decision-making techniques **and** their **application to the resource allocation and operational problems encountered** in the several areas of business, such as accounting, marketing, finance, economics and management. Operations research methods emphasized.

4113* Personnel Management and Industrial Relations. Prerequisite: 3013 or consent of instructor. Human resource management. Policies and practices used in personnel administration. Focus upon the relation of a worker to his employer and the functions of a personnel department.

4123* Labor Management Relations. Prerequisite: 3013. An introduction to manpower man**agement and labor** relations. Manpower needs, manpower **planning,** collective bargaining and special problems in labor relations.

4133* Compensation Administration. Prerequisites: 4113, STAT 2023. Introductory course. Fundamentals of compensation such as the legislative environment, compensation theories, job analysis, job evaluation, wage structures and indirect compensation programs.

4213* Managerial Decision Theory. Prerequisites: 3223 and MATH 2713 or consent of instructor. The **application** of statistical theory and methods to managerial decisions. Emphasizes applications in the several business fields, such as accounting, economics, finance, marketing and management.

4223* Management Information Systems. Prerequisites: 3223, COMSC 2113 or GENAD 3143, STAT 2013 or equivalent. Design and operation of management information systems, total systems concept, real-time systems and current development in management information theory.

4313* Organization Theory and Development. Prerequisite: 3123 or consent of instructor. 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* Management Systems Applications. Prerequisites: 4013 or **4443** (or concurrent enrollment), COMSC 2113 or GENAD 3143. Development and implementation of decision models using systems theory, computer simulation and related management science techniques. Emphasis on application of systems analysis through a project. Systems analysis and design process, feasibility studies and implementation problems. Applications are considered in relevant business fields such as accounting, economics, finance, marketing and management.

4443* Computer-Based Simulation Systems. Prerequisites: 3223, MATH 2713 or equivalent, COMSC 2113 or GENAD 3143 or consent of instructor. Utilization of the computer in complex situations, including the use of advanced computer languages in Monte Carlo simulation.

4713* Conflict Resolution In Industry. Prerequisite: 3013 or consent of instructor. 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* Management of Manpower Programs. Prerequisite: 4113 or ECON 4523, or consent of instructor. Management and evaluation of manpower programs; including employment, occupational training, job structuring, support services and- others. Manpower programming planning and analysis, manpower research and program effectiveness and support.

5113* Management and Organization Theory. Prerequisite: graduate standing. Contemporary theories of organization. Structure and dynamics of organizational goals and environments.

5123* Organizational Design and Research. Prerequisite: 5113 or 5213. 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: 5113 or consent of instructor. 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/or team research projects used to pursue advanced topics.

5223* Seminar In Personnel Management. Prerequisite: graduate standing. Theory and application of methods used in managing human resources in public and private organizations. Function, methods and characteristics of a personnel program.

5313* Management Science for Managerial Decisions I. Prerequisite: graduate standing. The application of management science methods such as mathematical programming, statistics, waiting-line theory, simulation and model building to provide a basis for rational decision making in the allocation of the firm's resources.

5333* Advanced Decision Theory for Management. Prerequisite: 5313, STAT 3013 or consent of instructor. The application of statistical theory and methods, both classical **and** Bayesian, to managerial decisions.

5413* Management Science for Managerial Decisions II. Prerequisite: 5313. Continuation of 5313.

5513* Advanced Organizational Policy Systems. Prerequisite: MBA core courses or consent of instructor. 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.

5610* Seminar in Managerial Systems Theory. 1-6 credits, maximum 6. Prerequisite: 5313 or consent of instructor. Advanced topics in systems analysis for management. The development of models which permit the identification of problems and the improvement of managerial decision-making. Both profit and nonprofit organizations considered.

5713* Labor Relations and Collective Bargaining. Prerequisite: graduate standing. 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.

5813* Administration and Evaluation of Manpower Programs. Prerequisite: 4813 or ECON 5533 or consent of instructor. Advanced study of the operation, administration and effectiveness of various manpower programs. Allocation of decision-making process among competing alternative programs and examination of various evaluation tech-

niques as a means of program improvement. Assessment of the longand short-run effects of manpower programs in both the private and public sectors.

MARKETING (MKTG)

3213* Marketing. Prerequisite: ECON 2123 or consent of instructor. A basic course concerned with the study of marketing strategy and decision-making. Consumer behavior, marketing institutions, competition and the law.

3323* Consumer and Market Behavior. Prerequisite: 3213 or consent of instructor. 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.**

3513 Sales Management. Prerequisite: 3213. Sales planning and control, organization of the sales **department,** developing territories, motivating salesmen and control over sales oper**ations.**

3613 Retailing Management. Prerequisite: 3213 or consent of instructor. Typical problems faced by a retail manager. Applied marketing knowledge, with attention given to those theoretical concepts that provide the necessary foundation.

4113* Decision Analysis and Marketing Information Systems. Prerequisite: 3213. Model **building** in making of marketing decisions and the subsequent design of information systems needed for the effective use of marketing data. Focus on decision areas such as sales forecasting, media selection, sales force control and site location.

4223* Business Logistics and Channel Management. Prerequisite: 3213. 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 2023. Basic research concepts and methods. **Qualitative** and quantitative tools of the market researcher.

4433* Field Experience In Marketing. Prerequisites: 4333 or consent of instructor. A project **course involving problems of** special interest to the individual student.

4443* Social Issues In the Marketing Environment. Prerequisite: 3213. Social and legisla**tive considerations as they relate to consumerism** and the marketplace.

4553* International Marketing. Prerequisite: 3213. The conceptual framework for marketing into and from foreign countries. The development of action-oriented strategies with em**phasis on** the **uncontrollable** factors which affect marketing decisions in an international setting.

4683* Managerial Strategies In Marketing. Prerequisites: 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: graduate standing or consent of instructor. 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.

5220* Seminar in Marketing. 1-6 credits, maximum 6. Prerequisite: 5133. Selected topics in marketing. Model building, demand analysis, mass communication and macro-mar**keting productivity analysis.**

5313* Advanced Marketing Research. Prerequisite: graduate standing. Research methodology applied to marketing problems. Measurement, survey research, experimentation and multivariate statistical analysis.

5513* Seminar In Marketing Theory. Prerequisite: 5133 or equivalent. Development and **evaluation of marketing theory.**

5613* Seminar In Consumer Behavior. Prerequisite: 5133 or consent of instructor. Psycho**logical, sociological, and anthropological** theories related to consumer decision processes. Special emphasis on current empirical research in consumer behavior.

5713* Seminar In Promotional Strategy. Prerequisite: graduate standing. Promotional prob**lems encountered by a firm and approaches to their solution.**

5813* Seminar in Logistics. Prerequisite: graduate standing. Customer service policies, transportation mode choice, transportation regulation, warehousing, inventory management *and* location analysis.

MASS COMMUNICATIONS (MC)

1013 (S)Mass Media in American Society. Prerequisite: ENGL 1113 or concurrent enrollment. Growth and development of principal segments of the mass communication industry, including elementary professional concepts and current social and ethical issues.

1123 Mass Media Style and Structure. Elementary writing and editing techniques in print, broadcasting and other media.

2173 History of Mass Communication. Prerequisite: 1123. Growth and development of mass communication systems in America, with emphasis upon the economic, social and political interaction of the media.

3090 Journalism/Advertising Laboratory. 1-3 credits, maximum 5. Prerequisites: 48 credit hours with 2.0 GPA. Laboratory and/or internship practice for qualified students who wish creative communications experience beyond that available in the classroom.

3163 Mass Communication Law. Principles involved in statutes and case decisions in print and broadcast law, including government regulation of broadcasting by the FCC and media relations with other regulatory agencies.

3323 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.

3333 Photography I. Lab 2. Taking and processing photographs: cameras, lenses, films, printing, 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.

4013* Interpreting the News. Prerequisite: 3163. Professional and behavioral aspects of mass communication, with emphasis on the role and interrelation of media in society. Ethics, techniques of systematic data gathering, analysis and interpretation, evaluation of sources, statements, evidence, etc.

4253 Photography Ii. Lab 2. Prerequisite: 3333. Technical and scientific phases of photography; basics of color photography; studio problems; photographic communication theory.

4360* Special Problems In Mass Communication. 1-3 credits, maximum 6. Prerequisites: junior standing and 3.0 GPA. Independent study and project development to fit the student's major or minor specialization.

4443 Basic Motion Picture Techniques. Lab 3. Prerequisite: 3333 or consent of instructor. Cameras, lenses, film characteristics and motion picture techniques, including the film documentary and cinematography for television. Special problems of preparing teaching and public relations films.

4913* General Semantics In Mass Communication. Prerequisite: senior or graduate standing, or consent of instructor. Modern concepts of language with special reference to the contributions of such writers as Alfred Korzybski, Hayakawa, Chase, Lee, Johnson, Ogden and Richards in relation to communications media.

5000* Thesis. 1-6 credits, maximum 6. For mass communication graduate students who are candidates for the master's degree.

5010* Specialized Reporting. 1-3 credits, maximum 3. Lab 4. Advanced reporting in the student's field of concentration.

5113* Methods of Research. Application of measurement and analysis tools to survey research problems. Single and multivariate hypothesis testing.

5223* Mass Communication Research Designs. Prerequisite: 5113. Principal designs and single and multivariate communications research. Relation of design to appropriate analysis tools. Projects fitted to areas of student interest.

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.

5733* ResponslbNNy 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 3. Editorial and business problems of communications enterprises, including magazines, newspapers, radio stations, television stations and the business press. Readings in mass media literature.

5883* Advanced Media Management. Prerequisite: JM 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.

MATHEMATICS (MATH)

1113 Elementary Algebra. Equivalent to one year of high school algebra. Some degree programs allow no credit toward graduation.

1213 (A)Intermediate Algebra. Prerequisite: one year of high school algebra or 1113. Review of fundamental operations of algebra, rational expressions, exponents and radicals, simple equations and inequalities, introduction to quadratic equations.

1314 (A)General College Mathematics. Prerequisite: one unit of high school algebra. Topics from set theory, logic, calculus and probability. For nonmajors.

1513 (A)College Algebra. Prerequisite: two years of high school algebra or 1213. Quadratic equations, functions and graphs, inequalities, systems of equations, exponential and logarithmic functions, theory of equations, sequences, permutations and combinations.

1613 (A)Trlgonometry. Prerequisites: one unit of high school plane geometry, and 1213 or high school equivalent. Trigonometric functions, logarithms, solution of triangles and applications to engineering.

1715 (A)College Algebra and Trigonometry. Prerequisites: one unit of high school plane geometry, and 1213 or high school equivalent. An integrated course in college algebra and trigonometry.

2265 Calculus I. Prerequisites: 1715, or 1513 and 1613. An introduction to derivatives, integrals and their applications, including introductory analytic geometry.

2365 Calculus II. Prerequisite: 2265. A continuation of 2265 including multivariate calculus, series and applications.

2373 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.

2383 Calculus for Technology Programs II. Prerequisite: 2373. 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.

2413 (A)Arlthmete for Teachers. Foundations of arithmetic for the elementary teacher.

2513 Structural Concepts for Teachers. Prerequisite: 2413 or equivalent. Structures of the number system; informal geometry. For the elementary teacher.

2613 Differential Equations. Prerequisite: 2365. A brief presentation of classical ordinary differential equation theory, finite difference theory, numerical methods and the Laplace transform theory. Applications.

2713 (A)Elementary Calculus. Prerequisite: 1513. An introduction to differential and integral calculus. For students of business and social sciences.

2813 (A)Finllte Mathematics. Prerequisite: 2713. Discrete probability, vectors and matrices and linear programming. For students of business and social sciences.

3013* Linear Algebra. Prerequisite: 2265. Algebra and geometry of finite-dimensional linear spaces, linear transformations, algebra of matrices, eigenvalues and eigenvectors.

3113* Introduction to Modern Algebra. Prerequisite: 2365. Modern algebra, including material on set theory and logic.

3204* Discrete Mathematical Structures. Prerequisites: 2713 or 2265, and COMSC 2113. Discrete mathematical structures and their applications. Applications to computing and information sciences emphasized. Sets of strings, computability, elementary graph theory. Boolean algebra, elementary circuit design and elementary probability theory. Same course as COMSC 3204.

3313* Essential Mathematics for the Biological and Social Sciences I. **Prerequisites:** 1213, and 60 credit hours or consent of instructor. Basic mathematics in the biological

and social sciences. Selected topics from algebra, trigonometry and analytic geometry. Credit in this course **and** in 3413 *may* not be earned by those with credit in calculus.

3413* Essential Mathematics for the Biological and Social Sciences II. **Prerequisite:** 3313. Selected topics from analytic geometry, **polynomial** calculus and matrix algebra. **Applications to social and biological sciences.**

3623* Linear Algebra and Analysis I. Prerequisite: 2365. An integrated treatment of linear **algebra,** differential equations and multivariable calculus. No credit for those with credit **in 2613 or 3013.**

3633* Linear Algebra and Analysis II. Prerequisite: 3623. Continuation of integrated treatment of linear algebra, differential equations and multivariable calculus begun in 3623. No credit for those with credit in 2613 or 3013.

3723* Algebra for Elementary Teachers. Prerequisite: 2513 or equivalent. Algebraic **systems related to modern programs in elementary school mathematics.**

3733* Geometry for Elementary Teachers. Prerequisite: 2513 or equivalent. Geometry as **a** deductive system based on sets of points and the relation of geometric concepts to the mathematics of modern programs in elementary school mathematics.

4013* Engineering Math: Calculus of Several Variables. Prerequisites: 2613 and 3013. **Differential and integral calculus of functions of several variables, vector analysis, other basic methods of analysis and applications.**

4043* Geometry I. Prerequisite: 2265 or equivalent. An axiomatic development of Euclidean **and nonEuclidean** geometries including the following topics: points, lines, angles, measure, betweenness, plane separation, triangles, quadrilaterals, polygons and circles.

4113* (L)Modern Algebra. Prerequisite: 3113. Basic properties of groups, rings, polynomial **rings and fields including homomorphism theorems and quotient structures.**

4243* Introduction to the Theory of Numbers. Prerequisite: 3113. Divisibility of integers, **congruences, quadratic** residues, distribution of primes, continued fractions and the theory of ideals.

4253* (L)Introduction to Numerical Analysis. Prerequisites: 2613, 3013, and COMSC 2113 or COMSC 4113. Basic numerical methods and error analysis associated with the following topics: power series, roots of equations, systems of linear algebraic equations, interpolation, **integration,** finite differences and ordinary differential equations. Same course as COMSC 4253.

4273* Combinatorial Math. Prerequisite: 2265. Counting techniques, generating functions, **difference equations and recurrence** relations, introduction to graph and network theory.

4353* Advanced Calculus I. Prerequisite: 2365. Elementary topology of Euclidean spaces. Theoretical treatment of functions, continuity, sequences, series and differentiation.

4363* Advanced Calculus II. Prerequisite: 4353. Continuation of topics in 4353. A theoretical treatment of integration and of functions of several variables.

4553* Linear and Nonlinear Programming. Prerequisite: 3013. Linear programming, simplex **methods,** duality, sensitivity analysis, integer programming and nonlinear programming.

4653* Engineering Math: Differential Equations. Prerequisites: 2613 and 3013. Systems of differential **equations,** series, solutions, special functions, Green's functions, Sturm-Liouville problems and stabiiity. Applications.

4673* Introduction to Complex Analysis. Prerequisite: 4013 or 4353. Complex variables for **students** in engineering and the **physical** sciences. Analytic functions, power series, resi**dues and poles and conformal mapping. Applications.**

4710 Honors Seminar. 1-3 credits, maximum 9. Prerequisite: upper-division standing of **honor student. Special subject matter areas and reports on current literature.**

4910* Special Studies. 1-3 credits, maximum 9. Prerequisite: consent of instructor. Special subjects in mathematics.

5000* Research and Thesis. 1-6 credits, maximum 6. Conferences and guidance **in reading and research and in the writing of reports and thesis.**

5010* Seminar in Mathematics. 1-3 credits, maximum 9. Prerequisite: consent of instructor. Topics in mathematics.

5051* Seminar In Teaching Methods. Prerequisite: appointment as teaching assistant. **Required of all graduate assistants assigned** teaching duties. Students may register in this **seminar only once.**

5123* Advanced Linear Algebra. Prerequisite: 3013. Linear transformations; determinants, eigenvalues and similarity transformations; canonical forms; bilinear and quadratic forms; orthogonal and unitary transformations.

5143* Theory of Functions of a Real Variable I. Prerequisite: 4363. Lebesgue measure theory, sequences of functions and the Lebesgue integral.

5153* Theory of Functions of a Real Variable II. Prerequisite: 5143. A general theory of measure, measurable functions and integration; introduction to metric and Banach spaces.

5213* Fourier Analysis. Prerequisite: 4013 or 4353. Orthogonal series expansions, Fourier series and integrals and boundary value problems. Applications.

5243* Ordinary Differential Equations I. Prerequisite: 4363 or consent of instructor. 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 nonlinear systems, perturbation and the Poincare-Bendixon theory for planar autonomous systems.

5303* Introduction to General Topology. Prerequisite: 3113 or consent of instructor. Topological spaces including continuous functions, compactness, separation properties, connectedness and metric spaces.

5313* General Topology. Prerequisite: 5303. General topological spaces including convergence, product and quotient spaces, metrization, compactness and uniform spaces.

5323* Algebra I. Prerequisite: 4113, and 5123 or consent of instructor. Group, ring and module theory to include products, co-products and ideal theory. An introduction to homological algebra, horn and tensor functors. Field extensions and Galois theory. Selected topics.

5333* Algebra II. Prerequisite: 5323. A continuation of 5323.

5383* Theory of Functions of a Complex Variable I. Prerequisite: 4353. Basic topology of the plane, functions of a complex variable, analytic functions, transformations, infinite series, integration and conformal mapping.

5393* Theory of Functions of a Complex Variable II. Prerequisite: 5383. A continuation of 5383.

5413* Differential Geometry. Prerequisite: 4013 or 4353. Differential geometry of curves and surfaces.

5513* Numerical Analysis I. Prerequisite: 4253 or COMSC 4253. Algorithms and error analysis, solution of equations, interpolation and approximation theory. Same course as COMSC 5513.

5543* Numerical Analysis II. Prerequisites: 4253 or COMSC 4253, and 4653. Discrete variable methods in ordinary differential equations including single-step and multistep methods. Iterative techniques for numerical solution of partial differential equations. Same course as COMSC 5543.

5553* Numerical Analysts Prerequisites: 3013, and 4253 or COMSC 4253. Theoretical and computational methods associated with matrix algebra, linear algebraic equations and algebraic eigenvalue problems. Same course as COMSC 5553.

5583* Applied Mathematics I. Prerequisites: 2613 and 3013. Selected problems in applied mathematics. Formulation and analysis of mathematical models of situations arising in physical, biological and management sciences.

5593* Applied Mathematic* II. Prerequisite: 5583 or consent of instructor. A continuation of 5583.

5623* Probability Theory. Prerequisite: 4513 or STAT 4113. Transformations of random variables, generating functions, sequences of random variables and convergence theorems. Same course as STAT 5113.

5633* Stochastic Processes. Prerequisites: 2613 and STAT 4113, or consent of instructor. 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 5123 and IDEN 5133.

5683* Partial Differential Equations I. Prerequisite: 4013 or 4353. Theory of partial differential equations of the first and second orders.

5693* Partial Differential Equations II. Prerequisite: 5683. A continuation of 5683.

5733* Algebraic Topology I. Prerequisites: 4113, 5123 and 5303; or 4113, 5303 and consent of instructor. An **introduction** to the homological algebra of geometric structures, including **homotopy, homology and cohomology theory.**

5743* Algebraic Topology II. Prerequisite: 5733. A continuation of 5733.

5813* Homological Algebra I. Prerequisite: 5333 or consent of instructor. Relative homological algebra including 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.

5823* Homological Algebra II. Prerequisite: 5813. Continuation of 5813.

5883* The Calculus of Variations. Prerequisite: 4363. Determination of functions, curves and surfaces with maximum or minimum properties, fields of extremals, the Hamilton- Jacobi partial differential equation. Applications to geometry and physics.

6000* Research and Thesis. 1-9 credits, maximum 24. Prerequisite: consent of advisory committee. Directed research culminating in the Ph.D. thesis.

6013* Functional Analysis I. Prerequisites: 5123, 5143 **and** 5303. Theory of normed linear spaces.

6113* Functional Analysis II. Prerequisite: 6013. A continuation of 6013.

6223* Advanced Probability Theory. Prerequisites: 5153, and 5633 or STAT 5123. A measure theoretic presentation of the theory of **probability.** Probability spaces, random variables and independence. Same course as STAT 6113.

6253* Convexity I. Prerequisites: 5123 **and** 5303. **Theory of convex sets.**

6263* Convexity II. Prerequisite: 6253. A **continuation of** 6253.

6313* Potential Theory. Prerequisite: 4363. The force of gravity, fields of force, potential, the divergence theorem, properties of Newtonian potentials at points of free space **and** at points occupied by masses, Green's functions, the logarithmic potential and existence theorems.

6410* Seminar and Research In Applied Mathematics. 1-3 credits, maximum 9. Prerequisites: consent of instructor and chairman of student's advisory committee.

6510* Seminar and Research In Analysis. 1-3 credits, maximum 9. Prerequisites: **consent of instructor and chairman of student's advisory committee.**

6610* Seminar and Research In Geometry. 1-3 credits, maximum 9. Prerequisites: consent of instructor and chairman of student's advisory committee.

6710* Seminar and Research In Topology. 1-3 credits, maximum 9. **Prerequisites: consent of instructor and chairman of student's advisory committee.**

6810* Seminar and Research In Algebra. 1-3 credits, maximum 9. Prerequisites: consent of instructor and chairman of student's advisory committee.

6910* Seminar and Research In Number Theory. 1-3 credits, maximum 9. Prerequisites: consent of instructor and chairman of student's advisory committee.

MECHANICAL AND AEROSPACE ENGINEERING (MAE)

3033* Mechanism Design. Prerequisite: ENGSC 2122. Motion programming and analysis of machines. Kinematics of cams, gear trains, and plane mechanisms. Introduction to symbolic logic.

3043* Intermediate Dynamics. Prerequisite: ENGSC 2122. Kinematics and dynamics of systems of particles and rigid bodies. Vector kinematics or relative motion, two-and three-dimensional rigid body dynamics, momentum and energy concepts, and Lagrange's equation.

3112* (L)Measurements and Instrumenlatlon. Lab 3. Prerequisites: MATH 2613 and ENGSC 2613. Theory and laboratory in the measurement of electrical quantities, strain, force, velocity, frequency, temperature and flow rate. Report writing including the use of charts, graphs, diagrams and uncertainty analysis.

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.

3323* Design Stress Analysis. Prerequisite: ENGSC 2114. Mechanics of deformable bodies with emphasis on the design of machine and structural members: general theories of stress and strain; stress-strain relations; theories of failure; reliability and safety factors in design; fatigue considerations.

3613 Petroleum Production Methods and Phase Behavior. Prerequisite: CHEM 1515 or concurrent enrollment. Drainage and laws governing **vapor-liquid** equilibrium. Operations of flowing, gas lift and pumping wells. The handling and treating of crude oil on the producing property. Introduction to pipe-line design and operation.

3723 Introduction to Dynamic Systems. Prerequisites: MATH 2613, ENGSC 2122 and ENGSC 2613. 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.

3733 (L)System Modeling, Simulation, and Design. Lab 3. Prerequisite: 3723 or ELEN 3723. Advanced modeling of mechanical engineering systems (mechanical, electromechanical, fluid and thermal). Numerical techniques for simulating system response. Model verification and identification, not-ideal elements and nonlinear effects. Correlation of experimental results (laboratory studies of mechanical engineering systems) with simulation and analytic response predictions. Use of system modeling, analysis and simulation as a design technique.

4010* Mechanical Engineering Projects. 1-6 credits, maximum 6. Lab variable. Prerequisite: consent of instructor. Special projects and independent study in mechanical engineering.

4053* Introduction to Automatic Controls. Prerequisite: 3733. Basic properties of feedback control systems, **mathematical** models of basic components, state-variable models of feedback systems, time-domain analysis, stability, transform analysis, frequency-domain techniques, root-locus, design of single-input-single-output systems and simple compensation **techniques.**

4063* Elementary Vibrations. Prerequisite: 3723. Linear analysis of vibrating machines. Theory of balancing and vibration isolation. Multimode analysis by conventional matrix methods. Energy methods. Introduction to nonlinear dynamic analysis.

4133* Mechanical Engineering Applications. Lab 6. Prerequisite: 3112. Application of mechanical engineering techniques to the solution of experimental or design problems.

4233* Heat Transfer and Fluid Flow II. Prerequisite: ENGSC 3233. Conservation equation and **boundary** layer theory. Applications to forced and free convection, multiphase behavior, compressible flow, and mass transfer.

4243* Gas Power Systems. Prerequisites: 3223 and ENGSC 3233. Power and propulsion engines utilizing a gas as the working substance. Basic thermodynamic and dynamic equations of one-dimensional compressible flow, including isentropic flow and normal shock waves. Applications to both transportation and stationary systems.

4253* Applied Aerodynamics and Performance. Prerequisites: MATH 2613, ENGSC 3233. History of flight, gliders, and man-powered aircraft. Mathematical models of fluid flow about bodies. Characteristic parameters of airfoils and wings. Thin airfoil theory and flow about finite wings. Aerodynamics stall and the effects of flaps and slots. Drag polars; rate of climb; maximum range and maximum endurance.

4263* Vapor Power Systems. Prerequisites: 3223, ENGSC 3233. Combustion processes and vapor power cycles for power production. Power system economics and load analysis. Design techniques for thermal system.

4273* (L)Experimental Fluid Dynamics. Lab 3. Prerequisite: 3112 and ENGSC 3233. Experimental study of fundamental processes in aerodynamics and fluid dynamics using advanced measurement techniques.

4283* Airplane Stability and Control. Prerequisite: 4253. Rigid-body airplane equations of motion. Aerodynamic stability derivatives. Steady-state flight and maneuvers. Static and dynamic stability; transfer functions; handling qualities criteria; design applications.

4293* Compressible Fluid Flow. Prerequisite: ENGSC 3233 and MATH 2613. Gas flows in one and two dimensions; basic thermodynamic and dynamic equations, nozzle and duct flows, plane shock waves, frictional high-velocity flows and heat addition effects.

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.

4343* Industrial Projects. Prerequisites: 3033, 3112 and 3733. Student teams work on professional-level engineering projects sponsored by participating industries. Projects are selected from a broad range of technical areas such as mechanical design, thermal analysis, instrumentation, controls, fluid mechanics and energy production.

4353* Mechanical Design Analysis. Prerequisite: 3323 or consent of instructor. Analysis and synthesis of machine components such as fasteners, springs, gears, brakes, bearings; lubrication; analytical methods for the study of impact, dynamic loading and fatigue; comprehensive treatment of failure, safety and reliability.

4363* (L)Experimentai Analysis. 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.

4373* Aircraft Design. Prerequisites: 4243, 4253 and 4513. Solution of problems arising in the design of aerospace systems. Prediction of the aerodynamic, structural, propulsive and control characteristics.

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. Structural analysis of flight structures. Dynamic loading in aircraft, missiles and spacecraft. Stress and deflection analysis of thin-skinned stiffened structures.

4523* Aerospace Structures II. Prerequisite: 4513. Deflection analysis of thin-skin structures. Classical methods of structural analysis. Indeterminate aircraft structures.

4703* Indoor Environmental Systems. Prerequisites: ENGSC 3213, ENGSC 3233. Study of heating, cooling and air-moving systems including moisture control. Calculation of heating and cooling loads. Design of air distribution systems and selection of components.

5000* Thesis. 1-6 credits, maximum 6. Prerequisite: graduate standing. 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. Prerequisite: graduate standing. 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. Prerequisite: 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.

5073* Mechanical Vibrations. Prerequisite: 4063 or consent of instructor. Analysis of nonlinear vibrations, classical analysis of continuous systems and numerical methods.

5083* Engineering Acoustics. Prerequisite: consent of instructor. 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: graduate standing or consent of instructor. Practical digital methods for obtaining steady-state and transient solutions to lumped and distributed mechanical, fluid and thermal problems.

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: ENGSC 3233 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 or consent of instructor. 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.

5373* Instrumentation. Lab 2. Prerequisite: consent of instructor. Analysis and design of instrumentation systems, laboratory experiences with electronic instrumentation and transducers, application of digital and analog integrated circuit components to measurement problems.

5403* Computer-Aided Analysis and Design. Prerequisite: basic FORTRAN programming. Theory, application and implementation of digital computer oriented algorithms for the synthesis, simulation, analysis and design of engineering systems. Advanced FORTRAN methods for optimization, simulation and data analysis. Implementation of these methods uses program libraries, batch processing, remote terminals and graphic display units.

5413* Motion Programming of Planar Mechanisms. Prerequisite: 3013 or consent of instructor. An advanced course in the synthesis and analysis of plane mechanisms. Application of inversion techniques, pole triangles, Robert's law, overlay technique, Euler-Savary equation, Freudenstein's equation and Kutzbach's criterion.

5423* Dynamics of Mechanisms. Prerequisite: graduate standing. Static and dynamic force analysis of plane and space mechanisms using vector, matrix and dual quaternion approaches. Simulation of mechanica; systems. Study of transient effects. Vibration analysis and balancing of linkages.

5433* Photoelastic Stress Analysis. Prerequisite: 4363 or consent of instructor. Application of photoelastic methods to the stress analysis of machine parts and redundant structures. Techniques of casting, annealing and stress freezing. Use of transmission and reflecting types of polariscopes.

5443* Lubrication, Friction and Wear. Prerequisite: ENGSC 3233 or consent of instructor. 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.

5463* Fluid Logic. Prerequisite: graduate standing or consent of instructor. Fundamentals of Boolean algebra and switching circuit design. Implementation of circuit equations with fluid and mechanical logic elements. Analysis and synthesis of fluid logic systems.

5473* Automatic Control I. Prerequisite: 4053 or ELEN 4413. An advanced course in the analytical design of linear control systems. Modeling, compensation, time domain response description, stability analysis, simulation and parameter optimization.

5533* Analysis of Structural Systems. Prerequisite: 4513 or consent of instructor. 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. Prerequisites: ENGSC 3313 or consent of instructor. 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 emphasized.

5563* Finite Element Methods. Prerequisite: consent of instructor. Introduction to the finite element method in mechanical engineering. Numerical and mathematical formulations including and introduction to variational methods. Computer applications in solid mechanics, heat transfer and fluid mechanics.

5583* Corrosion Engineering. Lab 2. Prerequisites: ENGSC 3313 or consent of instructor. Modern theory of corrosion and its applications in preventing or controlling corrosion damage economically and safely in service.

5613* Fluid Flow in Porous Media. Prerequisite: graduate standing or consent of instructor. Single- and two-phase fluid flow through porous media. Applications to underground oil and gas flow, production of water from aquifers for irrigation, atomic waste disposal and gas storage.

5623* Analysis of Energy/Power Conversion Systems. Prerequisite: graduate standing or consent of instructor. Methods of analysis related to design, development and utilization of **conventional and** unconventional energy conversion systems.

5633* Applied Thermodynamics. Prerequisite: graduate standing or consent of instructor. First **and** Second Law analysis. Prediction of properties of nonideal fluids, including mixtures. Engineering **applications** to power system design, solar systems, HVAC systems, waste heat recovery and underground petroleum reservoirs.

5643* Advanced Energy Resources Engineering. Prerequisite: graduate standing or consent of instructor. Application of new methods and concepts to the development of present and future energy sources. Diverse topics ranging from utilization of heat in production of oil to extraction of fusional materials from sea water.

5663* Solar Energy. Prerequisite: graduate standing or consent of instructor. Solar space and water heating systems including economic considerations.

5723* Nonlinear Systems Analysis I. Prerequisites: 4053 and ELEN 4413, or consent of instructor. 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.

5803* Advanced Thermodynamics I. Prerequisite: 3223. A rigorous examination of the fun**damental** principles of engineering thermodynamics; the First Law, the pure substance, flow processes, Second Law **availability,** properties of substances, thermochemistry, mix**tures and equilibrum.**

5823* Radiation Heat Transfer. Prerequisite: graduate standing or consent of instructor. 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 or consent of instructor. Advanced heat transfer analysis and design, with primary emphasis on conduction.

5873* Advanced Indoor Environmental System. Prerequisite: 4703. Heating, cooling, and **ventilating systems. System and component design, building thermal simulation and energy calculation procedures.**

5933* Aeroelasticlty. 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.**

5943* Jet and Rocket Propulsion. Prerequisite: 4243 or consent of instructor. **Thermodynamic and aerodynamic principles applied to turbojet, turbofan, ramjet and rocket en**gines for aircraft and missile **propulsion.** Component matching for turbojets; design of ramjet inlets; solid and liquid rocket fuels; rocket components and controls; rocket energy requirements for orbital and interplanetary flight.

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 or consent of instructor. **Application** of probability theory to the analysis of physical systems. Introductory **probability theory and random processes.**

6233* Turbulent Fluid Dynamics. Prerequisite: 5233 or consent of instructor. 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. Steamfunction-vorticity and pressure-velocity simulations of incompressible and compressible flows. Temperature and concentration **solutions.** Applications to various external and internal flow problems.

6423* Motion Programming of Space Mechanisms. Prerequisite: MATH 3013. Advanced techniques for the analysis of two-and three-dimensional mechanisms.

6453* Fluidics. Prerequisites: 5453 and 5463, or consent of instructor. Static and dynamic modeling of fluidic components for sensing, signal processing and transmission and con-

trol. **Component** interconnection and impedance matching problems. Synthesis of pro-**portional, digital and** A-C fluid systems for a wide variety of applications.

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 ELEN 5413 or consent of instructor. Meth-**ods 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. Prerequisite: consent of instructor. General nonlinear problems of elasticity including thermal, dynamic and anisotrophy effects; stresswave **propagation; consideration** of plasticity.

6723* Nonlinear Systems Analysis II. Prerequisite: 5723 or ELEN 5723. Advanced topics of **nonlinear** systems theory selected from the current literature. Topics may include nonli-**near stability theory,** multi-input describing functions, nonlinear feedback control theory, the problem of Lure **and** Popov's criterion and multiparameter pertubation theory.

6813* Advanced Thermodynamics Ii. Prerequisite: 5803. Development of statistical models to predict the behavior of ideal solids and gases. Fundamental treatment of probability, **combinatorial analysis,** statistical mechanics and quantum theory. Comparisons to show the **superiority** of statistical thermodynamics for predicting low temperature behavior.

6843* Convection Heat Transfer. Prerequisite: ENGSC 3233 or consent of instructor. Ad-**vanced convective heat** transfer in laminar and turbulent flows. Free convection, high-velocity heat transfer, liquid metals, boiling, condensation and mass transfer.

6963* Dynamics of Space Flights. Prerequisites: MATH 2613 and consent of instructor. Power requirements and dynamics for flight in space. Development of the laws of Kepler **for orbiting bodies, transfer trajectories between orbits; launch,** ascent and re-entry problems.

MECHANICAL DESIGN TECHNOLOGY (MECDT)

1213 Machine Drafting. Lab 6. Prerequisite: GENT 1153 or equivalent. Detail and assembly drawing of machines.

1843 Descriptive Geometry. Lab 6. The **graphical** analysis of points, lines and planes in space with practical **applications** to engineering working drawings.

2053 Pipe Drafting. Lab 6. Prerequisite: GENT 1153 or equivalent. Design and layout of **piping systems.**

2113 Technical Illustration. Lab 6. Prerequisite: 1214. Pictorial **drawing with applications to industrial production work.**

2743 Electronics Drafting. Lab 3. Prerequisites: GENT 1153 and PHYSC 1214 or equiva-**lent. Conventional preparation of graphical illustrations in the design and construction** of electronic **equipment.**

3003 Dynamics. Prerequisites: GENT 2323 **and** MATH 2373. Plane motion of particles and **rigid bodies. Graphical analysis of four-bar linkages,** cams and gears. Kinetics, work-**energy and impulse-momentum principles.**

3102 (L)Materials Testing. Lab 6. Prerequisite: 3323. Standard test techniques for the determination of the **mechanical** properties of various materials. Testing of structural compo-**nents and structures.**

3152 Structural Fabrication Design. Lab 3. Prerequisites: GENT 1153 and PHYSC 1114. The **application** of standards for detailing and fabrication of structural materials.

3323 Strength of Materials. Prerequisites: GENT 2323 and MATH 2373. 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.

3883 Tool Design. Lab 3. Prerequisites: 1214 and GENT 1222 or consent of instructor. Basic design and development of special tools for processing engineering materials.

4004 Machine Design L Lab 3. Prerequisites: 3323 and MATH 2383. Applications of statics and strength to the design of machine components. Problems of choosing materials, impact and fatigue loading.

4124 Advanced Drafting and Design Problems. Lab 9. Prerequisites: 2113, GENT 2543, 3003 and 4004. Selected problems in drafting and design; kinematics, strength analysis, materials selection and the selection and application of component systems.

4204 Machine Design 11. Lab 3. Prerequisite: 4004. A continuation of 4004 emphasizing the design of machine components such as gears, bearings, fasteners, springs, and weldments.

MECHANICAL POWER TECHNOLOGY (MPT)

1052 Fundamentals of Hydraulics. Prerequisite: MATH 1513. Elementary fluid mechanics. Principles of hydraulic power. Standard hydraulic symbols, fluid power systems, pumps, motors, cylinders and valves.

1105 (L)Elementary Internal Combustion Engines. Lab 4. Spark ignition engines and associated fuel, electric and cooling systems. Laboratory use of hand tools, visual inspection, measurement, service procedures and engine operation.

2113 Power Transmission Systems. Lab 2. Prerequisite: GENT 1052. 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.

2133 Diesel Engines and Injection Systems. Lab 2. Prerequisite: 1105. Compression ignition engines and fuel injection systems. Laboratory practice in inspection, adjustment, timing and testing of fuel injection systems. Diesel and spark ignition compared.

2212 Automotive Systems Analysis. Lab 2. Prerequisite: GENT 1052 or concurrent enrollment. Current suspension and chassis design. Steering angles and their effect on vehicles' stability and tire wear; understeer, oversteer, roll centers, roll angles and weight transfer.

3114 Basic Instrumentation. Lab 4. Prerequisite: PHYSC 1214 or concurrent enrollment. Measurement of time, temperature, flow, pressure and strain.

3124 Thermodynamics of Electrical Power Generation. Lab 3. The process of converting fuel energy to electrical power; steam generation and associated systems. Nuclear and hydro power.

3202 Transportation Problems. Prerequisite: 2133 or consent of instructor. An economic study of the transportation industry; selecting and operating commercial vehicles. Federal and state regulations of commercial transportation. Highway financing.

3322 Fuels and Lubricants. Lab 3. Prerequisite: 1105. Chemical structure; recognized tests and practical applications of petroleum-based fuels and lubricants. Combustion problems in spark ignition and compression ignition engines and auxiliary industrial equipment.

3433 Basic Thermodynamics. Prerequisite: concurrent enrollment in MATH 2373 or consent of instructor. Basic scientific principles of energy and the behavior of substances as related to engines and systems. Gas laws, vapors and engine cycles.cnclurbine Powerplant. Lab 2. Prerequisite: 3433 or consent of instructor. Application and theory of major engine sections including accessories and systems. Student participation in engine disassembly, inspection and operation.

3552 GAS TURBINE POWERPLANT. Lab 2. Prerequisite: 3433 or consent of instructor. Application and theory of major engine sections including accessories and systems. Student participation in engine disassembly, inspection and operation.

4115* Advanced Internal Combustion Engines. Lab 6. Prerequisites: 2133, 3114 and 3433. Advanced internal combustion engine theory; real cycles, mixtures, combustion, balancing and associated engine systems. Laboratory comparisons of engine characteristics; standard test procedures. Student engine modification with retest.

4213 Fluid Power. Lab 2. Prerequisites: GENT 1052, MATH 2373, and PHYSC 1214. Fluid mechanical principles applied to fluid power systems. Design and operation of fluid power components and circuits.

4433 Heat Transfer. Prerequisites: 3433 and MATH 2383 or equivalent. Conduction, convection, radiation, condensation and boiling heat transfer. Analysis and sizing of heat exchangers. Methods of enhancing exchange of heat.

4444 Power Station Technology and Design. Lab 3. Prerequisites: 3124 and 3433. Steam, hydro and internal combustion power plants; technical design, energy balance and economic evaluation.

MECHANIZED AGRICULTURE (MECAG)

1413 Introduction to Engineering in Agriculture. The use of power, machines and engineered systems for agricultural production and processing agricultural products. Engineering aspects of land and water resources development and utilization.

2202 Conservation Surveys and Technology. Lab 2. Use of the farm level; mechanical methods of erosion control including terracing and farm-pond planning.

3133 Components for Horticultural Systems. Prerequisite: MATH 1213. Structures including greenhouses, electrical systems, mechanical systems and irrigation systems for horticultural production.

3152* Electricity In Agriculture. Lab 4. Prerequisite: MATH 1213 or consent of instructor. Electricity applied to the farm and rural home including farmstead distribution and use and National Electric Codr requirements. Laboratory activities include simple circuits, practical wiring, home wiring planning, electric motors, water systems and controls.

3173* Buildings for Agriculture. Lab 2. Prerequisite: MATH 1213 or consent of instructor. 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.

3213 Metal and Woodworking Skills. Lab 3. Machine nomenclature and maintenance, workshop planning, operations including welding, metal working, wood working and framing, and concrete.

3222 Farm Shop Skills. Lab 6. Required of agricultural education majors; open to others if sections are not filled. Subject matter and skills used in teaching farm shop.

3233* Tractor Power Principles. Lab 2. Prerequisite: MATH 1213 or consent of instructor. The principles, operation, performance, maintenance and management of agricultural tractors. Two-stroke and four-stroke cycle gasoline and diesel engines covered. Laboratory activities involve engines, power trains, hydraulic systems, electrical systems and tractor performance.

4200* Topics In Mechanized Agriculture. 1-4 credits, maximum 4. Investigations in specialized areas of mechanized agriculture.

4203* Irrigation Principles. Prerequisite: MATH 1213. Sources, measurement and efficient use of irrigation water. Selection of pumping plants and power units. Layout and management of surface and sprinkler systems.

4220* Advanced Methods in Agricultural Mechanics. 1-6 credits, maximum 6. Prerequisite: 4222 or consent of instructor. Developing agricultural mechanics programs for vocational agriculture and technical schools. Application of agricultural mechanics methods, practices and skills to advanced projects.

4222* Farm Mechanics: Organization and Methods. Lab 4. Prerequisite: 3222. Required of agricultural education majors. Organizing the farm mechanics program and methods used in teaching farm mechanics. Shop skills and project work.

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.

MICROBIOLOGY (MICRO)

2122 Microbiology II. Prerequisite: BISC 1502. Introductory principles of microbiology, including their application to plant and animal disease, soil, air, water, sewage, foods, milk and dairy products. No credit for students with credit in 2124.

2124 (L)Introduction to Microbiology. Lab 4. Prerequisite: one year of chemistry. General principles of microbiology. No credit for students with credit in 2122.

3114 Dairy Microbiology. Lab 6. Prerequisite: 2122 or BISC 1502. Microbiology of milk and milk products.

3124* Cultivation and Properties of Microorganisms. Lab 4. Prerequisites: 2122 or 2124, one semester of organic chemistry. Enrichment, growth and identification of microorganisms.

3133* Advanced Microbiology. Prerequisites: 2122 or 2124 and one semester of organic chemistry. Molecular and genetic approaches to the study of microorganisms.

3134* Pathogenic Microbiology. Lab 3. Prerequisites: 2122 or 2124, and BISC 3013 or a course in biochemistry. Examination of pathogenic bacteria as they relate to humans, other animals, plants and insects.

3143* Medical Mycology. Prerequisite: 2122 or 2124. Examination of fungi as animal pathogens; laboratory techniques used in the identification of human and animal pathogens, differentiation from common contaminants.

3153 Medical Parasitology. Lab 2. Prerequisites: introductory biology and consent of instructor. 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. Same course as VPARA 4113.

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.

3255* Immunology. Lab 4. Prerequisite: 2122 or 2124. Theory and practice of antibody production and testing; phenomena of immunity, tolerance and hypersensitivity.

3264* Industrial Microbiology. Lab 4. Prerequisite: 3124 or consent of instructor. Production of solvents, vitamins, amino acids, antibiotics, flavored products, etc. Biodegradation of industrial wastes, pesticides, and herbicides. Microbial aspects of energy production, including petroleum microbiology.

4000 Honors In Microbiology. 1-4 credits, maximum 10. Prerequisite: permission of Departmental honors committee. Supervised study and research in microbiology.

4112* Microbiological Literature. Prerequisite: 2122 or 2124. The location and use of microbiological literature.

4113* Microbiology of Soil. Lab 6. Prerequisite: 2122 or 2124. Microorganisms of the soil and their relationship to soil fertility.

4123* Virology. Prerequisite: 3124 or BISC 3013 or one course in biochemistry. Structure and composition of animal, plant and bacterial viruses; transmission, infection and host-virus interactions.

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.

4144* Laboratory Techniques. Lab 6. Prerequisites: 3124, one semester of organic chemistry. Theory and current techniques employed in diagnostic and research laboratories.

4213* Immunohematology and Transplantation Immunology. Lab 2. Prerequisite: 3255 or concurrent enrollment. Blood group lymphocyte and histocompatibility antigens, their inheritance and medical importance in blood transfusion, transplantation and disease. Methods of blood group and histocompatibility antigen testing.

4990* Special Problems. 1-4 credits, maximum 4. Prerequisite: consent of instructor. Minor investigations in the field of microbiology.

5000* Thesis or Report. 2-6 credits, maximum 6. Prerequisite: permission of major professor. A student studying for the M.S. degree enrolls in this course for 6 hours credit for the thesis option or 2 hours credit for the report option.

5103* Bioenergetics and Metabolic Pathways. The energetics of metabolic pathways and their regulatory mechanisms.

5114* Advanced Immunology and Immunochemistry. Lab 4. Prerequisite: 3255 or consent of instructor. Recent findings and literature on some specific immunological problems and on advanced immunochemical methods used in immunological research.

5153* Genetics of Microorganisms. Prerequisites: 3124, 3134 or 4113, BISC 3024, and BISC

3013 or BIOCH 3653. Heredity in yeasts, molds, bacteria and viruses with emphasis on recent developments. Biochemical and molecular genetics, nucleic acids as genetic determinants and genetic control of metabolic function.

5160* Seminar. 1 credit, maximum 2. Required of all graduate students majoring in microbiology.

5243* Fungal Metabolism. Prerequisites: one course in biochemistry, consent of instructor. Water relations, transport, overflow metabolism and other aspects of catabolism and biosynthesis in the fungi in relation to fungal problems of growth and differentiation, which are unlike those normally encountered in other organisms.

5990* Special Problems. 1-4 credits, maximum 10. Prerequisite: permission of instructor. Investigations in the field of microbiology.

6000* Thesis. 1-15 credits, maximum 45. Prerequisite: permission 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. 3 credits, maximum 6. Prerequisite: one graduate course in biochemistry. Discussion and evaluation of recent scientific contributions in terms of the living organism.

6143* Microbial Anatomy. Lab 3. Prerequisite: one graduate course in biochemistry or consent of instructor. The chemistry and integrated functioning of microbial structures and macromolecules.

MILITARY SCIENCE (MILSC)

1000 Applied Outdoor Activities I. 1 credit, maximum 2. Prerequisite: concurrent enrollment in a lower-division military science course. Drill and ceremonies (5 hours), plus either: 10 additional hours drill, or participation in two activities conducted on Saturdays (orienteering, rappelling, field exercise).

1111 Introduction to Military Science and Land Navigation. Prerequisite: concurrent enrollment in 1000. The Reserve Officer Training Corps Program, customs and courtesies, service life, benefits of the military and land navigation.

1211 Tactics, Leadership, Orienteering and Marksmanship. Prerequisite: concurrent enrollment in 2000. Small, unit tactics, leadership techniques and principles, marksmanship and orienteering.

1312 Orienteering, Rappelling Hunter Safety. Interpretation of topographic maps and use of the compass, rules and techniques of orienteering, rappelling, outdoor living, equipment selection and hunter safety.

2000 Applied Outdoor Activities II. 1 credit, maximum 2. Prerequisite: concurrent enrollment in a lower-division Military Science course. Either orienteering; rappelling; marksmanship; drill and ceremonies; drill, ceremonies, orienteering and rappelling. Voluntary activities: field exercise, wilderness adventure trip, and orientation trip to Fort Sill. Instruction by arrangement, primarily on Saturdays.

2131 European Military History. Prerequisite: concurrent enrollment in 2000. Non-US warfare from the Renaissance to the present. The development of different professional military tactics (France, England, Germany, Japan) and different styles of leadership as expressed by the great commanders.

2231 Personnel Management and Instructional Techniques. Prerequisite: concurrent enrollment in 1000. Leadership and management. Small-group behavior, ethics and counseling techniques. Methods of preparing and presenting instruction. The Army in support of national objectives.

2330 Adventures in Military History. 1-3 credits, maximum 4. Modular and thematic courses in military history. Theory and practice of historical simulations; history and social function of the martial arts; the Army's role in the frontiers of the US.

3112 The Platoon Leader I. 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. The functional role of the platoon leader with practical work in leadership and decision making, intro-

duction to small-unit tactics in platoon offensive operations. Some labs 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 labs 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. Prerequisites: 3112 and 3223. Staff organization and procedures, in-basket management simulation, military justice.

4222 Leadership and Management. Lab 2. Prerequisites: 3112 and 3223. Obligation and responsibilities of the officer, world change and military implications.

4322 American Military History. Lab 2. Prerequisites: 3112 and 3223. American military heritage from the Colonial period to the present; the Army in the development of the nation. Selected battles and campaigns analyzed with emphasis on leadership.

MUSIC (MUSIC)

0501 Concert and Recital Attendance. Graduation requirement for music degree or certificate candidates.

1001 Percussion Class Lessons.

1011 Piano Class Lessons.

1021 Piano Class Lessons.

1031 Voice Class Lessons.

1041 Voice Class Lessons.

1051 Organ Class Lessons.

1052 String Class Lessons.

1061 Organ Class Lessons.

1062 String Class Lessons.

1072 Woodwind Class Lessons.

1082 Woodwind Class Lessons.

1092 Brass Class Lessons.

1102 Brass Class Lessons.

1110 Plano Lessons. 1-4 credits, maximum 4.

1120 Plano Lessons. 1-4 credits, maximum 4. Prerequisite: 1110.

1130 Voice Lessons. 1-4 credits, maximum 4.

1140 Voice Lessons. 1-4 credits, maximum 4. Prerequisite: 1130.

1150 Organ Lessons. 1-4 credits, maximum 4.

1160 Organ Lessons. 1-4 credits, maximum 4. Prerequisite: 1150.

1170 Violin Lessons. 1-4 credits, maximum 4.

1180 Violin Lessons. 1-4 credits, maximum 4. Prerequisite: 1170.

1190 Viola Lessons. 1-4 credits, maximum 4.

1200 Viola Lessons. 1-4 credits, maximum 4. Prerequisite: 1190.

1210 Violoncello Lessons. 1-4 credits, maximum 4.

1220 Violoncello Lessons. 1-4 credits, maximum 4. Prerequisite: 1210.

1230 String Bass Lessons. 1-4 credits, maximum 4.

1240 String Bass Lessons. 1-4 credits, maximum 4. Prerequisite: 1230.

1250 Flute Lessons. 1-4 credits, maximum 4.

1260 Flute Lessons. 1-4 credits, maximum 4. Prerequisite: 1250.

1270 Oboe Lessons. 1-4 credits, maximum 4.

1280 Oboe Lessons. 1-4 credits, maximum 4. Prerequisite: 1270.

1290 Clarinet Lessons. 1-4 credits, maximum 4.

1300 Clarinet Lessons. 1-4 credits, maximum 4. Prerequisite: 1290.

1310 Saxophone Lessons. 1-4 credits, maximum 4.

1320 Saxophone Lessons. 1-4 credits, maximum 4. Prerequisite: 1310.

1330 Bassoon Lessons. 1-4 credits, maximum 4.

1340 Bassoon Lessons. 1-4 credits, maximum 4. Prerequisite: 1330.

1350 Trumpet Lessons. 1-4 credits, maximum 4.

1360 Trumpet Lessons. 1-4 credits, maximum 4. Prerequisite: 1350.

1370 Horn Lessons. 1-4 credits, maximum 4.

1380 Horn Lessons. 1-4 credits, maximum 4. Prerequisite: 1370.

1390 Trombone Lessons. 1-4 credits, maximum 4.

1400 Trombone Lessons. 1-4 credits, maximum 4. Prerequisite: 1390.

1410 Baritone Lessons. 1-4 credits, maximum 4.

1420 Baritone Lessons. 1-4 credits, maximum 4. Prerequisite: 1410.

1430 Tuba Lessons. 1-4 credits, maximum 4.

1440 Tuba Lessons. 1-4 credits, maximum 4. Prerequisite: 1430.

1450 Percussion Lessons. 1-4 credits, maximum 4.

1460 Percussion Lessons. 1-4 credits, maximum 4. Prerequisite: 1450.

1512 Music Literature. Prerequisite: music major status. Music of the Baroque, Classical and Romantic periods, with emphasis on principles and style analysis.

1521 Music Literature. Prerequisite: music major status. Music of the Romantic and Contemporary periods, with emphasis on principles and style analysis.

1533 Theory of Music I. Prerequisite: Music 1592 or successful completion of Music Theory Placement Examination. Choral and instrumental writing correlated with sight singing, melodic and harmonic dictation and keyboard skills.

1543 Theory of Music II. Prerequisite: 1533. A continuation of 1533.

1592 Introduction to Reading and Writing Music. Scales, keys, intervals and triads with introductory sight singing, dictation and keyboard skills. No credit for students with prior credit in 2672.

2110 Piano Lessons. 1-4 credits, maximum 4. Prerequisite: 1120.

2120 Piano Lessons. 1-4 credits, maximum 4. Prerequisite: 2110.

2130 Voice Lessons. 1-4 credits, maximum 4. Prerequisite: 1140.

2140 Voice Lessons. 1-4 credits, maximum 4. Prerequisite: 2130.

2150 Organ Lessons. 1-4 credits, maximum 4. Prerequisite: 1160.

2160 Organ Lessons. 1-4 credits, maximum 4. Prerequisite: 2150.

2170 Violin Lessons. 1-4 credits, maximum 4. Prerequisite: 1180.

2180 Violin Lessons. 1-4 credits, maximum 4. Prerequisite: 2170.

2190 Viola Lessons. 1-4 credits, maximum 4. Prerequisite: 1200.

2200 Viola Lessons. 1-4 credits, maximum 4. Prerequisite: 2190.

2210 Violoncello Lessons. 1-4 credits, maximum 4. Prerequisite: 1220.

2220 Violoncello Lessons. 1-4 credits, maximum 4. Prerequisite: 2210.

2230 String Bass Lessons. 1-4 credits, maximum 4. Prerequisite: 1240.

2240 String Bass Lessons. 1-4 credits, maximum 4. Prerequisite: 2230.

2250 Flute Lessons. 1-4 credits, maximum 4. Prerequisite: 1260.

2260 Flute Lessons. 1-4 credits, maximum 4. Prerequisite: 2250.

2270 Oboe Lessons. 1-4 credits, maximum 4. Prerequisite: 1280.

2280 Oboe Lessons. 1-4 credits, maximum 4. Prerequisite: 2270.

2290 Clarinet Lessons. 1-4 credits, maximum 4. Prerequisite: 1300.

2300 Clarinet Lessons. 1-4 credits, maximum 4. Prerequisite: 2290.

2310 Saxophone Lessons. 1-4 credits, maximum 4. Prerequisite: 1320.

2320 Saxophone Lessons. 1-4 credits, maximum 4. Prerequisite: 2310.

2330 Bassoon lessons. 1-4 credits, maximum 4. Prerequisite: 1340.

2340 Bassoon Lessons. 1-4 credits, maximum 4. Prerequisite: 2330.

2350 Trumpet Lessons. 1-4 credits, maximum 4. Prerequisite: 1360.

2360 Trumpet Lessons. 1-4 credits, maximum 4. Prerequisite: 2350.

2370 Horn Lessons. 1-4 credits, maximum 4. Prerequisite: 1380.

2380 Horn Lessons. 1-4 credits, maximum 4. Prerequisite: 2370.

2390 Trombone Lessons. 1-4 credits, maximum 4. Prerequisite: 1400.

2400 Trombone Lessons. 1-4 credits, maximum 4. Prerequisite: 2390.

2410 Baritone Lessons. 1-4 credits, maximum 4. Prerequisite: 1420.

2420 Baritone Lessons. 1-4 credits, maximum 4. Prerequisite: 2410.

2430 Tuba Lessons. 1-4 credits, maximum 4. Prerequisite: 1440.

2440 Tuba Lessons. 1-4 credits, maximum 4. Prerequisite: 2430.

2450 Percussion Lessons. 1-4 credits, maximum 4. Prerequisite: 1460.

2460 Percussion Lessons. 1-4 credits, maximum 4. Prerequisite: 2450.

2554 Theory of Music III. Prerequisite: 1543. Choral and instrumental writing correlated with sight singing, melodic and harmonic dictation and keyboard skills.

2564 Theory of Music IV. Prerequisite: 2554. A continuation of 2554.

2573 APPRECIATION OF MUSIC I. The art of listening to music for majors other than music. Discussion of instruments, musical forms and styles and major composers from the 16th Century to the present. No prior musical experience is required.

2580 (H)Music in Life: Selected Topics. 2-6 credits, maximum 6. Acquaints general University students with the forms and composers of 20th Century art music, jazz, and music in the United States in three separate sections.

2600 Plano Ensemble and Chamber Music. 1 credit, maximum 8. Two pianos, 4 to 8 hands; music theatre, and combinations of piano, strings, voices, brass, woodwind and percussion instruments.

2610 Band I. 1-2 credits, maximum 6.

2620 Symphony Orchestra I. 1-2 credits, maximum 6.

2630 University Choral Ensembles I. 1-4 credits, maximum 6.

2672 Music Education. For certificate/licensure in elementary education. Fundamentals of music, sight singing 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.

3110 Piano Lessons. 1-4 credits, maximum 4. Prerequisite: 2120.

3120 Plano Lessons. 1-4 credits, maximum 4. Prerequisite: 3110.

3130 Voice Lessons. 1-4 credits, maximum 4. Prerequisite: 2140.

3140 Voice Lessons. 1-4 credits, maximum 4. Prerequisite: 3130.

3150 Organ Lessons. 1-4 credits, maximum 4. Prerequisite: 2160.

3160 Organ Lessons. 1-4 credits, maximum 4. Prerequisite: 3150.

3170 Violin Lessons. 1-4 credits, maximum 4. Prerequisite: 2180.

3180 Violin Lessons. 1-4 credits, maximum 4. Prerequisite: 3170.

3190 Viola Lessons. 1-4 credits, maximum 4. Prerequisite: 2200.

3200 Viola Lessons. 1-4 credits, maximum 4. Prerequisite: 3190.

3210 Violoncello Lessons. 1-4 credits, maximum 4. Prerequisite: 2220.

3220 Violoncello Lessons. 1-4 credits, maximum 4. Prerequisite: 3210.

3230 String Bass Lessons. 1-4 credits, maximum 4. Prerequisite: 2240.

3240 String Bass Lessons. 1-4 credits, maximum 4. Prerequisite: 3230.

3250 Flute Lessons. 1-4 credits, maximum 4. Prerequisite: 2260.

3260 Flute Lessons. 1-4 credits, maximum 4. Prerequisite: 3250.

3270 Oboe Lessons. 1-4 credits, maximum 4. Prerequisite: 2280.

3280 Oboe Lessons. 1-4 credits, maximum 4. Prerequisite: 3270.

3290 Clarinet Lessons. 1-4 credits, maximum 4. Prerequisite: 2300.

3300 Clarinet Lessons. 1-4 credits, maximum 4. Prerequisite: 3290.

3310 Saxophone Lessons. 1-4 credits, maximum 4. Prerequisite: 2320.

3320 Saxophone Lessons. 1-4 credits, maximum 4. Prerequisite: 3310.

3330 Bassoon Lessons. 1-4 credits, maximum 4. Prerequisite: 2340.

3340 Bassoon Lessons. 1-4 credits, maximum 4. Prerequisite: 3330.

3350 Trumpet Lessons. 1-4 credits, maximum 4. Prerequisite: 2360.

3360 Trumpet Lessons. 1-4 credits, maximum 4. Prerequisite: 3350.

3370 Horn Lessons. 1-4 credits, maximum 4. Prerequisite: 2380.

3380 Horn Lessons. 1-4 credits, maximum 4. Prerequisite: 3370.

3390 Trombone Lessons. 1-4 credits, maximum 4. Prerequisite: 2400.

3400 Trombone Lessons. 1-4 credits, maximum 4. Prerequisite: 3390.

3410 Baritone Lessons. 1-4 credits, maximum 4. Prerequisite: 2420.

3420 Baritone Lessons. 1-4 credits, maximum 4. Prerequisite: 2410.

3430 Tuba Lessons. 1-4 credits, maximum 4. Prerequisite: 2440.

3440 Tuba Lessons. 1-4 credits, maximum 4. Prerequisite: 3430.

3450 Percussion Lessons. 1-4 credits, maximum 4. Prerequisite: 2460.

3460 Percussion Lessons. 1-4 credits, maximum 4. Prerequisite: 3450.

3501 Observation and Student Teaching In the Public Schools. Lab 1. Prerequisite: admission to student teaching program. Observation and discussion of the materials and teaching of music in public schools.

3610 Band II. Lab 5. 1-2 credits, maximum 6. Prerequisite: 4 hours of 2610.

3620 Symphony Orchestra II. Lab 4. 1-2 credits, maximum 6.

3630 University Choral Ensembles II. 1-4 credits, maximum 6. Prerequisite: 4 hours of 2630.

3711 Conducting. Principles of conducting choral and instrumental groups.

3721 Conducting. Prerequisite: 3711. Interpretation of choral, band and orchestra scores.

3733 Music Education Methods K-6. Methods of teaching music in grades K-6.

3743 Foundations of Music Education. Interdisciplinary approach including aspects of philosophy, aesthetics, sociology and psychology as they are applied in music in post-elementary public schools.

3752 (I)History of Music (To 1750). Prerequisite: 1512 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.

3762 (I)History of Music (From 1750). Prerequisite: 3752 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. Prerequisite: 2564. Analysis and application of contrapuntal techniques of the 18th Century.

3782 Form and Analysis. Prerequisite: 2564. Simple song forms, development forms, formal and harmonic analysis.

3810* Problems In Musical Composition. 1-2 credits, maximum 2. Prerequisite: consent of instructor. Elementary problems in musical composition.

3840* Problems in Plano Teaching and Materials. 1-2 credits, maximum 2. Teaching of piano; and materials for piano.

4021 Piano Class Lessons. Prerequisite: senior music major status.

4032 Voice Class lessons. Prerequisite: senior music major status.

4110 Piano Lessons. 1-4 credits, maximum 4. Prerequisite: 3120.

4120 Piano Lessons. 1-8 credits, maximum 8. Prerequisite: 4110.

4130 Voice Lessons. 1-4 credits, maximum 4. Prerequisite: 3140.

4140 Voice Lessons. 1-8 credits, maximum 8. Prerequisite: 4130.

4150 Organ Lessons. 1-4 credits, maximum 4. Prerequisite: 3160.

4160 Organ Lessons. 1-8 credits, maximum 8. Prerequisite: 4150.

4170 Violin Lessons. 1-4 credits, maximum 4. Prerequisite: 3180.

4180 Violin Lessons. 1-8 credits, maximum 8. Prerequisite: 4170.

4190 Viola Lessons. 1-4 credits, maximum 4. Prerequisite: 3200.

4200 Viola Lessons. 1-8 credits, maximum 8. Prerequisite: 4190.

4210 Violoncello Lessons. 1-4 credits, maximum 4. Prerequisite: 3220.

4220 Violoncello Lessons. 1-8 credits, maximum 8. Prerequisite: 4210.

4230 String Bass Lessons. 1-4 credits, maximum 4. Prerequisite: 3240.

4240 String Bass Lessons. 1-8 credits, maximum 8. Prerequisite: 4230.

4250 Flute Lessons. 1-4 credits, maximum 4. Prerequisite: 3260.

4260 Flute Lessons. 1-8 credits, maximum 8. Prerequisite: 4250.

4270 Oboe Lessons. 1-4 credits, maximum 4. Prerequisite: 3280.

4280 Oboe Lessons. 1-8 credits, maximum 8. Prerequisite: 4270.

4290 Clarinet Lessons. 1-4 credits, maximum 4. Prerequisite: 3300.

4300 Clarinet Lessons. 1-8 credits, maximum 8. Prerequisite: 4290.

4310 Saxophone Lessons. 1-4 credits, maximum 4. Prerequisite: 3320.

4320 Saxophone Lessons. 1-8 credits, maximum 8. Prerequisite: 4310.

4330 Bassoon Lessons. 1-4 credits, maximum 4. Prerequisite: 3340.

4340 Bassoon Lessons. 1-8 credits, maximum 8. Prerequisite: 4330.

4350 Trumpet Lessons. 1-4 credits, maximum 4. Prerequisite: 3360.

4360 Trumpet Lessons. 1-8 credits, maximum 8. Prerequisite: 4350.

4370 Horn Lessons. 1-4 credits, maximum 4. Prerequisite: 3380.

4380 Horn Lessons. 1-8 credits, maximum 8. Prerequisite: 4370.

4390 Trombone Lessons. 1-4 credits, maximum 4. Prerequisite: 3400.

4400 Trombone Lessons. 1-8 credits, maximum 8. Prerequisite: 4390.

4410 Baritone Lessons. 1-4 credits, maximum 4. Prerequisite: 3420.

4420 Baritone Lessons. 1-8 credits, maximum 8. Prerequisite: 4410.

4430 Tuba Lessons. 1-4 credits, maximum 4. Prerequisite: 3440.

4440 Tuba Lessons. 1-8 credits, maximum 8. Prerequisite: 4430.

4450 Percussion Lessons. 1-4 credits, maximum 4. Prerequisite: 3460.

4460 Percussion Lessons. 1-8 credits, maximum 8. Prerequisite: 4450.

4480* Lessons In Applied Music (Minor Field(s)). 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.

4890* Problems in Vocal Pedagogy and Repertoire. 1-2 credits, maximum 2. Methods of teaching voice; and vocal repertoire.

4901 Senior Recital. Prerequisite: senior standing and permission of major applied music teacher.

4913 Orchestration and Arranging. Prerequisite: junior or senior standing as a music major. **Arranging** for string, woodwind, brass and **percussion** instruments **and** for voices.

4946 Student Teaching in the Public School Music. Prerequisite: 3501.

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: 2564, 3762. Melodic, harmonic and rhythmic techniques in twentieth century music.

4990* Colloquium In Music Education. 1-3 credits, maximum 8. Short-term area studies in elementary and secondary school vocal and instrumental music and materials.

NATURAL SCIENCE (NATSC)

1114 (N)Sclence Perspective I. Nature, processes and integrating principles of **natural** science. **Modular** format permitting students to individualize learning experiences. For the **nonmajor.**

1214 (N)Sclence Perspective 11. Integrating principles, applications and decision-making involving natural science. Modular format permitting students to individualize learning experiences. For the nonmajor.

3220 Special Studies In the Natural Sciences. 1-4 credits, maximum 8. Concepts in areas of the **natural** sciences. For teachers and other adults who have not already **developed** a proficiency in the subject.

3434 Earth Science. Fundamental principles and concepts of earth science. The earth and its formation; **ancient plants and** animals; eras of the earth's **development;** the **earth and** the universe; rocks **and** minerals; agents and effects of erosion, **earthquakes, volcanoes,** glaciers, weathering, oceans **and** rivers; the atmospheres.

3544 Space Science. Fundamental principles and concepts concerning the universe **and man's understanding** of it; the sun **and solar** system; movements of heavenly **bodies;** meaning **and** extent of space; problems of space travel; life in outer space rocketry; time concept.

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.

OCCUPATIONAL AND ADULT EDUCATION (OAED)

3012* Analysis and Assessment of Training Needs. Prerequisite: 3113 or TECED 3103 or TIED 3203. **Techniques** and procedures used in determining needs for, and content of, **instructional** programs. Emphasizes needs assessment techniques and methods for identi**fying 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 3112.

3119* Foundations of Occupational Education. Characteristics of **occupational** education **and** its **development,** role **and** function in **a** modern **educational** system. Economic **and sociological foundations** of **occupationally** oriented programs plus specific **information** on serving students with multicultural **backgrounds** and specific needs.

3149* Career Education: An Introduction. Introduces current and **prospective** teachers to the **fundamental concepts and operational** practices of career education. Historical de**velopment, needs assessment, goals, implementation strategies, evaluation, developmental concepts, curriculum planning and articulation.**

3901 Professional Observation in Occupational Education. Lab 1. **Prerequisite: Introductory course. Observation of instructional delivery and support systems, institutional management, and support activities related to the area of teacher preparation.**

4010* Occupational and Adult Education Workshop. 1-3 credits, maximum 5. **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. Prerequisites: 3113 and IAED 3202 or TIED 3203 or TECED 3103. Applications of teaching and learning principles. Emphasizes the wide variety of 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 teaching situations. No credit for students with credit in TIED 4103.

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/instructional evaluation.

4470 Teaching Practicum in Occupational Education. 1-6 credits, maximum 6. Organized teaching experiences under the guidance of a local school cooperating teacher and a University teacher educator. Participant is assigned to a cooperating teacher and given **responsibility** for planning, implementing and evaluating the classroom and laboratory **or shop.**

5000* Master's Thesis or Report. 2-6 credits, maximum 6. Students studying for a master's degree and writing a report enroll in this course for two credit hours. Enrollment is for 4-6 credit hours if a thesis is written.

5010* Seminar in Occupational and Adult Education. 1-3 credits, maximum 6. Graduate student seminars focusing on current and critical issues and common problems relevant to **occupational** and adult education.

5112* Program Evaluation In Occupational and Adult Education. Prerequisite: graduate standing with **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.

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.**

5153* Curriculum Planning In Occupational and Adult Education. Prerequisite: graduate standing. 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. No credit for students with credit in TECED 5223.

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 critques 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.

5222* Needs Assessment In Occupational and Adult Education. Prerequisite: consent of instructor. Techniques and procedures for designing and conducting surveys to determine human resources development needs.

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 which influence and impact upon adult and **continuing** education programs.

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 In Occupational and Adult Education. 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: graduate standing and 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. Prerequisite: consent of instructor. Technical developments in specialized occupational areas examined and analyzed for educational curriculum and program implications.

5533* Manpower Analysis in Human Resources Development. Prerequisite: graduate standing. Introduction to manpower analysis and human resources development. Recruitment, training, motivation and utilization of human resources both within employing units and throughout the industry. Application of basic concepts, data, tools and techniques of analysis to selected programs for human resources development. Same course as ECON 5533.

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 in Occupational and Adult Education. 1-3 credits, maximum 8. Professional workshops of various topics and lengths. Each workshop designed to meet unique or special needs of individuals concerned with occupational and adult education. Same course as ABSED 5720 and CIED 5720.

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.

6520* Seminar in Manpower Analysis and Human Resources Development. 1-2 credits, maximum 8. Prerequisite: graduate standing. Problems and issues in manpower and human resources development research.

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.

OFFICE MANAGEMENT (OFFMG)

1102 Basic Typewriting. Lab 2. For students with no previous instruction in typewriting and those who need a complete review of the keyboard. Emphasis on mastery of the keyboard, correct techniques, speed, accuracy and some personal applications. Students who have had one year of high school typewriting should enroll in 2313. Course cannot be counted for credit in meeting certificate or degree requirements in the College of Business Administration.

1213 Principles of Shorthand. For students who have had no previous instruction in shorthand. Reading fluency, controlled writing of shorthand characters in context and automatization of high-frequency shorthand words and phrases; pretranscriptit n study of common transcription problems. Gregg and Century 21 shorthand systems taught in separate sections. Students who have had one year of high school shorthand or one semester of college shorthand should enroll in 2223.

2223 Shorthand Theory and Speed Development Lab 2. Prerequisites: 1213 or equivalent and 1102 or equivalent. Speed building through application of shorthand theory in taking unfamiliar dictation; shorthand and typewriting applied in initial transcription activities.

2313 Production Typewriting. Lab 2. Prerequisites: 1102 or equivalent. Continued skill development in correct techniques, speed and accuracy with major emphasis on the application of skill.

2334 Dictation-Transcription. Lab **4.** Prerequisites: 2223 or equivalent and 2313 or equivalent. Application of shorthand theory, English usage and rules of punctuation, capitaliza-

Lion and spelling to the transcription of business letters; development of the ability to handle the terminology of business, government and selected professions.

2412 Records Management. The creation, classification, retention and disposal of records. Filing systems and equipment with emphasis on efficient storage and retrieval.

2630 Office Appliances. 1-3 credits, maximum 3. Lab 2. Prerequisites: 2313 or equivalent and 24 semester credit hours. Duplicating machines, transcribing machines, adding machines, printing and rotary calculators, electronic calculators and key punch operation.

3523 Office Problems in Typewriting. Lab 2. Prerequisites: 2313 or equivalent. Problems in office situations requiring application of typewriting knowledge and skills. **Emphasis** on **quality work at high speeds.**

3753 Executive Secretarial Transcription. Lab 2. Prerequisites: 2234 or equivalent and 3523 (or concurrent enrollment). Transcription of executive-level dictation with exacting **standards** covering English usage, vocabulary, proofreading and accuracy and speed of transcription.

3863 Secretarial Policies and Procedures. Prerequisites: 2334 and 30 credit hours. Theory of and applied practice in performing secretarial/managerial operations. Human relations in business as well as decision making and problem solving.

4103* Principles of Office Management. Prerequisite: 50 credit hours. The theory of planning and directing the functions of business and professional offices.

PETROLEUM TECHNOLOGY (PET)

1113 Introduction to Petroleum Industry. Lab 3. Exploration, drilling, production, **transportation and marketing.**

1234 Petroleum Fluid Properties. Lab 3. Prerequisite: CHEM 1314 or equivalent. Chemical and physical properties of petroleum, petroleum products, natural gas, coal and drilling fluids. Introduction to reservoir engineering.

2114 Petroleum Drilling Practices. Lab 3. Prerequisites: 1234 and GEOL 1124. Well drilling systems and operational techniques, mud system design, selection and design of drilling rig components, drilling stem testing, electrical and miscellaneous well logging and interpretation, casting design and cementing practices.

2333 Basic Petroleum Production. Lab 2. Prerequisites: 1234 and PHYSC 1114. Original completion of oil and gas wells. Design, sizing and selection of production equipment. Performance and interpretation basic testing connected with oil and gas production. Solutions to routine production problems.

2234 Petroleum Industry Pipeline Transportation and Storage. Lab 3. Prerequisite: 1234 **and** MATH 2373. Sizing, construction, operation and maintenance of petroleum and gas pipeline transportation and storage systems. Liquid, gas and two-phase systems. Pumps and compressors. Corrosion control.

3234 Petroleum and Natural Gas Processing Fundamentals. Lab 3. Prerequisites: 1234 and 2234. 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 3. Prerequisites: 3234 and COMSC 2113. Petroleum and natural gas operations are studied qualitatively and **quantitatively.** Distillation, absorption, dehydration, sweetening, refinery processes, instrumentation and controls.

4122 Advanced Petroleum Problems. Lab 3. Prerequisite: 3454. Individually selected topics in advanced petroleum drilling, production (primary, secondary or tertiary), recovery, transportation and storage.

4223 Petroleum Reservoir Engineering. Lab 3. Prerequisites: 1234, MATH 2383 and COMSC 2113. 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, 4223. Remedial and workpower operations on producting oil and gas wells. Workover methods; planning of recompletions in new horizons. Build-up and draw-down tests on producing and injection wells. Enhanced recovery methods and equipment.

PHILOSOPHY (PHILO)

1213 (H)Phllosophles of Life. Introductory ethics and social **philosophy. Moral decision-making, the good life,** social values, freedom and responsibility.

1313 (A)Logic and Critical Thinking. Principles of correct reasoning. Logic **and language, types of argumentation and detection of fallacies.**

2113 (H)Introduction to Philosophy. Selected philosophical problems: the nature of reality, knowledge, value, social ideals and religion.

2303 (A)Principles of Symbolic Logic. Symbolic analysis and calculus of **propositions.** Ap**plications in various fields. Nature of axiom systems.**

3113* (H,I)Anclent and Medieval Philosophy. Main systems of Western thought from the Greeks to 15th Century Europe. Emphasis on Plato, Aristotle, Augistine and Aquinas.

3213* (H,I)Modern Philosophy. Major philosophers and problems in Western **thought** from the 16th through the 19th Century. Emphasis on Descartes, Hume and Kant.

3300 (H)Phllosophy and the Quality of Life. 2-4 credits, maximum 6. Prerequisite: 1213 or 2113. 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.

3413* (H)Ethics. Contemporary and classical **views on the nature of moral judgements, moral value, relativity and objectivity, freedom and responsibility.**

3513* (H,I)Social Philosophy. Major social thinkers and contemporary issues. Social authori**ty, human rights, political forms and justice. Emphasis on Aristotle, Locke, Mill and Marx.**

3613* (H)Philosophy of Religion. Nature of religion, religious experience and religious language. God-concepts, theistic arguments, God and evil, God and immortality.

3713* (H)Philosophy of Education. Traditional and contemporary American educational theories. Educational conservatism, humanism in education, moral education, vocationalism and radical reform movements.

3813* (H)Recent American Philosophy. Dominant trends in American **philosophy during the last 100 years, with emphasis on pragmatism.**

3833* (H)Ethical Issues in Biology and Medicine. Moral problems brought about by recent **developments** in scientific research and medical technology. Abortion, euthanasia, genetic engineering, and human experimentation. Same course as REL 3833.

3913* (H,I)Exlstentialism. Selected writings and themes in the development of existentialism and related intellectual movements. Subjectivity, phenomenological description, hermeneutics, freedom and value; and such writers as Kierkegaard, Nietzsche, Heidegger, Sartre, Marcel and Buber.

3923* (H)Contemporary Issues in Philosophy. Selected current controversies and recent trends in Anglo-American **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.**

4113* (H)Philosophy of Ad and Literature. Nature of aesthetic objects and experiences; form, meaning and value in the arts; the function of art in society; criteria of criticism of the arts.

4313* (H)Philosophy of Mind. Problems in **philosophical psychology.** Mind and body, freedom and determinism, personal identity and survival, self-knowledge, analysis of mental concepts.

4453* (H)Philosophy In Literature. Selected literary works examined for philosophical ideas and themes. Attention to the interrelation of form and content. Thematic approach.

4613* (H,A)Sclentlflc Method. Fundamentals of scientific explanation, including nature of evidence, definitions, classification, probability and models.

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.

4990* Special Studies In Philosophy. 1-3 credits, maximum 10. Selected philosophical topics or works.

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, religions 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)

1710 Team Sports I. 1-2 credits, maximum 2. Lab 2. Theory and practice of field hockey, soccer, speedball and volleyball; analysis and practice of skills; basic rules and strategy.

1720 Team Sports II. 1-2 credits, maximum 2. Lab 2. Theory and practice of basketball and softball; analysis and practice of skills; basic rules and strategy.

1730 Individual Sports I. 1-2 credits, maximum 2. Lab 2. Theory and practice of tennis and badminton; analysis and practice of skills; basic rules and strategy.

1740 Individual Sports II. 1-2 credits, maximum 2. Lab 2. Theory and practice of gymnastics and track and field; analysis and practice of skills; basic rules and strategy.

1755 Sport and Movement Foundations. Lab 2. Basic movement principles, scientific principles, historical and philosophical foundations of physical education and career opportunities.

1765 Sports and Movement Foundations II. Lab 4. Basic concepts of movement and sports skills. Theory and practice in the understanding of perceptual, intellectual and motor functioning through the use of creative movement.

2052 Sports Officiating. Lab 1. Current rules and techniques. Students who perform satisfactorily receive official ratings.

2712 Creative Movement for Pre-School and Primary Age Children. Lab 2. Movement activities to enhance: conceptual development of pre-school and primary age children; understanding basic human movement patterns; understanding of the interaction of perceptual, intellectual and motor functioning.

3722 Methods and Materials In the Dance I. Prerequisite: 60 credit hours or 45 hours with a GPA of 3.25, including LEIS 2332. Methods and techniques necessary for teaching folk, square and social dance.

3763 Physical Education for Elementary Age Children. Lab 2. Prerequisites: 2712, CIED 2450 (2 hours), FRCD 3303, ABSED 3113, ABSED 4052. Physical education and its place in the educational system. Programming for children from nursery/preschool through grade six. Methods of teaching children activities and ways to enhance conceptual development of movement principles and motor functioning.

3773 Methods and Techniques of Teaching Sports. Lab 2. Prerequisites: 60 credit hours or 45 hours with a GPA of 3.25, all activity proficiencies and HLTH 2654. Mechanical principles, skill analysis, evaluation techniques, problem solving method of teaching, practical experience in teaching, test construction, lesson and unit planning. Applications to typical and atypical students.

3822 Coaching Wrestling.

3832 Coaching Track and Field.

4712 Methods In Physical Education for Elementary Teachers. Prerequisite: 60 credit hours, or 45 hours with a GPA of 3.25, including 3762.

4723* Tests and Measurement In Health and Physical Education. Evaluation techniques commonly **used** by the physical education teacher in the public schools to measure knowledge, attitudes, sports skills and physical fitness.

4733* Organization and Administration of Health and Physical Education.

4742 Methods and Materials In the Dance II. Prerequisite: 60 credit hours, or 45 **hours** with **a** GPA of 3.25, including LEIS 2312 or equivalent. Techniques necessary for teaching **modern dance; developing compositions and choreographic techniques.**

4753* Movement Activities for the Developmentally Disabled. Nature of mental retardation and perceptual-motor handicaps; characteristics of children with learning disabilities and with mental retardation; selection of appropriate gross motor activities for the **TMR, EMR, and** CDL; methods of teaching.

4793* Adapted Physical Education. Lab 2. Prerequisites: 60 credit hours, or 45 hours with a GPA of 3.25, including 2712, 3762, HLTH 2654 and PHSIO 3113. 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.

4842 Coaching Football.

4852 Coaching Basketball.

4902 Athletic Therapy Modalities. Lab 1. Prerequisite: 60 credit hours, or 45 hours with a GPA of 3.25, including 4992. Theory and practical application of commonly used therapeutic devices used in training rooms.

4992 Strength, Conditioning, and Rehabilitation. Lab 1. Prerequisites: 60 credit hours, or 45 hours with a GPA of 3.25, including 4793, HLTH 2654. Scientific methods in conditioning athletes and rehabilitation of injured athletes. Practical rehabilitation under the direct supervision of the OSU medical faculty.

PHYSICS (PHYSC)

1014 (N)Descrlptlve Physics. For students who wish only 4 semester hours of physics. May not be substituted for later courses in physics.

1114 (N,L)General Physics. Lab 2. Prerequisite: MATH 1213 or equivalent. Physics for liberal arts students; mechanics, heat and sound.

1214 (N,L)General Physics. Lab 2. Prerequisite: 1114. Continuation of 1114; electricity, magnetism, light and modern physics.

2014 (L)General Physics. Lab 2. Prerequisite: Calculus or concurrent enrollment. For physics majors and engineering students. Mechanics, heat and sound.

2114 (L)General Physics. Lab 2. Prerequisite: 2014 or equivalent. Continuation of 2014. Electricity, magnetism and light.

2413 Electronics. Prerequisite: 2114 or consent of instructor. AC circuits, vacuum tube and transistor amplifiers, oscillators and power supplies. Pulse and digital circuits.

2520 (L)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 2613 or concurrent enrollment. Mechanics of particles, systems of particles and rigid bodies.

3053* Celestial Mechanics. Prerequisite: MATH 2613. 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.

3113* Heat. Prerequisites: 1214 or 2114, and calculus. Thermometry, heat transfer, elementary theory of specific heat and the three laws of thermodynamics.

3213 Optics. Prerequisite: 1214 or 2114. Geometrical optics; illumination and photometry; interference, diffraction, dispersion, absorption and polarization of light.

3313* Modern Physics for Engineers. Prerequisite: 2114 or equivalent. Emphasis on nuclear, molecular and solid state physics with engineering applications.

3320* (L)Optics Laboratory. 1-3 credits, maximum 3. Lab 3. Prerequisite: 3213, concurrent

enrollment, or consent of instructor. Lens systems, lens aberrations, prism dispersion and diffraction grating; use of lasers, spectrometers, interferometers and spectrophotometers; analysis and application of polarized light.

3413* Mechanics II. Prerequisite: 3013. Coupled oscillators, propagation of waves in discrete and continuous media, mechanics of discrete and continuous media and acoustics.

3513* Mathematical Physics. Prerequisites: 1214 or 2114, and MATH 2365. Physical applications of vectors, vector calculus and differential equations, Fourier analysis. Orbit geometry, coordinate systems and transformation of coordinates. Matrices and determinants.

3522* (L)Radioactivity and Nuclear Physics Laboratory. Lab 6. Prerequisite: 3613 or 4213 or concurrent enrollment, or consent of instructor. Basic measurement techniques in nuclear physics.

3613* Radioactivity and Nuclear Physics. Prerequisite: 3313. Natural and artificial radioactivity, decay laws; absorption, detection and measurement of radiations; nuclear transformations.

3620 (L)Atomlc Physics Laboratory.1-3 credits, maximum 3. Lab 3-9. Prerequisite: 3313 or concurrent enrollment. Exercises in photo electricity and thermionic emission; determination of elm; high vacuum technique; discharge through gases; ionization and radiation potentials.

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 2613, or their equivalents. Electrostatic fields, magnetic fields of steady currents, induced EMFs, Maxwell's equations and introduction to electromagnetic wave theory. Vector analysis used.

4213* Introduction to Nuclear Physics. Prerequisites: 8 hours of physics and 8 hours of chemistry. For nonphysics majors. Fundamentals of nuclear physics with applications to chemistry, engineering and biology.

4263* Introduction to Solid State Physics. Prerequisite: consent of instructor. Structure, specific heat, dielectric properties, lattice vibrations, free electron theory, band structure and superconductivity of solids.

4313* Biophysics. Prerequisites: 1214 or 2114, CHEM 3015, and BISC 1402, 1502, or 1602, or consent of instructor. 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. Same course as BISC 4313.

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.

4513* Introductory Quantum Mechanics. Prerequisite: 3413 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, servomechanisms, operational amplifiers, solid state switching devices, measurement and control circuits.

4712* (L)Advanced Physics Laboratory I. Lab 3. Prerequisite: 3013 or consent of instructor. Selected experiments in electricity, X-rays, mechanics, acoustics, heat, wave analysis, nuclear physics and other fields with critical analysis of results.

4812* (L)Advanced Physics Laboratory II. Prerequisite: 4712 or consent of instructor. Continuation of 4712 with experiments of an advanced nature.

5000* M.S. Thesis Research. 1-9 credits, maximum 9. Prerequisite: consent of major professor.

5110* Seminar. 1-3 credits, maximum 6. Prerequisite: graduate standing in physics. Special topics in physics.

5113* Thermodynamics and Kinetic Theory. Prerequisite: 3113. Fundamental concepts of thermodynamics, first, second and third laws, thermodynamic potentials and relation-

ships. Maxwellian velocity distribution; ideal gas law; Van der Waals law; transport phenomena; Boltzmann H-theorem and thermodynamic equilibrium.

5133* Theory of Spectra. Prerequisite: consent of instructor. Line spectra, hyperfine structure, Lamb shift, band spectra, NMR spectra and ESR spectra.

5213* Statistical Mechanics. Prerequisite: 5113 or consent of instructor. Maxwell-Boltzmann distribution; partition function and its connection with classical thermodynamics; phase space and the Liouville theorem; Planck's radiation law; quantum statistics; ensemble theory; **application** to real gases, specific heats, paramagnetism, condensation phenomena and Wiedmann-Franz law.

5263* Nuclear Physics. Prerequisites: 5453 and 5613. Nuclear forces, structure of nuclei and **nuclear models.**

5313* Electromagnetic Theory. Prerequisite: 5453 or consent of instructor. Boundary value problems; electromagnetic waves, electromagnetic energy and momentum, retarded potentials and radiation theory; applications to waveguides; relativistic transformation of Maxwell's equations.

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 Bioenergetics. Prerequisites: 1214 and BISC 3013 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 **and BISC** 5353.

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 or consent of instructor. Introduction to the various methods and techniques used in theoretical physics.

5513* Selected Topics In Acoustics. Prerequisite: 3413, 5453 or consent of instructor. Radiation, transmission and absorption of acoustic waves, acoustic impedance; high-intensity effects; ultrasonics.

5550* Colloquium. Prerequisite: graduate standing in physics. Participation in colloquia. This course carries no credit.

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 or consent of instructor. 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.

5812* Nuclear and Radiation Physics. Prerequisites: 3522 and 4213. Continuation of 4213 with emphasis on neutron physics, fission and fusion, and high energy nuclear processes. Not for **physics majors.**

5913* Selected Topics in Astrophysics. ASTRO 2023 and 3023 desired but not mandatory. 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 or consent of instructor. Group theory and imperfections in crystals. Dislocation theory and color centers.

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.

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, or consent of instructor. Nuclear and elementary particle interactions, resonances, and models; relativistic **quantum** mechanics and quantum field theory.

6713* Classical Theory of Fields. Prerequisite: 5313 or consent of instructor. **Electromagnetic and gravitational fields. Lorentz electron theory.**

PHYSIOLOGICAL SCIENCES (PHSIO)

3034 (N,L)Introductory Anatomy and Physiology. Lab 1. Prerequisites: Chem 1215 and equivalent and BISC 1114 or BISC 1303. A descriptive study of the structure and function of the mammalian body. For students majoring in applied biological sciences and **nonbiology majors. Laboratory** sections specialized in human or domestic animal physiology. No credit for students with credit in 3125.

3113* (L)Physiology of Exercise. Lab 2. Prerequisite: 3034. Physiological effects of exercise.

3125* Mammalian Physiology. Prerequisites: CHEM 3015, BISC 1602. Descriptive and **quantitative** functional analysis of the mammalian nervous, endocrine, respiratory, excretory, digestive, cardiovascular, musculo-skeletal and reproductive organ systems. For majors in basic biological (including premedical, predental and preveterinary) sciences.

4023* Introductory Pharmacology. Prerequisite: 3125 or 3034 and consent of instructor. Major drug classes based on their predominant use and/or principal activity in the body; basis for drug action; and modification of drugs and their action by physiological processes.

4212* Mammalian Physiology Laboratory. Lab 6. Prerequisite: 3125 or consent of instructor. Laboratory experiments that illustrate function of organs, organ systems or mechanisms of **whole body physiological** control. For students majoring in basic biological sciences.

4431 Seminar In Physiology. Introduction to research and the integration of experimental **biology** with **applied biology.** Seminar format will be used to deliver the content with active **participation** of the student. Graded on pass-fail basis.

5000* Research and Thesis. 1-6 credits, maximum 6. Prerequisites: graduate standing and 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. Prerequisites: 3034, BIOCH 3653. Influence of envi**ronmental factors upon** reproductive processes, and the application of reproductive physiology to animal production.

5115* Cellular and Comparative Physiology. Lab 3. Prerequisite: BIOCH 3653 or RISC 3013. Basic cellular activities and fundamental physiological processes as applied to each **animal phylum.**

5123* Basic Neurology and Animal Behavior. Lab 2. Prerequisite: first-year standing in College of Veterinary Medicine or consent of instructor. Anatomy and physiology of the **nervous system. Behavior of domestic animals. Emphasizes aspects applicable to veterinary medicine.**

5124* Veterinary Cell Physiology and Metabolism. Lab 3. Prerequisite: first-year standing in College of Veterinary Medicine or consent of instructor. Functional metabolism of cells, tissues and organs in domestic animals. Includes essential nutrients, metabolism of ruminants and selected metabolic diseases.

5125* Cardiovascular, Respiratory, Digestive and Renal Physiology. Lab 3. Prerequisite: first-year standing in College of Veterinary Medicine or consent of instructor. Medical **physiology** of the cardiovascular, respiratory, digestive and renal systems of domestic **animals.**

5221* Cellular and Comparative Physiology Laboratory. Lab 3. Prerequisite: 5115. Advanced research techniques. Students design and carry out a research project.

5233* Veterinary Endocrinology and Reproduction. Prerequisite: second-year standing in College of Veterinary Medicine or consent of instructor. Functions of endocrine and **reproductive** systems of the animal body.

5343* Veterinary Pharmacology I. Prerequisite: second-year standing in College of Veterinary Medicine or consent of instructor. Pharmacodynamics, posology and administration of drugs in veterinary medicine.

5742* Rumen Physiology. Prerequisites: ANSI 3653. Physiology and development of the ruminant digestive tract. Same course as ANSI 5742.

6000* Research and Thesis. 1-15 credits, maximum 50. Prerequisites: graduate standing and consent of instructor. Independent research for the doctoral dissertation under the super**vision** of **a Graduate** Faculty member.

6110* Advanced Physiology of Selected Systems. 2-10 credits, maximum 10. Prerequisite: 3125 or 5125. 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. Prerequisite: consent of instructor. 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.

6154* Veterinary Pharmacology II. Lab 3. Prerequisite: third-year standing in College of Veterinary Medicine or consent of instructor. Exploration of drugs commonly used in veterinary medicine. Continuation of 5343.

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 biotoxicology. Repeatable; re-enrollment permits study of additional topics.

6223* Advanced Physiology Of Reproduction. Lab 3. Prerequisites: 5113 or 5233 or equivalent. Selected aspects of the physiology of reproduction of domestic and laboratory animals; **consideration** of infertility. Emphasis placed 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.

6262* Veterinary Toxicology. Prerequisite: third-year standing in College of Veterinary Medicine or consent of instructor. Consideration of veterinary toxicological problems **and therapeusis.**

6273* Comparative Neurophyslology. Lab 2. Prerequisite: 5123 or consent of instructor. **Physiology of mammalian nervous systems.**

6415* Endocrinology. Lab 6. Prerequisite: 3125 or consent of instructor. Structure, function **and** interrelationships of the endocrine glands.

6570* Seminar. 1-6 credits, maximum 6. Consideration of literature and research problems pertaining to **physiology** and pharmacology.

PLANT PATHOLOGY (PLP)

3344* (N,L)Plant Pathology. Lab **4. Prerequisite:** BISC 1402. The cause, spread and control **of plant diseases.**

3593* Forest Pathology. Lab 2. Prerequisite: BISC 1402. The diseases of trees and the decays **of woods.**

4003* Introductory Plant Nematology. Lab 3. Prerequisite: 3344 or concurrent enrollment. Emphasis on plant parasitic forms. Includes extraction techniques, general morphology, **subfamily** identification and concepts of biology, pathogenicity and control.

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.

4050* Plant Health Practicum. 1-2 credits, maximum 2. Lab 2-6. Prerequisite: 3344. Practical **application** of the principles of plant health developed in the plant health curriculum. At different times of year various types of grower operations analyzed to determine the health status of the crop. Where health problems exist plant specimens will be analyzed, management procedures examined, the problem diagnosed and control measures suggested.

4400 Undergraduate Research. 1-3 credits, maximum 3. Prerequisite: consent of instructor. Undergraduate research problems in plant pathology.

4913* Pesticides in the Environment. Prerequisite: BISC 1402, CHEM 1225. A discussion of pesticides (fungicides, insecticides, herbicides and nematocides), including potential movement, degradation, fate and significance in the environment. Same course as AGRON 4913 and ENTO 4913.

5000* Research. 1-6 credits, maximum 6. Research for the M.S. degree.

5013* Virus Diseases of Plants. Prerequisite: 3344. Symptomatology, etiology, epidemiology and control of plant virus diseases.

5104* Mycology. Lab 6. Prerequisite: graduate standing. A systematic study of the fungi.

5303* Bacterial Diseases of Plants. Prerequisite: 3344. Bacteria as plant pathogens, special methods and techniques, host-pathogen relationships, pathogen variation and its implications and methods of control.

5560* Problems In Plant Pathology. 1-5 credits, maximum 10. Prerequisite: consent of instructor.

5603* Fungus Diseases of Plants. Prerequisite: 3344. Principles and concepts involved with fungus plant pathogens. Selected diseases studied to bring out important facets of phytopathological history, etiology, epiphytology and control. Laboratory designed to acquaint students with symptoms, characteristics of fungi and techniques of isolation and pure culture of fungi.

5850* Plant Pathology Seminar. 1 credit, maximum 4. Required of all undergraduate seniors and graduate majors.

6000* Research. 1-12 credits, maximum 36. Research for the Ph.D. degree.

6102* Plant Disease Genetics. Prerequisites: **3344** or equivalent and a course in general genetics. The relation of hybridization, mutation, heterosis and parasexualism to variability in plant pathogens and the practical implications of physiologic specialization on **host-parasite interactions.**

6203* Physiology of Fungi. Lab **4.** Prerequisite: 3344 or BISC 1502. Principles and concepts of **physiology** of growth and reproduction of fungi; production of compounds of commercial, human **and** veterinary medical interest. Laboratory exercises to demonstrate principles.

6403* Plant Nematology. Prerequisite: 4003. Plant diseases caused by nematodes including identification, biology, pathogenicity and control of plant parasitic nematodes.

6503* Principles of Plant Pathology. Prerequisite: 3344. A systematic consideration of the factors and concepts involved in the development and control of plant diseases.

POLITICAL SCIENCE (POLSC)

1013 (S)Amerlcan Government. Organization, processes and functions of the national government of the United States.

2023 (S)Publlc Law and Private Rights. For any student interested in the American legal system. Constitutional rights, remedies for governmental wrongs, small claims court operations, legal education and topical issues of American public law.

2113 (S)Essentials of Political Science. Political processes and institutions of contemporary societies and an introduction to the concepts and methods of political science. Strongly recommended as a foundation for all upper-division Political Science courses.

2993 Honors Tutorial In Political Science. Prerequisites: 2013, 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.

3013* (I,S)Internatlonal Relations. Political dynamics and machinery of international relations with emphasis on nationalism, imperialism, self-help, collective security and foreign policy formulation and execution.

3023* (I)Intemationai Communications and Foreign Affairs. Theory and practice of international communications. The role of information media in the foreign policy of domestic, **totalitarian** and emerging states; the United Nations information service.

3033* (I)Internatlonal 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.

3113* **(I)Govemments of Germany and Italy.** Political processes and governmental institutions of major European states, with emphasis on Germany and Italy.

3123* (I)Politics and Governments of the U.S.S.R. and Eastern Europe. Political processes and governmental institutions of the Soviet Union and selected Eastern Europe countries.

3153* (I)Governments of Great Britain and France. Political processes and governmental institutions of major European states, with emphasis on Great Britain and France.

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* (I)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)Polltics 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)Politics and Administration In East Asia. Political processes, governmental institutions and administration in China, Japan and Korea.

3253* (I)Politlcs and Governments of Africa. Political processes and governmental institutions of selected African countries.

3313* (I)Governments and Polltics 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* Political Opinion and Propaganda. Political implications of public opinion and the use of surveys and polls in politics. Formation and nature of political attitudes and their impact on public policy. Application of survey research to political analysis. Functions and analyses of political propaganda, stressing propaganda techniques and devices for measurement and identification.

3453* (S)The Legislative Process. The process of legislation at both the national and state levels of government in the United States and in other nations. Special attention paid to legislative leadership, organization and the role of the legislature in the political system.

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.

3613* State and Local Government. Political processes, government and administration of American states, cities and counties; special emphasis on Oklahoma.

3883* (H)Political Thought. The teachings of the three lasting traditions of Western political thought: classical, Christian and modern.

3713* Public Administration. Principles of public administration, including a study of administration, administrative organization, decision making, governmental public relations and administrative responsibilities.

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* (L)Politlcal Analysis. Prerequisite: 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* (l)American Foreign Policy. Major problems and policies of American foreign relations since World War II and description of foreign formulation and aid administration.

4053* (l)Worid 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 2013. Special problem areas of government, politics and public policy concentrating on topics not covered in other Departmental course offerings.

4113* (l)international Institutions. The organization, procedures, functions and role of international institutions, with emphasis on the United Nations and related agencies.

4213* (l)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* Jurisprudence and Criminal Justice. An introduction to theoretical issues of public law and law enforcement, with emphasis upon criminal justice.

4323* Criminal Justice Administration and Organization. Organizational design and structure of criminal justice systems. Problems and innovation concepts of administration with respect to design, implementation, planning, information needs and managerial perspectives in control of crime.

4353* Administrative and Environmental Law. Legal powers, limits and procedures of administration agencies, with emphasis upon regulation of the environment.

4403* Urban Politics. Problems of governing American metropolitan areas.

4413* Government Budgeting. The politics, planning and administration of government budgets.

4453* 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.

4493* Public Policy. Prerequisite: 60 credit hours, or 45 hours with GPA of 3.25, including any one of: 2013, 2113; ECON 1113, 2113, 2123; SOC 1113; PHILO 2113. Examination of rationales underlying selected governmental programs and assessments of the effectiveness of the programs.

4513* (S)American Politics. Significant developments and issues in American politics, including American political behavior and political leadership.

4553* (H)American Political Thought. A survey of the major developments in American political thought from the Colonial period to the present, followed by a topical analysis of important recent theoretical developments in political science.

4593* 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 concepts of communism, democratic socialism and the welfare state.

4693* Women In Politics. Changing role of women in American government and politics. Voting behavior, public opinion, women in government and the women's movement.

4883* American Constitutional Law; The Division of Governmental Powers. Prerequisite: 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.

4963* American Constitutional Law: Equal Protection of the Laws. 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.

4983* American Constitutional Law: Due Process of Law. 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: invitation of Head of Department, senior standing. A guided reading and research program ending with an honors thesis under the direction of a senior faculty member. Required for graduation with honors in **political science.**

5000* Thesis. 1-6 credits, maximum 6.

5003* Readings in Politics, Public Policy or Public Administration. Prerequisite: consent of supervising professor. Readings in the student's major area of study. For advanced students.

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.

5100* Advanced Problems in Government, Politics, and Public Policy. 1-6 credits, maximum 6. Public policy process including formulation, implementation and evaluation. Various approaches to public policy analysis including systems, rationalism, incrementalism and bounded rationality, institutionalism, technology assessment and impact analysis.

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.**

5310* Seminar In Public Administration. 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 admin**istrative accountability.**

5313* Intergovernmental Relations. Problems of American federal system necessitating new forms of local-state-federal relationships.

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.

5610* Seminar in Government Regulation. 1-3 credits, maximum 6. Types of governmental rules and regulation, their implementation, their consequences and their utility as appraised by different standards.

PSYCHOLOGY (PSYCH)

1113 (S)IntrOductory Psychology I. Principles, theories, vocabulary and applications of the science of psychology.

1123 Introductory Psychology II. Prerequisite: 1113. Survey of psychological research. Emphasis is placed on areas of contemporary interest such as cognitive psychology, biofeedback, sex-role learning and aging.

2313 (S)Psychology and Human Problems. Prerequisite: 1113. Personality dynamics and their application to personal, cultural and vocational experience.

2593 (S)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.

2663 Computer-Assisted Instruction. Lab 1. Prerequisite: 1113. Computer-assisted instruction (CAI) methods and theory surveyed. Learning process and learning technology reviewed within the CAI context. Laboratory activities include use of the microcomputer as an instructional device.

3013* Introduction to Psychology of Motivation. Prerequisite: 1113. Selected review of experimental literature and theory in area of human motivation with special stress on theories of emotion, hostility, curiosity and aesthetics.

3073* (N)Elementary Physiological Psychology. Prerequisite: 1113. Neural bases of human experience and behavior including "split-brain" research, physiology of stress and of meditation, and biofeedback and biorhythm research.

3113* (N)Elementary Comparative Psychology. Prerequisite: 1113. Comparative study of behavior characteristics of selected samples of the animal kingdom from protozoa to man.

3213 Introduction to Research Methods In Psychology. Prerequisite: 1113. 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.

3273* (S)History of Psychology. Prerequisite: consent of instructor. A survey of how modern experimental psychology emerged from seventeenth century physiology and philosophy.

3333* Industrial and Organizational Psychology. Prerequisite: 1113. Behavior in task group and organizational context with emphasis on management, leadership and human relations.

3413* Psychology of Social Behaviors. Lab 1. Prerequisite: 1123. 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. Prerequisite: 1123. 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.

3643 Applied Community Psychology. Psychological principles for prevention, intervention and rehabilitation in the community model.

3651 Experience In Applied Community Psychology. Lab 3. Prerequisite: 3643 or concurrent enrollment. A field-experience-based application of psychological principles for prevention, intervention and rehabilitation in the community model.

3743* (L,S)Introductory Social Psychology. Prerequisite: 60 credit hours or 45 hours with GPA of 3.25. Human behavior as affected by social stimuli.

3753 Introduction to Freud's Psychoanalytic Theories. Prerequisite: consent of instructor. A genetic approach to Freud's system of psychoanalysis as a theory of personality and as an historically important method of psychotherapy.

3772 Careers and Professionalism in Psychology. Lab 1. Prerequisite: psychology major/minor. Current career options in psychology are reviewed and career skills developed. Skills and information which a professional psychologist needs in a work setting stressed.

3823 Cognitive Psychology. Prerequisite: 1123 or equivalent. Cognitive processes. Thinking, problem solving, visual imagery, attention and memory search. Both theory and application emphasized.

3914* (L)Experimental Psychology. Lab 4. Prerequisites: 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. 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. Personality and behavior engendered by minority group status. Review of pertinent psychological theories and research.

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, and reactions to victims. Laboratory exercises conducted in a courtroom.

4183* Current Issues In Clinical Psychology. Prerequisites: 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.

4333* (S)Introductlon to Personality. Prerequisites: 1113, 3443, or 2313, or consent of instructor. Major personality theories and their application to behavioral change, behavioral assessment and research.

4483* Psychology of Parent Behavior. Prerequisite: 1113. Parental techniques are examined in light of the personalities of parents, society's view of children and the American judicial-legal system.

4613* Introduction to Mental Retardation. Prerequisite: 1113. Nature, etiology and social consequences of mental retardation. Classification, characteristics and care of mental retardates.

4813* Psychological Testing. Prerequisite: 3213. Quantitative aspects of measurement and testing, with emphasis on scaling, standardization, reliability and validity. Basic principles of construction and the ethics of use.

4990* Special Problems. 1-6 credits, 6 maximum. Prerequisite: consent of instructor. For honors students and other outstanding students. Experimental or library research.

5000* Thesis. 1-6 credits, 6 maximum. Required of all graduate students majoring in psychology and writing a thesis.

5022* Interviewing Techniques. Prerequisite: graduate standing. Basic principles essential to good interviewing procedures. Techniques of the nondirective approach. Analysis of interviews from tape recordings.

5043* Social Interaction. Prerequisite: graduate standing. Data sources and interaction of factors in social interactions; tools and techniques of analysis specifically related to interpersonal interaction.

5083* Principles of Counseling Psychology. Prerequisite: graduate standing. Current theories, principles and approaches in the counseling situation.

5113* Psychopathology. Prerequisites: graduate standing, 15 credit hours of psychology, and consent of instructor. Principles of diagnosis and treatment of major disorders.

5120* Psychology Workshop. 2-6 credits, 6 maximum. Prerequisite: graduate standing. Provides an opportunity to study specific psychological problems, both applied and theoretical.

5133* Minority Issues. Prerequisites: graduate standing and six credit hours of psychology. Social issues related to pluralism with emphasis on community and social psychology.

5153* Individual Mental Tests. Prerequisites: 3443, 4813, graduate standing and consent of instructor. Practice in understanding, administering and interpreting the Stanford-Binet, WAIS, WISC-R and other mental tests.

5173* Child Psychopathology and Treatment. Lab 1. Prerequisites: 5113, 5153 and graduate standing. Theoretical positions and issues in child psychopathology. Procedures used in the treatment of psychological disorders of children.

5180* Introduction to Rehabilitation Counseling. 2-3 credits, 3 maximum. Lab 1. Prerequisites: graduate standing and consent of instructor. Required of all students majoring in rehabilitation counseling. Background, legal aspects and philosophy of rehabilitation. Overview of current practices in rehabilitation and related areas.

5223* Psychosocial Aspects of Rehabilitation Counseling. Prerequisites: graduate standing and consent of instructor. Psychological and social implications of handicapping conditions; some areas for better understanding and facilitating the development of human potential, e.g., needs, communications and the helping relationship.

5253* Seminar in Human Development. Prerequisites: graduate standing and consent of instructor. Behavioral aspects of development from the prenatal period to senescence. Normal development contrasted to exceptional development.

5263* Personality Theories. Prerequisite: nine credit hours of psychology. Various theories of personality.

5283* Community Psychology. Prerequisites: graduate standing and 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.

5303* Research 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* Research Methods in Psychology II. Prerequisite: 5303. A continuation of 5303. Higher-order analysis of variance designs, correlation and regression techniques, analysis of covariance, with emphasis on applications to psychological experimentation.

5323* Theory and Methods of Scaling. Prerequisites: graduate standing, six credit hours of psychology and three hours in statistics; or consent of instructor. Theoretical and methodological principles underlying paired comparison, successive interval, fusing, scalogram and equal-appearing interval scales. The application of these measurement scales to research in the behavioral and social sciences.

5353* Psychology of Motivation. Prerequisites: 3914 and graduate standing. Outline of theory and research in human and animal motivation.

5380* Research. 1-12 credits, 12 maximum. Prerequisites: graduate standing and consent of instructor. Research project on some psychological problem.

5393* Verbal Processes. Prerequisite: graduate standing. Consideration of task and subject variables, transfer and mediation, associative processes and verbal behavior.

5413* 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 unforseen and remote effects.

5423* Perception. Prerequisites: 5483 and graduate standing, or consent of instructor. Survey of sensory and perceptual processes. Emphasis on theories of perception.

5433* Psychology of Information Processing: Developmental/Aging Aspects. Attention, list processing, pattern recognition and related areas in terms of contemporary facts, theory and application. Special attention paid to development/aging aspects of information processing.

5483* Physiological Psychology. Prerequisite: 3073 or equivalent. Neurological mechanisms underlying human behavior.

5513* Experimental Learning Theories. Prerequisite: nine credit hours of psychology. Basic concepts and empirical findings in animal and human learning.

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 conununication process. Same course as ABSED 5553.

5563* Advanced Social Psychology. Prerequisites: 3743 and graduate standing. History, theory and experimentation of dynamic interaction of group membership and individual behavior.

5573* Experimental Social Psychology. Prerequisites: 3743 and graduate standing. Social psychology of psychological research with special emphasis on the conceptualization, planning, execution and ethical fulfillment in a laboratory or laboratory-field experience.

5620* Seminar in Psychology. 1-9 credits, 9 maximum. Prerequisites: graduate standing and consent of instructor. Consideration of special topics that are particularly timely or technical in nature.

5623* Seminar and Workshop in Test Construction Techniques. Prerequisite: graduate

standing or consent of instructor. Derivation and use of the basic equations and formulas pertaining to the measurement of individual differences on the basis of well defined collections of stimuli.

5640* Clinical Practicum. 1-12 credits, 17 maximum. Prerequisites: graduate standing and consent of instructor. Primarily for graduate students in the clinical psychology and vocational rehabilitation counseling programs.

5650* Practicum. 1-16 credits, 16 maximum. Prerequisite: graduate standing. Primarily for graduate students in the areas in their specialization.

5660* Teaching Practicum. 1-2 credits, 2 maximum. Prerequisites: graduate standing and consent of instructor. Primarily for graduate students with well defined new teaching responsibilities.

5713* Projective Psychodiagnostic Methods. Prerequisites: 5113, 5153, graduate standing, and consent of instructor. Administration and interpretation of projective tests such as the Rorschach, TAT and their derivatives.

5723* Child Diagnostic Methods. Prerequisites: 3443, and 3583 or equivalent. Administration and interpretation of diagnostic instruments used specifically with children.

5753* Objective Psychodiagnostic Methods. Prerequisites: 3443, 4813, graduate standing, and consent of instructor. Complex objective personality and interest tests and their diagnostic and clinical uses.

5823* Cognitive Processes. Theory and experimental research findings dealing with human thought processes from a developmental and functional standpoint.

5853* Group Processes. Prerequisites: 3743 and graduate standing. Analysis of both intragroup and intergroup behavior in small groups. Emphasis on experimental research reported. Relationships of small groups to large groups, institutions and collective behavior.

5910* Internship in Mental Health. 1-6 credits, 6 maximum. Prerequisite: enrollment in Mental Health Specialist program (M.S. option). Supervised clinical experience under the direction of a qualified clinical psychologist in a mental health setting.

6000* Dissertation. 1-16 credits, maximum 60. Prerequisite: graduate standing. Research and report thereon by graduate students in partial fulfillment of requirements for the Doctor of Philosophy degree.

6223* Research Design. Prerequisites: 3914, 5323, and doctoral level standing. Experimental techniques in psychophysics, sensory processes, attention and perception, motivation and emotion, and learning and memory.

6233* Computer Applications In Psychology. Prerequisites: 5303 and 5313 or permission. 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.

6283* Factor Analysis. Prerequisites: graduate standing and consent of instructor. Factor analysis and implications for measurement of mental abilities, personality traits and learning.

6313* Systems of Psychotherapy. Prerequisites: 5113 and graduate standing. The major approaches to psychotherapy. Methods for creating multiple impacts for behavioral change, including interpersonal, social, community and preventative interventions.

6393* Psycholinguistics. Prerequisite: graduate standing. 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.

6513* Group Treatment Methods. Prerequisite: 5113. Introduction to major techniques of group treatment including Gestalt and transactional analysis as well as more conventional techniques.

6523* Family Treatment Methods. Introduction to techniques and philosophies of family treatment. Includes marital counseling and emphasis on family dynamics.

6633* Psychological Assessment of Key Personnel. Prerequisites: 4813 and 5263. Assessment center methods and theory, merit systems and strategies for guiding and fostering the development of key personnel.

6693* Experimental Clinical Psychology. Prerequisite: graduate standing or consent of instructor. Experimental literature in the various areas of clinical psychology and personality research emphasizing problems of methodology and research design.

6913* Interpersonal Influence and Perception. Prerequisites: 3743 and graduate standing. Social perception processes with emphasis on aspects of person cognition such as impression formation, implicit personality theory, attribution theory, social schemata, psychological similarity and the recognition of emotions.

6933* Communication and Persuasion. Prerequisites: graduate standing and consent of instructor. 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.

RADIATION AND NUCLEAR TECHNOLOGY (RNT)

3124 Radiation Biology. Lab 3. Prerequisites: 2315 and RISC 1114. Interaction of radiation with living tissues. Introduction to target theory; LET concept, LD 50 relationships and tissue damage concepts.

3214 Radiological Health. Lab 3. Interaction of matter with ionizing radiation, radiation dose units, radiation shielding calculations, radiation dose from internal and external radiation sources, biological effects of radiation, radiation protection guides, airborne and waterborne radioactive sources, MPC for air and water and MPBB and surface contamination considerations.

3315 Radiation Measurement I. Lab 6. Prerequisite: STAT 2013. Concentrated laboratory experience in counting techniques for alpha, beta, gamma radiations using GM, gas flow proportional, scintillation counters, the multi-channel analyzer, and chemical analysis techniques.

3324 Radiation Measurement II. Prerequisite: 2315. A continuation of 2315.

3404 Environmental Radiation Fundamentals. Lab 3. Prerequisite: 3315. Radioactive material in air, water, food and soil, use of dispersion and diffusion equations, analytical techniques for environmental material, evaluation of environmental releases, transport of material in the environment, radiation surveillance and waste disposal.

4233 Public Health Aspects of Radiation. Prerequisite: senior standing. Public health organizations and administration, history of radiation and radioactive material, history of radiation exposure and accidents, radiation risk and public health protection procedures.

4413 Health Physics Practices. Lab 2. Prerequisite: 3404. Personnel monitoring, area monitoring, radiation surveys, hazards evaluation, storage operations, radioactive waste disposal and other health physics activities.

4523 Health Physics Practices and Design. Lab 3. Prerequisite: 4413. Comprehensive study of the field of radiological health, design of health physics instrumentation and radiation safety systems, practical application of health physics principles; guest lectures, student group presentation of selected materials and review of recent literature.

RADIO-TELEVISION-FILM (RTVF)

2003 introduction to Broadcasting. History, growth and development of radio and television; FCC and other federal regulatory agencies; station and network operations and their effect of society.

2223 History and Significance of Film and Broadcasting. Film and broadcasting in our society and how they affect the individual. The bases of impact, program evaluation and criteria for intelligent and discriminating listeners and viewers.

2403 Basic Radio Production. Lab 3. Prerequisite: MC 1123. Theory and practice of communication using electronic media. Students prepare and present materials in broadcasting situation.

3100 Radio-Television-Film Laboratory. 1-2 credits, maximum 5. Prerequisite: sophomore standing and consent of instructor. Preparation and participation in all phases of radio-television-film.

3123 Radio and Television News Writing. Lab 3. Prerequisite: JM 2113. Elementary broadcast news writing and reporting techniques. Familiarization with broadcast equipment, news services and broadcast news values. Exercises in news preparation.

3663 Television Production. Lab 3. Television production techniques including camera, audio, lighting, staging, graphics and on-camera performance.

4103 Programs and Audlences.Principles of 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.

4213 Writing for Radio-Television-Flint. Lab 3. Prerequisite: 2403. Relationship of written to spoken language. Commercial continuity and specialized copy. Scripting and adaption to specific media.

4403 Broadcast Sales. Sales development, pricing, promotion and other aspects of broadcast sales and sales management.

4433 Broadcast Station Operation. Prerequisite: 4403. Economic structure of the broadcasting industry; relationships with other industries; station budget planning and cost control.

4463 Television Directing. Lab 3. Prerequisite: 3663. Techniques and aesthetics of television directing in various standard directing formats.

4533 Advanced Radio and Television News Writing. Lab 3. Prerequisite: 3123. Advanced broadcast news writing with special emphasis on techniques of investigative in-depth reporting for radio and television.

4643 Broadcast Documentary. Lab 3. Prerequisite: 3123 or consent of instructor. Students write and produce news documentaries; selected programs analyzed.

4883 Broadcast Management. Prerequisite: 18 hours RTVF credit, including 4433. Functions, structure and organization of the broadcasting industry; special problems in broadcast station management, including personnel, sales, programming and government regulations.

5663* Educational Broadcasting. Uses of broadcast media for instructional purposes, both on the air and in the classroom. Current usages by institutions of higher learning and public schools. Research studies of the effects of educational broadcasting.

RECREATION

(See Leisure Sciences)

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.

1111 (H)Religlon and Contemporary Issues. The nature of religion and its relation to current problems, such as racism, sexism, hunger, ecology and war. 8 weeks only.

2123 (H)Introduction to the Old Testament. The writings of the Hebrew Scriptures with emphasis upon historical background, critical analysis and theological interpretation.

2223 (H)Introductlon to the New Testament. The writings of the New Testament in their historical contexts. Emphasis on interpreting selected New Testament passages.

2513 (H)Religious Groups In the United States. Selected religious groups in 19th and 20th-century America. Emphasis on significant movements and groups outside of mainstream Christianity.

3123 (H)The Old Testament Prophets. Recommended: 2123. 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: 2223. 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: 2223. The letters of Paul in their historical context with special emphasis on his theology and ethics.

3273* (H)History of Christianity to the 16th Century. The development of the Christian church from New Testament times to the Reformation.

3283* (H)History of Christianity from the 16th Century. The Christian church from the Reformation to the present.

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 2123. 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.

3603 (H)Christian Ethics and Modern Society. Moral decision-making from the perspective of the Judeo-Christian tradition. Emphasis on selected moral issues in human sexuality, recent developments in biology and medicine, war and peace and the environmental crisis.

3623 (H)Religlon and the Arts. Key literary, graphic and musical works of art of a historical period will be studied to discover what humans are expressing of religious significance. Selected periods will be chosen from the Renaissance to the present.

3713* (H)Religion, Culture and Society. Recommended: 1103, ANTH 2353, and 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.

3733* (H)Religious Experience and Personality. Recommended: 1103 and PSYCH 2313. A study of faith and doubt in relation to the intellectual and emotional life. Psychological **explanations** of belief and religious behavior as collective unconscious, projection of father figure, highest goal, peak experience and random reinforcement are critically examined.

3833* (H)Ethical Issues in Biology and Medicine. Moral problems brought about by recent developments in scientific research and medical technology. Abortion, euthanasia, genetic engineering, and human experimentation. Same course as PHILO 3833.

4023* (H)Archaeology and the Ancient Near East. Recommended: 2123. A study of ar**chaeological** remains in the Near East from the Stone Age to the Iron Age with special attention to the background of the Hebrew Scriptures.

4043* (H)Archaeology and Early Christianity. Recommended: 2223. A study of archaeological remains from the Roman world which set a background for early Christian development, including cities, art documents and architecture.

4050* Studies In Religion. 2-6 credits, maximum 6. Independent studies, seminars and courses on selected topics in religion.

RUSSIAN (RUSS)

1115 (I)Elementary Russian I. Lab 1 1/2. Understanding, speaking, reading and writing. Method of instruction is audio-lingual.

1225 (I)Elementary Russian 11. Lab 1 1/2. Prerequisite: 1115 or equivalent. Continuation of 1115.

2115 (H,I)Intermediate Russian I. Prerequisite: 1225 or equivalent. Understanding, speaking, literature and writing. Classes conducted in Russian.

2225 (H,I)Intermediate Russian II. Prerequisite: 2115 or equivalent. Continuation of 2115.

4113 (H,I)Russlan 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,I)Russian Literature In Translation II. Russian and Soviet literature from mid-19th century to present: Tolstoy, Chekhov, Gorky, Zamiatin, Sholokhov, Pasternak, Bunin, Solzhenitsyn, Arzhak (Daniel), Tertz (Sinyavsky), Voznesensky and Evtushendo. Readings in English. Classes conducted in English.

SOCIAL SCIENCES (SOCSC)

3000 Special Studies in the Social Sciences. 1-3 credits, maximum 8. Prerequisite: six hours credit in any lower-division courses in the social sciences. Specific problems of theory and application encountered in the social sciences. Emphasis on the solution of social problems through the interdisciplinary approach.

SOCIOLOGY (SOC)

1113 (S)Introductory Sociology. The science of human society. Emphasis on basic concepts. Assists the student in understanding the social influences on day-to-day life.

2123 (S)Social Problems. Prerequisite: 1113. Exploration in selected social issues in contemporary American society, such as deviance, poverty, sexism, racism and ageism.

2223 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.

2993 Sociology of Racism. Sociological phenomena of racism: developmental processes, problems and consequences.

3113 Introduction to Sociological Theory. Prerequisites: 1113 and 2123 with a 3.25 GPA, including 2123. 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* Collective Behavior and Social Movements. Analyzes panics, crazes, riots and social movements emphasizing institutional and social psychological origins and consequences.

3423* (S)Urban Sociology. Trends toward urbanization. The demography and ecology of cities and regions. Urban social institutions and behavior patterns.

3523* 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.

3633* Regional Analysis and Planning. Introduces methods of examining and analyzing regions. Examination and interpretation of the spatial, social and ecological aspects of regional planning. Same course as GEOG 3633 and ZOOL 3633.

3713* Religion, Culture and Society. Prerequisites: 1113 and ANTH 2353 or REL 1103. Scientific study of religion. Religious functions in both developing and technological societies studied in the light of contemporary interpretations of culture and of social behavior. Same course as REL 3713.

3723* 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.

3883* The Field of Social Work. Prerequisites: 1113 and 2123. Methods of social work practice, agency setting and current social welfare programs.

3923* Introduction to the Field of Corrections. The social forces that gave rise to the development of social control, correctional strategies and rehabilitative treatment. Modern alternatives to conventional imprisonment.

3952 Orientation to the Internship In Sociology. Preparation for internship in sociology.

3993* (S)SociolOgy of Aging. Sociological problems of aging, including the analysis of the behavior of the aged within the framework of social institution.

4003* Quantitative Applications in Sociology. Prerequisites: 3113 and STAT 4013. Application of basic statistical procedures in the analysis of social data. Measures of association, scale and index construction and applications of probability theory.

4023* 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.

4113* Advanced Sociological Principles. Systematic review and integration of major propositions, concepts and research data from various fields of sociology. Comprehensive theoretical orientation for the explanation of social phenomena.

4123* (L)Methods Of Social Research I. Prerequisites: 3113 and STAT 4013. Scientific method in sociological research. Formulation of research designs, hypothesis testing, sampling, interviewing, observation, coding, use of documents, questionnaires and scales. An actual research project included.

4223* 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.

4333* Criminology. Summarizes sociological and psychological research pertaining to crime causation and crime trends. Modern trends in control and treatment.

4383 Social Stratification. Systems of class and caste, with special attention to the United States. Status, occupation income and other elements in stratification.

4423* Community Organization and Development. Structure, change and development of the local community in rapidly changing society. Emphasis on cummunity organization and planned change.

4433* (S)Sociai 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 phases.

4533* (I,S)Population Problems. Factors influencing fertility, mortality and migration. Related social issues such as the population explosion, birth control and future population projections for the United States and the world.

4593* (I)Comparative Family Systems. The family as a social institution, featuring its variations and uniformities, cross-culturally and subculturally within American society. The changing roles of males and females in both marital and societal contexts.

4623* (S)Sociology of Industry and Work. The interrelationship of the social order and work plant as a social system, work role behavior and special groups in industry and work.

4633 (S)Racial and Cultural Minorities. A sociological approach to the study of ethnic and racial groups in contemporary pluralistic society, including a cultural-historical perspective on their origins, social relations, value systems and goals.

4643* (I)Women: A Cross-Cultural Perspective. Prerequisite: 60 credit hours, or 45 hours with 3.23 GPA including 1113 and ANTH 2353 or equivalents. Social, familial, economic and legal status and roles of women in both industrial and nonindustrial societies. Same course as ANTH 4643.

4723* Alternative Choices to Traditional Marriage. 3723 or equivalent. Social, marital and sexual alternatives to traditional permanent marriage in American society.

4850 Internship in Sociology. 1-4 credits, maximum 4. Prerequisites: 3952, completion of 9 credit hours of core requirements and consent of internship coordinator. Field experience in corrections or social service agency.

4953* Social Welfare as a Social Institution. Historical setting and philosophical base of social welfare. Social welfare's functions and methods in relation to problems of American society.

4990* Exploration of Sociological Issues. 1-3 credits, maximum 6. Prerequisite: consent of instructor. Examines sociologically significant topics and issues.

5000* Thesis In Sociology. 1-6 credits, maximum 6.

5113* Sociological Theory I. Prerequisite: 4113 or equivalent. Major trends in sociological thought, 1800-1920. The emergence of sociological theory in Europe and America.

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: 4123, 5243, or equivalents. Advanced techniques in sociological research involving participation in a research project.

5323* Social and Cultural Change. Social and Cultural change; theory, innovation, diffusion and conflict.

5353* Social Systems Analysis. Relations between properties of relatively large social systems. Emphasis on theories relating these variables, empirical derivations of their measures and research concerning their interrelations.

5433* 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.

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 man throughout history. Same course as HPELS 5413.

5533* Correctional Institutions and Residential Treatment. Prerequisite: 3523 or 4333. 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: 3523 or 4333. 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: 12 credit hours of sociology. 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. Same course as CIED 5883.

5980* Graduate Corrections Internship. 1-6 credits, maximum 6. Prerequisite: graduate standing in the Corrections program. Supervised field placement in the correctional agency.

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.

6110* Sodological Theory II. 2-3 credits, maximum 6. Critical examination of significant theoretical formulations, 1920 to the present. Relation between theoretical development and current research emphasis.

6213* The Sociology Of Knowledge. Prerequisite: 4113 or equivalent. Relationship between human thought and the social context within which it arises.

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.

6650* Seminar in Social Psychology. 2-3 credits, maximum 6. Development and critical' analysis of research in social **psychology.**

6750* Seminar In Criminology and Deviance. 2-3 credits, maximum 6. Current research **and theory in criminology,** penology and deviance in modern society.

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 (I)Elementary Spanish I. Lab 1 1/2. Pronunciation, conversation, grammar and reading.

1225 (I)Elementary Spanish I1. Lab 1 1/2. Prerequisite: 1115, or equivalent.

2112 (H,I)Intermediate Reading and Conversation I. Lab I. Prerequisite: 1225 or **equivalent. (May have** been gained in **high school.)** May be taken concurrently with other **2000-level Spanish courses.**

2113 (H,I)Intermedlate Conversation and Composition I. Lab 1. Prerequisite: 1225 or **equivalent. (May have been gained in high school.) Oral and written review of the essentials of the Spanish language. May be taken concurrently with other 2000-level Spanish courses.**

2222 (H,I)Intermediate Conversation and Composition II. Lab 1. Prereouisite: 2113 or **equivalent. (May have** been gained in high school.) May be taken concurrently with **other 2000-level Spanish courses.**

2223 (H,I)Intermediate Reading and Conversation II. Lab 1. Prerequisite: 2112 or **equivalent.** (May have been gained in high school.) May be taken concurrently with other **2000-level Spanish courses.**

3103 (H,I)Spanish Short Story. Prerequisite: 20 credit hours of Spanish or equivalent. Reading and class discussion of selected Spanish or Spanish American short stories.

3200 (H,I)Advanced Conversation and Composition. 1-3 credits, maximum 3. Lab 0-6. Prerequisite: 20 credit hours of Spanish or equivalent. Spanish majors must take all 3 hours in one semester.

3210 (H,I)Advanced Grammar. 1-3 credits, maximum 3. Prerequisites: 20 credit hours of Spanish or equivalent proficiency. Spanish majors must take all 3 credits in one semester.

3333 (H,I)Hlspanic Civilization I. Prerequisite: 20 credit hours of Spanish or **equivalent.** Reading **and** discussion of selected texts outlining the development of contemporary Spanish civilization. Classes conducted in Spanish.

3463 (I)Advanced Diction and Phonetics. Lab 1. Prerequisite: 20 credit hours of Spanish or consent of instructor. Required course for teacher certification/licensure. Spanish speech sounds and intonation patterns, with practice to improve the student's pronunciation.

4173 (H,I)Hispanic Drama. Prerequisite: 20 credit hours of Spanish or equivalent competence. Reading and interpretation of dramatic works selected from the Hispanic literatures.

4220 (H,I)20th Century Hispanic Literature. 1-3 credits, maximum 3. Prerequisite: 20 credit hours of Spanish or equivalent. Major 20th century Hispanic writers. Classes conducted in Spanish.

4243 (I)Translation and Writing of Documents. Prerequisite: 20 credit hours of Spanish or equivalent competence. Translation of documents produced by government agencies,

universities, business and industrial organizations. Writing of letters, memos, contracts, etc.

4253 (H,I)Masterpieces of Hispanic Literature I. Prerequisite: 20 credit hours of Spanish or equivalent competence. Reading and analysis of classics selected from the Hispanic literatures.

4263 (H,I)Masterpieces of Hispanic Literature II. Prerequisite: 20 credit hours of Spanish or **equivalent** competence. Reading and analysis of classics selected from the Hispanic literatures. An historical continuation of 4253. SPAN 4253 is not a prerequisite for this course.

4333 (H,I)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 (I)Seminar in Spanish. 1-3 credits, maximum 9. Prerequisite: 20 credit hours of Spanish or equivalent. Readings and discussion of vital subjects in Spanish.

5110* Advanced Hispanic Studies. 1-3 credits, maximum 9. Lab TBA. Prerequisite: 22 hours of Spanish or graduate standing in foreign language.

SPEECH COMMUNICATION (SPCH)

1703 Spoken English for International Students. Lab 1. Oral discussion and laboratory drill designed to improve English pronunciation, intelligibility and oral/aural comprehension. Articulation, stress, pitch, intonation and visual cues of English.

2713 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 conpetency-based approach.

3010 Speech Activity Participation. 1-3 credits, maximum 6. Preparation for and participation in speech communication and/or speech pathology activities.

3703* Elements of Discussion. The nature of small groups. Emphasis upon task groups with special consideration given to group roles, group norms, group leadership and effective participation in various types of discussion groups.

3711 Employment Interviewing. Lab I. Prerequisite: junior standing. To understand, prepare for, and participate n employment interviews. Resumes, researching job opportunities and other forms of preparation for an interview.

3713 Argumentation and Debate. Prerequisite: 2713. The responsibilities of the advocate, the proposition, evidence, reasoning, the case, fallacies and refutation. Experience in mini-debates, standard and cross-examination debating.

3723* Business and Professional Communication. Prerequisite: 2713. Oral communication problems encountered in business and professional settings. Effective listening, business-organizational communication barriers and corrective strategies, interviewing, nonverbal business communication, parliamentary procedures and conducting meetings. Special forms of public speaking along with techniques of oral reporting and briefing.

3733* Elements of Persuasion. Prerequisite: 2713. Principles and concepts relevant to interpersonal and public persuasive encounters. The instrumental nature of persuasion, audience analysis and the ethics of persuasion. Designing and participating in actual persuasive encounters.

3743 Advanced Public Speaking. Prerequisite: 2713. The preparation and delivery of various types of public speeches.

3793* Processes of Interviewing and Speech Communication. Prerequisites: 2713. Basic processes of human communication and the theoretical and practical implications of these processes for various levels of communicative interaction. Individual and group projects emphasizing the inputting, processing and outputting of information.

4010* Research and Practicum. 1-3 credits, maximum 9. Prerequisite: consent of instructor; prospectus should be filed during semester previous to enrollment. Supervised research and/or practicum in one of the following branches: theatre, speech communication, speech education, speech correction or audiology.

4703* Speech Communication Models. Prerequisite: senior standing or consent of instructor. A survey of the structure and functions of speech-communication models.

4723* History of Public Address. Prerequisite: 2713. Leading world orators and speakers.

Study of content, style and delivery of their speeches and the historical situation in which they were given.

4743* Problems of Interpersonal Speech Communication. Prerequisite: 3793. Application of modern communication theory to problems of interpersonal communication. Identification and elimination of barriers to communication in the personal interview and small group setting. Use of role-playing techniques and off-campus projects.

4753* Current Oral Communication Problems. Study of speech communication problems within today's socio-cultural context. Emphasis upon social and cultural barriers to communication.

4763* Organizational Communication. Prerequisite: 3793. 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.

4793* Nonverbal Communication. Prerequisites: 2713 and permission of instructor. Nonverbal aspects of speech communication.

5000* Research and Thesis. 1-3 credits, maximum 6. Prerequisite: approval of major professor. Research in speech and/or 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, theatre, and speech pathology and audiology.

5713* Rhetorical Theory. Contemporary rhetorical theory focusing on the processes pf 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.

SPEECH PATHOLOGY (SPATH)

1713 Voice and Speech Improvement. Lab 2. Use of the international phonetic alphabet in the improvement of pronunciation, with some attention to substandard and nonstandard speech. Correction of distracting articulation, voice qualities and regionalisms. Exercises in the production of sounds and oral reading.

2213 Phonetics. Prerequisite: sophomore standing. The sounds of English from the standpoints of their production, reception and symbolic use. Extensive practice transcribing English into the international phonetic alphabet.

3010 Pre-Practicum Clinical Experience. 1-3 credits, maximum 6. Prerequisite: consent of instructor. Observation of and participation in speech and language pathology and audiology clinical activities.

3113* Introduction to Speech and Language Pathology. Prerequisite: 2213 (previous or concurrent enrollment) and sophomore standing. The nature, symptoms, etiology and diagnosis of major speech and language disorders. Methods and techniques utilized in the correction of speech and language disorders. Direct therapy observations.

3123* Audiology and Audiometry. Prerequisite: 3113. Anatomy and physiology of the hearing mechanism and related physics of sound. Common etiologies of hearing disorders. Practical experience in pure tone and speech audiometry. Study of hearing conservation programs.

3213* Speech-Language Pathology for Teachers. Prerequisite: sophomore standing. The normal development of speech and language. The nature, causes and symptoms of communication disorders. Instruction in identification, referral and classroom management of the communicatively handicapped child.

3224* Speech and Language Development. Prerequisite: 3113. The nature, theories and influencing factors of speech and language development.

4010* Research and Practicum. 1-3 credits, maximum 9. Prerequisite: consent of instructor. Supervised research and/or practicum in speech and language pathology and audiology.

4113* Speech and Language Pathology: Functional Disorders. Prerequisite: 3113. Incidence, causes and characteristics of articulation, stuttering and language disorders. Discussion of therapy techniques.

4123* Speech and Language Pathology: Organic Disorders. Prerequisite: 3113. Incidence, causes and characteristics of organically based speech and language disorders with emphasis on cleft palate, cerebral palsy, aphasia and laryngectomy. Discussion of therapy techniques.

4133* Aural Rehabilitation for the Acoustically Handicapped. Prerequisite: 3123. Clinical aspects of habilitation and/or rehabilitation programs for deaf and hard-of-hearing, including: speech reading, auditory training, speech conservation, speech and language therapy, hearing aid orientation and counseling. Amplification units studied.

4214* Anatomy and Physiology of the Speech Mechanism. Prerequisite: 3113. Structure and function of the speech mechanism. Lab experiences.

4223* Psychology of Speech. Prerequisites: PSYCH 1113 and 6 credit hours of speech. A comprehensive study of the psychological and sociological bases of speech.

4242* Orientation to the Clinical Process I. Prerequisite: 4113. Clinical procedures, use of clinical equipment, phonetic transcription of disordered speech, basic articulation testing, planning therapy sessions, progress report writing and proficiency in selected therapy techniques.

4252* Orientation to the Clinical Process II. Prerequisite: 4242. Speech and language diagnostic testing and procedures, interpreting diagnostic information and deriving appropriate treatment goals.

5000* Research and Thesis. 1-3 credits, maximum 6. Prerequisite: approval of Head of Department. Research in speech and language pathology and audiology.

5013* Introduction to Graduate Study In Speech Pathology. Research methods with emphasis on those used most frequently in speech and language pathology and audiology; experience devising and implementing research.

5113* Articulation Disorders. Prerequisites: 3224, 4113. Recent research into the nature, causes and treatment of articulation disorders in children.

5123* Clinical Audiology. Prerequisite: 3123. Hearing disorders and their etiologies. Clinical application of pure tone and speech audiometric tests, including special diagnostic tests. Overview of rehabilitation and amplification.

5133* Stuttering. Prerequisite: 4113. Recent research into the nature, causes and treatment of stuttering.

5154* Neurological Speech Disorders. Prerequisites: 4123, 4214. Neurological structures and organization necessary for speech production. Nature, diagnosis and treatment of neurologically based speech and language disorders emphasizing aphasia, cerebral palsy and motor speech disorders.

5172* Cleft Palate Rehabilitation. Prerequisites: 4123, 4214. Recent research in the etiology repair, speech characteristics and communication remediation procedures with persons having cleft palate.

5183* Voice Disorders Rehabilitation. Prerequisites: 4123, 4214. The vocal mechanism and factors that may cause voice deviation. Recent research on diagnostic and remediation procedures for hoarseness, pitch deviation, laryngectomy and other laryngeal conditions.

5210* Advanced Practicum. 1-3 credits, maximum 9. Prerequisite: consent of instructor. Practical experience for the advanced student on or off campus.

5213* Speech Science. Prerequisite: 4214. Analysis of research on the acoustic parameters, the perceptual and productive processes of speech and the interrelationships of these factors during speech communication. Laboratory applications.

5233* Language Disorders of Children. Linguistic and nonlinguistic characteristics of lan-

guage **acquisition.** Review of current literature regarding the acquisition process in various groups of language-disordered children and analysis of management techniques.

5253* Diagnostic Procedures in Speech Pathology. Prerequisites: 3123, 4113, 4123. Theo**ries, methods and techniques of evaluation of** speech and language disorders.

5710* Special Topics In Speech Pathology. 1-4 credits, maximum 9. Individual and group investigations of problems in speech and language pathology and audiology.

STATISTICS (STAT)

2013 (A,L)Elementary Statistics. Prerequisite: MATH 1213. Descriptive measures, elementary **probability,** sampling, estimation and testing, chi-square, regression and correlation, analysis of variance. No credit for students with credit in 2023.

2023 (A,L)Elementary Statistics for Business and Economics. Prerequisite: MATH 1513. Descriptive measures, elementary probability, sampling, estimation and testing, regression and correlation. No credit for students with credit in 2013.

3013* (A,L)Intermedlate Statistical Analysis. Lab 2. Prerequisite: 2013 or 2023. Applications, experimental design, analysis of variance, simple and multiple regression, nonparametric statistics, survey sampling, time series and Bayesian analysis.

4013* (A,L)Statistlcal 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 of one-way classification, two-way classification and nested classification.

4023* (A,L)Statistlcal Methods II. Lab 2. Prerequisite: 4013 or equivalent. Basic concepts of experimental unit and experimental error. Analysis of variance of disproportionate data, covariance, split-plot techniques. Factorial arrangements of treatments, multiple regression in estimation and analysis of variance, curvilinear regression and enumeration data.

4033* Engineering Statistics. Lab 2. Prerequisite: MATH 2365. Introduction to probability, random variables, probability distributions, analysis of variance and linear regression.

4043* Applied Regression Analysis. Prerequisite: 4013 or equivalent. Fitting a straight line, matrix models, residuals, selecting best equation, multiple regression and nonlinear estimation.

4053* Statistical Methods for Engineers. Lab 2. Prerequisite: MATH 2365. Methods of experimental statistics for engineers. No credit for students with prior credit in 4013.

4113* Introduction to Probability Theory. Prerequisite: MATH 2365. Basic probability theory, **independence and dependence,** random variables, moments, functions of random variables.

4203* Mathematical Statistics I. Prerequisite: MATH 2365. A survey course in mathematical statistics. Includes probability, univariate populations, multivariate populations, sampling distributions, point estimation, interval estimation, tests of hypotheses.

4213* Mathematical Statistics II. Prerequisites: 4113 or 4203 and MATH 3013. Multivariate normal distribution, maximum likelihood estimators, interval estimation, tests of hypotheses, linear regression, decision theory, sequential analysis and distribution-free methods.

4910* Special Studies. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Special subjects in statistics.

5000* Research in Statistics. 1-6 credits, maximum 6. Methods of research and supervised thesis or report.

5033* Nonparametric Methods. Prerequisite: 4023 or consent of instructor. Alternatives to normal-theory statistical methods; analysis of categorical data and ordinal data; measures of association; goodness-of-fit tests; order statistics.

5043* Sample Survey Designs. Prerequisite: 4013 or consent of instructor. Constructing and analyzing designs for survey investigations. Descriptive surveys including simple random, stratified and multistage survey design. Estimation in finite populations including ratio and regression estimation. Questionnaire construction. Nonsampling errors, analytical surveys, sampling for time series, nonparametric tests.

5053* Time Series Analysis. Prerequisites: a course in probability and consent of instructor. Descriptive techniques; probability models for time series, autoregressive processes, fore-

casting. Fourier methods and special density and cross-spectrum. Smoothing techniques. Use of computer programs for model fitting.

5063* Multivariate Methods. Prerequisites: 4023 and 4043, or consent of instructor. Use of Hotelling's T-squared statistic, multivariate analysis of variance, canonical correlation, **principal** components, factor analysis and linear discriminant functions.

5113* Probability Theory. Prerequisite: 4113. Transformations of random variables, generating functions, sequences of random variables, convergence theorems. Same course as MATH 5623.

5123* Stochastic Processes. Prerequisites: 4113 or MATH 2613 or consent of instructor. 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 INDEN 5133 **and** MATH 5633.

5213* Bayeslan Decision Theory. Prerequisite: 4213. Intermediate-level course in the general theory of statistical decision theory. Introduces the axiomatic basis of selecting optimal decisions.

5303* Experimental Designs. Prerequisite: 4023. Analysis of variance involving subsamples **and disproportionate** subclass numbers, estimation of variance components, incomplete block designs including lattice designs, confounding of factorial effects, fractional replication of factorials, multiple comparison techniques, principles of split-plots and combining experiments.

5323* Theory of Linear Models I. Prerequisites: 4023 or 4033 or 4043, and 4213. Markov theorem, general linear hypotheses of full rank and less than full rank, regression models, experimental design models, cross classification models, incomplete block models, vari**ance components,** mixed models.

5333* Theory of Linear Models II. Prerequisite: 5323. Computing techniques, polynomial models, functional **relationships,** experimental design models, mixed models and vari**ance component estimation.**

5403* Theory of Sample Designs. Prerequisite: 4113. Mathematical **development of sampling, simple probability systems, methods of estimation, simple random, stratified ran**dom **and** two-stage designs, sample size methods of allocation and simple cost function.

5513* Multivariate Analysis. Prerequisite: 5113 or MATH 5623. Theory of 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, discrimi**nate analysis and applications.**

5810* Seminar In Statistics. 1-6 credits, maximum 12. 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: 4023 or 4043, and 4213, 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.**

6113* Advanced Probability Theory. Prerequisites: 5123 or MATH 5633, and MATH 5153. A measure theoretic **presentation** of the theory of probability. Probability spaces, random variables, and independence. Same course as MATH 6223.

6213* Advanced Statistical Inference. Prerequisite: 5213. Confidence intervals, point, esti**mation,** maximum likelihood, Cramer-Rao inequality, Neyman-Pearson theory of testing **hypotheses and** power of test.

6323* Advanced Design of Experiments I. Prerequisite: 5323 or consent of instructor. Theory of factorial arrangements of treatments. Confounding of factorial effects. Fractional **replication of factorials, confounding in mixed series of factorials, randomization tests, transformations of data, plot techniques and principles of split-plot techniques. Analysis of series of experiments and analysis of covariance.**

6333* Advanced Design of Experiments Ii. Prerequisite: 6323. Application of Galois field theory to **construction** of designs. Experimental structures, main effect plans, randomization theory. Response surface designs, constrained randomization and other selected topics.

6910* Special Problems. 1-6 credits, maximum 12. Investigation of special problems in the theory and application of statistics using current techniques.

TECHNICAL EDUCATION (TECED)

3103 Introduction to Technical Education. Prerequisite: OAED 3113. 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.

4112* Instructional Aids. Materials and hardware currently available in typical vocational and technical education programs. Practice in the development of projected and nonprojected materials. Each student develops instructional aids appropriate for use in the technical specialty.

5113* Comparative Occupational 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 enlarges, critical view of technical education.

5223* Curriculum Development in Technical Education. The interrelationship of mathematics, science, technical specialty and general education in technical curriculums. Contemporary practices in constructing, revising and evaluating technical curriculums. No credit for students with credit in OAED 5153.

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.

THEATRE (TH)

2413 (H)Introduction to the Theatre in Western Civilization. Character, plot, thematic, **historical and production** analyses of various types of play scripts; understanding the work of **various** theatre artists; developing appreciative audiences.

2423 Oral Interpretation. Reading aloud effectively; training in voice improvement, platform techniques, selection criteria and audience analysis.

2433 History and Design of Theatrical Costume. Periods of stage costume; manners of wearing costumes; costume-related accessories; techniques of design and construction for costumes of great theatrical eras.

2444 Stagecraft I. Lab 2. Prerequisite: 2413 or consent of instructor. Scenery and lighting design and execution. Practical experience in technical theatre in preparation of Theatre **Guild productions.**

2721 Makeup for Stage and Television. Lab 2. Techniques in theatrical makeup: fundamentals, character and corrective.

3423* Acting. Prerequisite: 2413 or consent of instructor. Theories and techniques of acting; stage movement and vocal interpretation; performance of scenes.

3442 Stagecraft II. Lab 2. Prerequisite: **2444.** Extended laboratory for those with special abilities **and** interests in stagecraft.

4413* Lighting for Theatre and Television. Lab 2. Stage lighting design, elementary electricity, physics of lighting instruments. Practical experience in lighting in preparing for **Theatre Guild productions.**

4420* Summer Theatre. 3-6 credits, maximum 6. Workshop in all phases of theatre production: acting, stagecraft, lighting, makeup, publicity, box office, etc.

4433* Scene Design for Theatre and Television. Prerequisite: 2444 or consent of instructor. The designer's **approach** to the script; execution of sketches, models and working drawings.

4443* Directing. Prerequisite: 3423 or consent of instructor. Techniques of play selection, play analysis, casting and rehearsal. Preparation of play production manuals; planning **and** direction of scenes and short plays.

4453* (H)Theatre History L Prerequisite: 2413 or **consent** of instructor. Physical theatre, drama, production and management from the sixth century B.C. to the eighteenth century A.D.

4463* (H)Theatre History II. Prerequisite: 2413 or **consent** of instructor. Physical theatre, drama, production and **management** from the eighteenth century to the mid-twentieth century.

4513* Current Theatre Of the Western World. Prerequisite: 2413 and 3423 and **4443,** or consent of instructor. Theatrical analyses of **avant** garde **plays of protest and paradox.**

4523* Reader's Theatre. Prerequisites: 2423 **and** 3423, or consent of instructor. Various approaches to Reader's Theatre production. Character analysis and vocal interpretation.

5010* Seminar In Theatre. 1-3 credits, maximum 6. Prerequisite: **consent** of instructor. Individual or group studies in techniques, history or literature of the theatre.

5413* Dramatic Theory. Concepts of play construction and audience effects: classic, neoclassic and modern.

5423* Problems in Advanced Acting. Prerequisites: **2444 and 4413 and 4443 and 4453 and 4463, or consent of** instructor. **Practical realization, concentration, imagination, awareness and emotional** memory; seminar reports on theories, genres **and** periods of great acting; four scenes demonstrating theoretical **and** practical **knowledge.**

5443* Problems In Advanced Directing. Prerequisites: **2444 and 4413 and 4443 and 4453 and 4463, or consent of** instructor. **Analyses of various** theatrical **styles; directing for proscenium, arena and open stages; a complete production directed by each student.**

TRADE 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.

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.**

3112 Trade and Job Analysis. Techniques **and** procedures for **analyzing occupations and** trades to determine teaching content **and** for organizing the information into appropriate units for further course **development.** No credit for students with credit in OAED 3012.

3203 Introduction to 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.

3212* Safety Practices In Educational Programs. Prerequisites: 60 credit hours or teaching experience. **Application** of industrial safety principles and practices to instructional shop **and** laboratory **situations.**

4103* Instructional Procedures In Trade and Industrial Education. Prerequisite: 4343. 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 4. Prerequisite: **consent** of instructor. New developments in scientific **and** technical information and **knowledge** which are relevant to current trade practices.

4122* Coordinating Trade and Industrial Youth Activities. The role of youth clubs in vocational education at local, state and national levels. Includes procedures **for planning** programs-of-work, fund-raising activities **and techniques** for recognizing **outstanding** members **and** community supporters.

4213* Organization and Management of Instructional Facilities. Techniques and procedures for organizing and managing instructional facilities and learner **activities to enhance the quality of instruction and improve efficiency of equipment and space utilization.**

4343* Instructional Planning. Prerequisite: Developing and organizing course outlines and instructional materials for shop and laboratory courses.

5114* Interdisciplinary Cooperative Education. Prerequisites: 3112 and 3203. Techniques and procedures for coordinating cooperative education programs. Includes planning, organizing, implementing and evaluating effective cooperative programs.

5150* Supervision of Vocational Education. 2-3 credits, maximum 3. 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.

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.

5552* Education-Industry Relations. Prerequisite: vocational teaching experience. Techniques for establishing and maintaining positive relationships between vocational industrial education, industry and the community.

5662* Conference Leading. Developing skills in organizing and leading conferences based upon,vlndividual and group behavior patterns.

5773* Related Information for Interdisciplinary Cooperative Education. Prerequisite: 3112 and 3203. Selection, organization and application of resources materials for direct and indirect related study in part-time cooperative classes.

5882* Practices and Problems of the Coordinator. Prerequisites: 3112 and 3203. Current practices and problems in planning and coordinating interdisciplinary cooperative programs.

5910* Developing and Analyzing Teaching Content. 1-3 credits, maximum 6. Prerequisites: 3112, 4343 and consent of instructor. Provides opportunity for experienced teachers to incorporate the latest industrial technology into their course of study.

UNIVERSITY (UNIV)

1313 Critical Reading and Thinking. An interdisciplinary course to develop reading and thinking skills. Reading in various disciplines, following a method designed to help students see the bias of the writer, understand the relevance of style to meaning, discover and formulate the assumptions and implications, and appreciate the many ways of making writing clear, cogent and enjoyable.

2113 Man and His Environment. An interdisciplinary approach to environmental problems: population growth, food supply, pollution, management of natural resources, impact of technology, urban problems, political and institutional change and disease.

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.

2223 Man and Society. An interdisciplinary approach to social problems in a technological age.

3110 Directed Study. 1-6 credits, maximum 6. Prerequisite: written application approved by instructor, the department head, and the dean of the student's college. Independent study, research, field work or internship.

3510 Issues and Innovations. 1-6 credits, maximum 6. Lab 0-12. May be used for not more than two semesters for experimental courses centering on a significant contemporary topic and/or applying a unique pedagogical approach.

5940* Career Orientation and Guidance. 1-3 credits, maximum 6. Developing models for career orientation: implementing programs of guidance for occupational choice. Employment opportunities and career development.

VETERINARY ANATOMY (VANAT)

5115* Veterinary Histology and Cytology. Lab 5. Prerequisite: first-year standing in College of Veterinary Medicine or consent of instructor. Organization and structure of cells and tissues of domestic animals.

5216* Veterinary Gross and Developmental Anatomy. Lab 7. Prerequisite: First-year standing in College of Veterinary Medicine or consent of instructor. Dissection and study of the comparative gross and developmental anatomy of the body cavities, the head and the central nervous system of representative species of the Orders Carnivora, Perissodactyla, Artiodactyla and a brief study of the anatomy of Class Aves.

5444* Comparative Anatomy of Domestic Animals II. Lab 6. Prerequisite: second-year standing in College of Veterinary Medicine or consent of instructor. Comparative anatomy of representative species of the Orders Carnivora, Perissodactyla and Artiodactyla, with special reference to the limbs and locomotion.

5531* Veterinary Agronomics and Poisonous Plants I. Lab 2. Prerequisite: second-year standing in College of Veterinary Medicine or consent of instructor. Soil, plant and animal interrelationships in the practice of veterinary medicine. Recognition of warm-season plants important to veterinary medicine.

5641* Veterinary Agronomics and Poisonous Plants II. Lab 2. Prerequisite: second-year standing in College of Veterinary Medicine or consent of instructor. Recognition of cool-season plants important to veterinary medicine. Toxicology of selected warm- and cool-season plants as it relates to the practice of veterinary medicine.

6110* Comparative Regional Anatomy. 1-3 credits, maximum 15. Lab 3-9. Prerequisite: consent of instructor. Comparative study of limited parts or regions of the bodies of domestic animals.

6161 Applied Anatomy I. Lab 2. Prerequisite: third-year standing in College of Veterinary Medicine. Anatomical topics designed to support other related courses in the third-year veterinary medicine program.

6210* Problems In Anatomy. 1-3 credits, maximum 12. Lab 3-9. Prerequisite: consent of instructor. Problems in gross anatomy, histology or embryology.

6220* Special Anatomy. 1-3 credits, maximum 12. Lab 3-9. Prerequisite: consent of instructor. Detailed study of the anatomy of a selected animal species.

6281 Applied Anatomy II. Lab 2. Prerequisite: third-year standing in College of Veterinary Medicine. Anatomical topics that support other related courses in the fourth-year veterinary medicine program.

6440* Surgical Anatomy. 1-3 credits, maximum 12. Lab 3-9. Prerequisite: consent of instructor. Gross anatomy of special areas related to surgical diagnosis and treatment.

6550* Advanced Veterinary Agronomics. 1-3 credits, maximum 6. Lab 3-9. Prerequisite: 5531. Pharmacodynamics of plant toxins and therapeutic measures used to counteract their actions.

6583* Veterinary Neuroanatomy. Lab 3. Prerequisite: 5235. Gross and microscopic anatomy of the central and peripheral nervous system of domestic animals including the special sense organs.

VETERINARY MEDICINE (VMED)

5111 Orientation to the Veterinary Medical Profession. Prerequisite: first-year veterinary student standing. An introduction to medical etymology, the history and literature of veterinary medicine, the obligations of the profession and the field of specialization.

5231 * Fundamentals of Biometry. Introduction to the science of statistics applied to biological observation. For second-year veterinary medical students.

6261* Veterinary Medical Conference I. Prerequisite: third-year standing in the College of Veterinary Medicine. Specialty conferences for third-year students. Graded on pass-fail basis.

6372* Veterinary Medical Conference II. Prerequisite: 6261. Clinical conferences for fourth-year students. Graded on pass-fail basis.

6481* Veterinary Medical Conference III. Prerequisite 6261. Specialty conferences for fourth-year students. Graded on pass-fail basis.

VETERINARY MEDICINE AND SURGERY (VMS)

6100* Clinical Problems and Investigation. 1-6 credits, maximum 6. Prerequisite: 6762, 6402, 6376, graduate standing in the College of Veterinary Medicine. Advanced training in clinical research problems and techniques.

6102* Small Animal Medicine and Diseases II. Prerequisite: 6463. Diagnosis, treatment and prevention of diseases of small domestic animals. Continuation of 6463.

6110* Advanced Clinics. 1-6 credits, maximum 6. Prerequisite: 6762, 6402, 6376, 6484 or graduate standing in the College of Veterinary Medicine. Advanced clinical study of diseases of animals.

6151 Clinical Orientation. Lab 3. Prerequisite: third-year standing in the College of Veterinary Medicine. Behavioral traits, physical examination, restraint of animals and clinical techniques.

6155* Clinical Medicine II. Lab 4. Prerequisite: third-year standing in the College of Veterinary Medicine. Reproduction in domestic animals including principles of parturition and dystocia, genital diseases and breeding problems. Laboratory: special assignments in clinical reproduction techniques and problems in animals.

6171* Clinical Medicine III. Prerequisite: third-year standing in the College of Veterinary Medicine. Clinic rounds: discussion of cases of large and small animal diseases.

6181* Clinical Medicine IV. Prerequisite: 6171. Clinic rounds: continuation of 6171.

6202* Large Animal Medicine and Diseases II. Prerequisite: 6563. Diagnosis, treatment and prevention of sporadic and infectious diseases of large animals. Continuation of 6563.

6220* Seminar. 1-3 credits, maximum 3. Prerequisite: graduate standing in the College of Veterinary Medicine or biological sciences. Consideration of literature and research problems pertaining to veterinary medicine and surgery.

6251* Radiology I. Prerequisite: third-year standing in the College of Veterinary Medicine. Fundamentals of veterinary radiology, radiological diagnosis and therapy; use of radioisotopes in veterinary medicine.

6261* Radiology II. Prerequisite: 6251. Recitations and demonstrations pertaining to the interpretation of radiographs and evaluations of radiological therapy. Continuation of 6251.

6281* Surgery IV. Lab 4. Prerequisite: 6302. Continuation of 6302.

6302* Surgery III. Lab 4. Prerequisite: 6663. Discussion of operative techniques and operative practice in veterinary surgery.

6330* Comparative Anesthesiology. 1-3 credits, maximum 3. Prerequisite: graduate standing in the College of Veterinary Medicine or consent of the Head of the Department. Advanced training in anesthesiology of animals.

6353* Surgery I. Lab 3. Prerequisite: third-year standing in the College of Veterinary Medicine. The **pathophysiology** of surgery including an introduction to techniques in veterinary surgery and anesthesiology. Laboratory consists of special assignments and programmed techniques in surgical preparation and procedures in anesthesiology.

6376* Clinic III. Lab 18. Prerequisite: 6402. Continuation of 6402. Graded on pass-fail basis.

6382* Jurisprudence and Medical Economics. Prerequisite: fourth-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. Visiting lecturers in specialty areas assist in this course.

6402* Clinic II. Lab 6. Prerequisite: 6762. Continuation of 6762. Graded on pass-fail basis.

6440* Special Clinic. 1-4 credits, maximum 4. Prerequisite: 6462 and fourth-year standing in the College of Veterinary Medicine. Elective for selected areas of medicine and surgery The diagnosis, prognosis and treatment of diseases of animals in selected areas.

6452 Clinical Medicine I. Prerequisite: third-year standing in the College of Veterinary Medicine. Introduction to clinical medicine emphasizing physical examination of animals, diagnostic methods and application of fundamentals of medicine.

6463* Small Animal Medicine and Diseases I. Prerequisite: 6155 and third-year standing in the College of Veterinary Medicine. Diagnosis, treatment and prevention of infectious and noninfectious diseases of small animals.

6476* Preceptorship Clinic and Conference. Lab 18. Prerequisite: 6102, 6202, 6302, 6402 and fourth-year standing in the College of Veterinary Medicine. Diagnosis, prognosis and treatment of diseases of animals presented in the preceptorship program. Graded on pass-fail basis.

6484* Clinic IV. Lab 12. Prerequisite: 6376. Continuation of 6376. Graded on pass-fail basis.

6563* Large Animal Medicine and Diseases I. Prerequisite: 6155 and third-year standing in the College of Veterinary Medicine. Diagnosis, prevention and treatment of sporadic and infectious diseases of large animals.

6650* Special Surgical Problems and Techniques. Lab 3-5. 1-5 credits, maximum 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.

6663 Surgery II. Lab 4. Prerequisite: 6353, 6155. Operative techniques and practice in veterinary surgery.

6762 Clinic I. Lab 6. Prerequisite: 6452, 6155, 6251, 6353 and third-year standing in the College of Veterinary Medicine. Diagnosis, prognosis and treatment of animal diseases. Graded on 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.

4113 Medical Parasitology. Lab 2. Prerequisites: Introductory biology and consent of instructor. Human and parasitological problems including endemic, exotic, and zoonotic organisms. Life cycles, diagnosis and control procedures. Principles are applicable to all areas of zoology, medicine, veterinary medicine and medical technology. Same course as MICRO 3153.

4203* General Parasitology. Lab 2. Prerequisite: ZOOL 3104. Taxonomy, structure, physiology, ecology and epidemiology of parasites. Same course as ZOOL 4203.

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 Veterinary Medicine or consent of instructor. Basic principles of immunology and their application to veterinary medicine.

5132* Introduction to Public Health. Prerequisite: second-year standing in College of Veterinary Medicine. Relationship and responsibilities of the veterinarian to public health programs. Topics in community and environmental health.

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 WILDL 5213..

5223* Veterinary Bacteriology. Lab 3. Prerequisite: first-year standing in Veterinary Medicine or consent of instructor. Pathogenic bacteria of domesticated animals and relationship to public health.

5242* Epidemiology and Zoonoses. Lab 6. Prerequisite: second-year standing in College of Veterinary Medicine or graduate standing and consent of instructor. Epidemiology in the practice of veterinary preventive medicine and public health with emphasis on the zoonotic diseases.

5321* Veterinary Mycology. Lab 3. Prerequisite: first-year standing in Veterinary Medicine

or consent of instructor. Fungi **pathogenic** for domesticated animals and their relation**ship to public health.**

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.**

5433* Veterinary Virology. Lab 3. Prerequisite: **second-year** standing in Veterinary Medicine or consent of instructor. Viruses **responsible** for disease in domesticated animals and their **relationship to public health.**

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 Helmint hology. Lab 3. Prerequisites: 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.**

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. Prerequisites: senior or graduate standing in zoology or **entomology or** permission of Department Head. Structure, life cycle, **physiology,** host **relations, methods and diagnosis concerned with protozoan parasites affecting verte**brates, including man.

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 40. 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.**

6382* Food Hygiene. Lab 4. Prerequisite: fourth-year standing in College of Veterinary Med**icine. 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.**

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.

5135* Veterinary Pathology I. Lab **4.** Prerequisite: second-year standing in College of Veterinary Medicine or written consent of Department Head. Cellular and tissue pathology, **pigments, inflammation, disturbances of growth and circulation; pathology of the various systems. Functional disturbances that accompany changes in structures, as well as the cause of disease. Students are taught to correlate altered structure and function with clinical signs.**

5245* Veterinary Pat hoiogy II. Lab 3. Prerequisite: 5135 or written consent of Department Head. **Continuation** of 5135.

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 veteri**nary pathology. Graduate** credit in meeting requirements of the Ph.D. degree.

6020* Seminar. 1-2 credits, maximum 6. Prerequisite: graduate standing in biological sciences. Literature and research problems in veterinary pathology.

6030* Laboratory Animal Pathology. 1-2 credits, maximum 2. Lab 2. Prerequisite: 6461 or written consent of Department Head. Etiology and pathogenesis of spontaneous and experimentally induced diseases of commonly used species of laboratory animals.

6152* Poultry Pathology. Prerequisite: 5245. Diagnosis, prevention and treatment of diseases of poultry.

6253* Pathology of Infectious Diseases. Prerequisite: 5245. Pathology of specific infectious diseases of animals, including those communicable to man, and methods employed in their diagnosis.

6330* Diagnostic Pathology. 1-4 credits, maximum 20. Prerequisites: graduate standing in the College of Veterinary Medicine and approval of Department Head. A weekly review of current cases submitted to the Department and the methods employed in their diagnosis. Students examine necropsy reports, specimens and preparations individually and are required to formulate their own diagnoses.

6363* Clinical Pathology. Lab 2. Prerequisite: third-year veterinary standing or graduate standing and consent of Department Head. Laboratory methods used in evaluation of pathologic conditions in animals. Includes hematology, urinalysis and clinical chemistry.

6443* Advanced Oncology. Lab 2. Prerequisites: 5135, graduate standing, and consent of Department Head. Neoplastic diseases of animals with emphasis on morphologic characterization, etiology, metastatic propensities and mechanisms and comparative relationships among different animal species.

6461* Laboratory Animal Diseases. Prerequisite: 5135 or written consent of Department Head. Taxonomy, biological characteristics, husbandry and recognition, prevention, treatment and control of diseases of animal species used in biomedical research and teaching.

6553* Neuropathology. Lab 2. Prerequisite: 5245, graduate standing, and consent of Department Head. **Morphologic** changes which occur in the nervous systems of the domesticated animals and the correlation of such lesions with recognized specific diseases.

6660* Advanced Systemic Pathology. 3-4 credits, maximum 18. Total credit not to exceed 6 for the M.S. degree and 12 for the Ph.D. Prerequisites: 5245, graduate standing, and consent of Department Head. Re-enrollment permits the study of 2 to 4 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.

6773* Advanced Hematology. Lab 2. Prerequisites: 5245 or equivalent, graduate standing, and consent of Department Head. The etiology and pathogenesis of diseases of the blood and bone marrow.

6863* Advanced Clinical Pathology. Lab 2. Prerequisites: 5245 or equivalent, graduate standing, and consent of Department Head. Applied clinical biochemistry, organ function tests and related cytologic examination.

WILDLIFE (WILDL)

3513* Principles of Wildlife Ecology. Prerequisites: 60 credit hours, including BISC 3034. Application of ecological principles to the production and control of natural populations.

3522* (L)Fleld Problems in Wildlife Ecology. Lab 4. Prerequisites: 3513 and STAT 2013. Research techniques, data collection and analyses used by the wildlife biologist. Emphasis on problem identification, research design and report writing.

3700 Readings in Wildlife ECOlogy. 1-3 credits, maximum 3. Prerequisite: consent of instructor. Discussion of announced readings.

4100* Wildlife Laboratory Techniques. 1-3 credits, maximum 3. Prerequisite: 3513 or consent of instructor. A modular course covering those parts of histology. microtechnique and biological and environmental sampling that are related to professional wildlife work.

4513* Biological Basis of Wildlife Management. Prerequisite: 3513. Biological basis for the management of wildlife, their populations and habitats, with additional emphasis on current problem areas in wildlife conservation.

4800 Undergraduate Research Problems. 1-4 credits, maximum 4. Prerequisite: consent of

instructor. Participation in faculty research and/or execution of a problem formulated by the 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 a graduate faculty member.

5100* Graduate Seminar. 1-3 credits, maximum 10. Prerequisite: consent of instructor. Discussion of announced topics.

5213* 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.

5300* Special Problems. 1-3 credits, maximum 6. Prerequisite: consent of instructor. A report of results obtained to be placed in Department files.

5414* Wildlife Management Techniques. Prerequisite: 4513 or consent of instructor; 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/management recommendations and report preparation and presentation.

5553* Ungulate Ecology. Prerequisite: consent of instructor. Ecology and behavior of ungulates including taxonomy, ruminant and nonruminant life styles, evoluation of social systems, ontogeny of horns and antlers, and habitat relationships. Population models.

5573* Advanced Wildlife Ecology. Prerequisites: 4513 and BISC 3034. Dynamics of terrestrial populatons: animal-plant interdependencies, physiological and behavioral mechanisms, limitations in carrying capacity of habitat and limitations in adjusting to alterations of the environment.

5563* Weiland 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.

6000* Research for Ph.D. Dissertation. 1-24 credits, maximum 24. Prerequisite: approval of major adviser. Independent research for the Ph.D. dissertation under the supervision of a Graduate Faculty member.

ZOOLOGY (ZOOL)

3104* Invertebrate Zoology. Lab 4. Prerequisite: BISC 1602. Morphology, physiology, reproduction and ecology of major invertebrate groups.

3205* Vertebrate Morphology. Lab 6. Prerequisite: BISC 1602. Comparative gross anatomy of representative vertebrates with consideration given to embryology, histology and evolution.

3423 Field Ornithology. Lab 4. Field work in identification, habits and life histories of birds.

3500 Colloquium on Environmental Crises. 1 credit, maximum 4. Current environmental issues presented by fihns and speakers. Critiques written on several selected presentations.

3604* Vertebrate Natural History. Lab 6. Prerequisite: BISC 1602. Basic principles of vertebrate classification and functional organization: systematic, life histories, reproduction, behavior and ecological adaptations of vertebrates, emphasizing local fauna. One weekend field trip required.

3633* Regional Analysis and Planning. An introduction to methods of examining and analyzing regions. Examination and interpretation of the spatial, social and ecological aspects of regional planning. Same course as GEOG 3633 and SOC 3633.

3700 Readings and Special Studies in Zoology. 1-3 credits, maximum 6. Prerequisites: BISC 1602 and consent of instructor. Discussion of selected readings.

3903* Evolution. Prerequisite: BISC 3003 or 3024. Development of the evolutionary concept: speciation, evolutionary mechanisms and phylogenetic concepts.

4002* 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 under-

take a research project in exhibit design. Lecturers include professional staff members of the Oklahoma City Zoo and guest speakers.

4124* Ichthyology. Lab 6. Prerequisite: 3205 or consent of instructor. Systematics, evolution, distribution and morphological, ecological and behavioral adaptations of fishes. Emphasis on Oklahoma forms. Two weekend field trips required.

4144* Herpetology. Lab 6. Prerequisite: BISC 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: 3205 or consent of instructor. Classification, distribution, economic value, identification, life histories, management, morphology of birds. One weekend field trip required.

4174* Mammalogy. Lab 4. Prerequisite: 3205 or consent of instructor. Classification, distribution, life histories, economic importance, techniques of field study, methods of collection and preservation of mammals.

4203* General Parasitology. Lab 2. Prerequisite: 3104. Fundamentals of parasitism with emphasis on: life cycles, disease conditions, epidemiology, diagnosis, treatment, historical significance, terminology, taxonomy and parasitological techniques.

4254* (L)Llmnology. Lab 3. Prerequisite: BISC 3034. Physical, chemical and biological factors in lakes and streams.

4424* (L)Embryology. Lab 4. Prerequisites: 3205,BISC 3013, 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.

4443* General Vertebrate Histology. Lab 3. Prerequisite: 3205 or consent of instructor. Cellular structure of tissues and organs.

4454* Microtechnique. Lab 4. Prerequisite: 3205 or consent of instructor. Techniques of killing, fixing, staining, sectioning and mounting animal tissues.

4524* Fisheries Management. Lab 4. Prerequisite: BISC 3034. Techniques and principles involved in management of fishes. Field trip fee required.

4800 Undergraduate Research Problems. 1-4 credits maximum 4. Prerequisite: consent of instructor. Participation in faculty research and/or execution of a problem formulated by the student.

4950 Honors Study In Zoology. 1-5 credits, maximum 5. Prerequisites: 90 credit hours, GPA of 3.3 in 16 or more hours in zoological courses, approval 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.

5100* Graduate Seminar. 1-3 credits, maximum 10. Prerequisite: consent of instructor. Discussion selected topics.

5200* 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.

5300* 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.

5503* Aquaculture. Lab 2. Prerequisite: graduate standing or consent of instructor. Environmental and nutritional requirements, diseases and cultural practices affecting growth and production of aquatic animals. Three weekend field trips required.

5504* Biology Of Fishes. Lab 6. Prerequisites: 4124, 4254. Ecology, food habits, behavior, life histories and distribution of fishes.

5513* Advanced Fishery Science. Lab 4. Prerequisites: 4124, 4254, 4524, and 6 credit hours of statistics or consent of instructor. Application of ecological and evolutionary theory to problem solving in fishery research and management.

5523* Early Life Hlstory Of Fishes. Lab 3. Prerequisites: 4124 and graduate standing or consent of instructor. Early life stages of fishes and the environmental factors influencing growth and survival during the first year of life.

5533* Water Pollution Ecology. Lab 6. Prerequisite: 4254 or consent of instructor. Effects of pollution on the ecology of aquatic ecosystems. Effects of contaminants on the structure and function of ecosystems; ecology of plankton, fish and benthic macroinvertebrates.

5544* 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.

5552* Population Dynamics. Prerequisites: BISC 3034, STAT 4013. Quantitative approaches to population *parameters* and related processes. Natural regulation of numbers emphasized.

5623* Environmental Cytology. Prerequisite: BISC 3013. Effects of environmental contaminants on cell structure and physiology.

5713* Ethology. Lab 3. Prerequisite: consent of instructor. The development of ethological principles and their use in analyzing the organization, function and causation of behavior. Emphasis on the adaptiveness of vertebrate behavior and the use of behavior in clarifying evolutionary relationships.

6000* Research for Ph.D. Dissertation. 1-15 credits, maximum 24. Prerequisite: approval of major adviser. Independent research for the Ph.D. dissertation under the supervision of a Graduate Faculty member.

6100* Ph.D. Candidate Seminar. 1-3 credits, maximum 10. Prerequisite: 30 credit hours of acceptable graduate work. For students doing study in zoology beyond the M.S. degree level. May deal in depth with specific areas of general topics.

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