

O K L A H O T M A T E



Catalog 1984-85

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 or an associate degree program in three 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 degree requirements that were in effect at the time of matriculation, plus changes indicated above, or meeting the new degree requirements that may 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 department office through which the degree is offered.

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**OKLAHOMA
STATE
UNIVERSITY**

CATALOG

1984 • 1985

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.

Contents

Admission	12
Degrees Offered	33
University Academic Regulations	35
College of Agriculture	47
College of Arts and Sciences	65
College of Business Administration	113
College of Education	127
College of Engineering, Architecture and Technology	147
College of Home Economics	173
College of Veterinary Medicine	185
The Graduate College	190
Oklahoma City Technical Institute	192
Course Listings	1-A
Index	203-A

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

University Calendar

Summer 1984

Regular 8-week Summer Session

May 31, June 1	Thursday, Friday	Registration
June 4	Monday 7:30 a.m.	Class work begins
July 4	Wednesday	Independence Day recess
July 28	Saturday, 12 Noon	Class work ends
August 1	Wednesday, 5:00 p.m.	Grades due

First Semester 1984-Fall

August 23,24	Thursday, Friday	Registration
August 27	Monday, 7:30 a.m.	Class work begins
September 3	Monday	Labor Day recess
October 15,16	Monday thru Tuesday	Fall recess
October 19	Friday, 5:00 p.m.	Progress reports for freshmen
October 26	Friday	Pre-enrollment for Spring
November 22	Thursday, 7:30a.m.	Thanksgiving recess begins
November 26	Monday, 7:30 a.m.	Class work resumes
December 10-14	Monday thru Friday	Pre-finals week
December 17-21	Monday thru Friday	Final examinations
December 21	Friday, 5:00 p.m.	Class work ends
December 31	Monday, 5:00 p.m.	Grades due

Winter Intersession

December 10-14	Monday thru Friday	Registration
December 24	Monday	Intersession begins
January 4	Friday	Intersession ends

Second Semester 1985-Spring

January 10-11	Thursday, Friday	Registration
January 14	Monday, 7:30 a.m.	Class work begins
March 8	Friday, 5:00 p.m.	Progress reports for freshmen
March 9	Saturday, 12:00 Noon	Spring recess begins
March 18	Monday, 7:30 a.m.	Class work resumes
March 22	Friday	Pre-enrollment for Fall
April 29-May3	Monday thru Friday	Pre-finals week
May 6-10	Monday thru Friday	Final examinations
May 10	Friday, 5:00 p.m.	Class work ends
May 11	Saturday 11:00 a.m.	Commencement
May 15	Wednesday, 5:00 p.m.	Grades due

Summer 1985

Regular 8-Week Summer Session

May 30-31	Thursday, Friday	Registration
June 3	Monday, 7:30 a.m.	Class work begins
July 4	Thursday	Independence Day recess
July 29	Monday, 5:00 p.m.	Class work ends (makeup exams)
July 31	Wednesday, 5:00 p.m.	Grades due

First Semester 1985-Fall

August 22,23	Thursday, Friday	Registration
August 26	Monday, 7:30 a.m.	Class work begins
September 2	Monday	Labor Day recess
October 18	Friday, 5:00 p.m.	Progress reports for freshmen
October 21,22	Monday thru Tuesday	Fall recess
October 25	Friday	Pre-enrollment for Spring
November 28	Thursday, 7:30 a.m.	Thanksgiving recess begins
December 2	Monday, 7:30 a.m.	Class work resumes
December 9-13	Monday thru Friday	Pre-finals week
December 16-20	Monday thru Friday	Final examinations
December 20	Friday, 5:00 p.m.	Class work ends
December 30	Monday, 5:00 p.m.	Grades due

Winter Intersession

December 9-13	Monday thru Friday	Registration
December 23	Monday	Intersession begins
January 3	Friday	Intersession ends

Second Semester 1986-Spring

January 9-10	Thursday, Friday	Registration
January 13	Monday, 7:30 a.m.	Class work begins
March 7	Friday, 5:00 p.m.	Progress reports for freshmen
March 8	Saturday, 12:00 Noon	Spring recess begins
March 17	Monday, 7:30 a.m.	Class work resumes
March 21	Friday	Pre-enrollment for Fall
April 28-May 2	Monday thru Friday	Pre-finals week
May 5-9	Monday thru Friday	Finals examinations
May 9	Friday, 5:00 p.m.	Class work ends
May 10	Saturday, 11:00 a.m.	Commencement
May 14	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 38,250 population. It is almost equal distance to Tulsa and Oklahoma City. The University is coeducational and has an enrollment of some 29,000 students of which more than 22,000 are on campus, 3,400 at Okmulgee and 2,880 at Oklahoma City, as well as several hundred students at the University Center at Tulsa.

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 some \$250,000,000. These facilities include one of the largest and most modern libraries in the entire Southwest, a large Student Union complete with hotel facilities, the 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 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 1,400,000-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 38 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 National Associa-

tion of State Universities and 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.

OSU 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, Architecture and Technology 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 undergraduate program in the College of Home Economics holds full accreditation from the American Home Economics Association and is one of its institutional members.

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 Colleges of Agriculture and Arts and Sciences, the director of the 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 University 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 ob-

tain 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

Seniors who are graduating from OSU at the end of a semester or summer session may take a limited number of courses for graduate credit during the last two semesters or summer sessions. The 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. Such credit may be earned under the following conditions: (a) the student must meet the same admission requirements and be subject to the same possible probationary or provisional restrictions as students admitted in graduate status; (b) the credits must not be required or needed for the bachelor's degree; (c) the total registration must not exceed 18 credit hours for a semester or nine credit hours for a summer session; (d) the student must either complete the requirements for the bachelor's degree at the end of the semester or summer session or be within 12 semester credit hours of completing such requirements at the beginning of the semester or summer session in which graduate credit is requested; (e) admission to courses taken for graduate credit must have the approval of the course instructor, the head of the department in which the courses are offered and the dean of the Graduate College; (f) not more than 14 semester credit hours taken while a senior may be approved for graduate credit, and a minimum of 16 semester credit hours must be completed in residence after the student registers in the Graduate College. Courses taken for graduate credit during the senior year may not be accepted for graduate credit at institutions other than OSU; (g) the use to be made of the graduate courses will be determined by the adviser when the student registers in the Graduate College and submits a plan of study for an advanced degree. The student must achieve an overall 3.00 grade-point average in *all* courses and make no less than a "B" in those courses for which he or she wants graduate credit.

Academic Dishonesty or Misconduct

Academic dishonesty or misconduct is not condoned nor tolerated at Oklahoma State University. *Academic dishonesty is* behavior in which a deliberately fraudulent misrepresentation is employed in an attempt to gain undeserved intellectual credit, either for oneself or for another. *Academic misconduct is* behavior that results in intellectual advantage obtained by violating specific directions, rules, or accepted academic standards, but without deliberate intent or use of fraudulent means.

Admission Requirements

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

Admission to Oklahoma State University 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 RESIDENT:	Freshman Transfer Special Admission
NONRESIDENT OF OKLAHOMA:	Freshman Transfer
READMISSION:	Oklahoma Resident and Nonresident

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 a resident and a nonresident 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 a student as a resident or a nonresident 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 to the Office of Admissions 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 OSU 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 a student as a resident or nonresident. Any

student who cannot determine his or her classification from these provisions should contact the Office of the Registrar for information.

Oklahoma Resident-High School Senior. 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 Resident-Freshman*, with the exception of being a high school graduate.

A high school senior who wishes to apply for concurrent enrollment should contact the Office of Admissions for instructions on how to proceed.

Oklahoma Resident-Freshman. Any resident of Oklahoma who (a) is a graduate of an accredited high school, (b) has participated in the American College Testing Program (ACT), 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 ACT 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 ACT, be admitted on probation for study in any summer session. A student admitted under this provision who (a) carries a credit-hour load of six 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, 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 OSU 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 Resident-Transfer. For information on transfer of credits, 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" grade-point average over all college work attempted. An Oklahoma resident transferring from another institution with less than a "C" grade-point average over 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 immediate past academic year and his or her grade-point average over all hours attempted is equal to or above that specified below:

<i>Total hours attempted in all colleges</i>	<i>Minimum grade point average required</i>
<i>fewer than 36</i>	<i>1.50</i>
<i>36 through 54</i>	<i>1.60</i>
<i>55 through 73</i>	<i>1.70</i>
<i>74 through 90</i>	<i>1.80</i>
<i>91 through 108</i>	<i>1.90</i>
<i>over 108</i>	<i>2.00</i>

Oklahoma Resident-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 ACT which ranked him or her among that of the upper one-half of high school seniors, based on twelfth-grade national norms,

or

- (2) the applicant's academic performance-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" grade-point average over the first semester's work to be eligible to return for a second semester.

Nonresident of Oklahoma-Freshman. An out-of-state student must file with his or her application 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) where available must have participated in the ACT 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 high school graduating class.
- (2) Attained a composite standard score on the ACT, 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 refer to *Admission Requirements, Oklahoma Resident-Freshman*. The policy that applies to Oklahoma residents also applies to nonresidents.

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

An out-of-state student must file with his or her application for admission a \$10 application fee which is not refundable.

A nonresident of Oklahoma transferring to OSU 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.
- (3) Must have not less than a 2.00 in his or her last academic semester.

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

English Proficiency Requirement. All new applicants to OSU for undergraduate study for whom English is a second language shall be required to present a score of 500 or above on the Test of English as a Foreign Language (TOEFL), regardless of the number of semesters or terms completed in other institutions.

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

Transfer of Credits

A student who desires to complete or who has completed one or more semesters of work in residence at an accredited college or university and transfers those credits 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 OSU and those credits will apply toward a baccalaureate degree 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 OSU
- (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 OSU.
- (3) Credits earned in *a junior college* cannot be used to satisfy OSU upper-division (junior and senior) level requirement 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 OSU.
- (5) A maximum of 65 credit hours earned at a junior college can apply toward a baccalaureate degree at OSU.
- (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

Application for Admission. Before enrollment is permitted, students entering Oklahoma State University for the first time must apply for admission by submitting **the Combined Application**. All students who apply for admission and who meet the admission requirements are accepted. When the form is received by the Office of Admissions, specific enrollment information is mailed back to the applicant. Early application is encouraged.

University Housing Application. One **section** of **the** above-mentioned *Combined Application* 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 one's choice of residence halls.

Student Health Services and Requirement. Prior to enrolling at OSU, the student is required to present a record of a physical examination by his

or her local or family physician or by presenting a recent equivalent record of physical examination, such as from a place of employment or school, or 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 Reserve Officers Training Corps (ROTC) and physical education.

First-time College Student.

A seven-semester transcript must be mailed to the Office of Admissions. Before enrollment, the applicant will be requested to pay a \$40 advance fee payment. Students will be notified when evidence is available that admission requirements have been met. Fall enrollment periods for the entering freshman 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 education plans for the future and selecting a major.

Transfer Student

A student who has attended OSU before and desires to transfer credits back to OSU should follow procedures given under *Former Student*. A student who wishes to transfer to OSU and who has never attended OSU should file his or her application for admission with the Office of Admissions. The student should also have each college attended mail an official copy of all transcripts to the Office of Admissions. Upon receipt of the application for admission and official copies of all transcripts, the Office of Admissions will notify the student of his or her admission status and will instruct the student who is accepted on how to enroll. The student should bring with him or her a \$40 advance fee payment when he or she comes to the campus to enroll.

Former Student

A student who has attended OSU but did not enroll in the immediate past semester should file an application for readmission. The application form may be obtained 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. If admissible the student will be given instructions 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	\$19.30 General fee <u>2.35</u> Required student activity fee \$21.65 Total per credit hour
Upper-division courses	\$22.60 General fee <u>2.35</u> Required student activity fee \$24.95 Total per credit hour
Graduate-division courses	\$27.30 General fee <u>2.35</u> Required student activity fee \$29.65 Total per credit hour

Nonresidents of Oklahoma

Lower-division courses	\$19.30 General fee 2.35 Required student activity fee <u>50.20</u> Nonresident tuition \$71.85 Total per credit hour
Upper-division courses	\$22.60 General fee 2.35 Required student activity fee <u>58.20</u> Nonresident tuition \$83.15 Total per credit hour
Graduate-division courses	\$27.30 General fee 2.35 Required student activity fee <u>70.00</u> Nonresident tuition \$99.65 Total per credit hour

At OSU 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	\$ 765.35 General Fee per semester
Non-residents of Oklahoma	765.35 General Fee per semester 1,727.70 Non-resident Tuition per semester \$2,493.05 Total per semester

In addition to the above fees and tuition, College of Veterinary Medicine students will pay \$2.35 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 to 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.

Student service facility fee	\$ 4.30 per credit hour
	\$64.50 maximum per semester

Students will not be billed facility fees and will not have access to the facilities when enrolled (a) *only* in a specialized course(s) offered for a special-interest group and not in any other course(s) in the University or (b) 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

Application fee for nonresident students	\$10.00
Audit, without credit	same as regular in-state fee
Correspondence course fees:	
High school courses	\$25.00 per credit (112 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
Off-campus at military bases	30.00 per semester hour
On-campus courses	20.00 per semester hour
Specialized courses	50.00 per semester hour
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, Doctor of Education degrees	20.00
Thesis binding fee	6.00 each
Dissertation microfilming fee	35.00
Special fees:	
Advanced standing examination fee	5.00 per credit hour
Automobile parking permit	
Campus residents	15.00 per year
Off-campus residents	25.00 per year

International student status maintenance fee	15.00 per semester 10.00 per summer term
Irregular examination fee	1.00
Late payment fee	1.00 per day, 5.00 maximum
Late registration fee	5.00 first day, 10.00 maximum

Music fees:

Beginning class lessons in music	7.50 per semester hour
Group lessons in music	15.00 per semester hour
Individual lessons in music	15.00 per semester hour
Organ practice	7.50 per semester hour
Maximum charge per semester for music instruction	60.00

Re-enrollment after withdrawal	5.00
Speech clinic service	25.00 per course
Transcript (per copy after first one)	1.00

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

International students who need, or may be required by their sponsors to have, extra assistance which extends beyond the content of the regular academic program of the University may make such arrangements through their sponsors. It is the practice of Oklahoma State University to negotiate with the student's sponsor an additional administrative/management/programming charge with the amount to be based on the level of professional assistance needed. The negotiation will consider appropriate amounts for such items as special training, research costs, enrichment, necessary travel and transportation, and other costs required to provide an appropriate program of education for international students.

Withdrawal and Drop Fee Policy. A student withdrawing from the University or 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:

Prior to the first week of classes of a semester or summer session
 00% if course dropped
 00% if withdrawing from University

During the first week of classes of a semester or summer session
 00% if course dropped
 20% if withdrawing from University

During **the second week** of classes of a semester

20% if course dropped

20% if withdrawing from University

During **the third or fourth week** of classes of a semester or the second week of a summer session

50% if course dropped

50% if withdrawing from University

During **the fifth or sixth week** of classes of a semester or the third week of a summer session

75% if course dropped

75% if withdrawing from University

After the sixth week of classes of a semester or the third week of a summer session

100% if course dropped

100% if withdrawing from University

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 OSU 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. To be eligible for an exception to this fee policy, an employee-student must submit a completed *Request for Faculty/Staff Fee Waiver* form to the Office of the Registrar prior to the beginning of classes. If the form is not on file prior to the beginning of classes, the student will *not* be granted the waiver in fees.

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 Office of 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).

Full-time staff members may audit courses after securing an audit card for a fee of one-half the regular tuition fee per course.

For early pre-enrollment, a full-time staff employee must obtain approval from the appropriate administrator authorizing his or her enrollment in the University. The employee will attach a letter of support from his or her supervisor to the enrollment trial study. The trial study and letter of support may be turned in to the Office of the Registrar any time after the class schedule book is **available**. **An effort** will be made to schedule classes of full-time employees to minimize conflict with their University employment.

Facilities and Services

Housing

Single Student Housing. Residence halls at OSU offer single students a variety of living arrangements in 13 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: residence hall libraries, quiet hours, classes in the residence halls, faculty lunch program, scholarship recognition of individuals, floors and residence 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 residence 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 opportunity to insure consideration.

Fraternities and Sororities. The fraternity and sorority system at OSU has served the campus and community for over 65 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 15 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, spon-

sor service projects for the campus and community, and seek to maintain high social and scholastic standards among their members.

Student Health Services

A student enrolling at Oklahoma State University for the first time is required to present a record of a physical examination by his or her local or family physician prior to enrolling, or else a recent equivalent record of physical examination, such as from a place of employment or school, or 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 Reserve Officers' Training Corps (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 eight full-time physicians, a clinical psychologist, 13 registered nurses, three laboratory and x-ray technicians, a part-time dietitian, and other necessary supportive and ancillary personnel who make a specialty of providing the best possible care at the least possible expense for the student. Along with this full-time help, there are part-time specialists in 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 financial aid officer to discuss financial needs.

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

Institutional loans are of two types: short-term loans-normally not exceeding \$300-which are to be repaid 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.

OSU 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 five percent simple interest per annum on the unpaid balance. The rate of interest on the GSL is eight percent for first-time borrowers.

Scholarships. OSU awards approximately 700 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. Application forms may be obtained from the high school principal or the OSU Office of High School and College Relations.

Approximately 600 upperclass university scholarships each year are provided to sophomores, juniors and seniors who have an outstanding academic record. Application for these scholarships must be made by April 1.

Transfer scholarships are offered each year to students transferring from junior colleges. Applicants must apply by April 1 each year. An applicant will be considered for a Junior College Transfer Scholarship or a Wentz Service Scholarship.

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

The Graduate College of OSU offers approximately 400 graduate fee waiver scholarships each year.

Grants. OSU participates in two Federal Grant programs.

Supplemental Educational Opportunity Grants are given to students who **have** established need. The grant does, as its name states, supplement all other aid to help meet the demonstrated financial need of the student.

The *Pell Grant Program* is a major source of federal student financial aid. The purpose of the Pell Grant Program is to provide a "floor" of financial aid to help defray the costs of post-secondary education. Eligible students must carry at least six semester credit hours to qualify. A student may receive a Pell Grant until he or she receives an undergraduate degree. These grants range from \$200 to \$1,900 per academic year. The grants need not be repaid. Applications may be obtained from high school guidance offices and college student financial aid *offices*.

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 Personnel Services. Its primary aim is to help OSU students find employment, either on campus or in the Stillwater 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 interested in working part-time on campus should contact this office and file an application. This may be done either by mail or personal visit. After completion of the application, interviewers are available to talk with the student concerning his or her employment interests and needs. A list of current vacancies on the OSU campus and in the Stillwater area is located in the hallway outside room 407 Whitehurst. The best time to seek employment is at the beginning of the fall semester in late August; however, jobs do become available throughout the year.

Pay scales and working hours vary. Jobs on campus usually offer 12 to 20 hours of work per week in such areas as clerical, technical, food service and labor. Similar jobs, working hours and salaries are available off campus. Ideally, students seeking work on campus should arrange their class schedule to allow for a four hour block of free time during mornings or afternoons, Monday through Friday.

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 an academic major, 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 (624-5481), International Student Advisement (624-5459), and Substance Abuse Educational Programs (624-5472).

The University Counseling Services is an accredited member of the International Association of Counseling Services. To make appointments students may call 624-5472 or come to Room 310, Student Union (Monday-Friday from 8 a.m. to 5 p.m. except noon hours).

Academic Advisement. Each student has an academic adviser who is available to assist the student in clarifying his or her long-range goals, developing educational plans and selecting courses for **realizing these goals.** *The student is responsible for identifying and completing the degree program requirements.* **Advisers** are available as facilitators in helping the student 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.

University Placement

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 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.

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 nearly 1,400,000 volumes, over 14,000 journals, nearly 180,000 maps, and more than 1,400,000 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 more than 100 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 260 recognized and registered 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 Survival 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 education events.

Other centers of activity include Lewis Field for football; Allie P. Reynolds Stadium for baseball; 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 students detailed information regarding organizations and activities:

General information regarding all organizations and activities: manager of student activities, Student Union, Room 040.

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: **manager of student activities, Student Union, Room 040.**

Musical organizations: (vocal and instrumental), head of the Department of Music, 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 of intramurals, 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

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 the president deems advisable to protect the assumed and designated interests of Oklahoma State University and to see that its rules, regulations and policies are enforced. The president shall 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 the president may call upon any agency of the University created to deal with cases arising under Section A. Action by any state or federal court shall not preclude the University from exercising its disciplinary authority.

D. RESPONSIBILITY OF THE BOARD OF REGENTS

The Board of Regents recognizes that by the Constitution and Statutes it has the power to make such rules and regulations for the management of the University as it may deem necessary and expedient, not inconsistent with the Constitution and laws of the state. While the Regents fully appreciate their 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 Board of Regents to furnish all possible assistance to the president when requested by the president.

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

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.

A student of OSU has the right to:

- (a) Inspect and review information contained in his or her educational records.
- (b) Challenge the contents of the educational record.
- (c) Have a hearing if the outcome of a challenge is unsatisfactory.
- (d) Submit an explanatory statement for inclusion in the educational record, if the outcome of the hearing is unsatisfactory.
- (e) Prevent disclosure, with certain exceptions, of personally identifiable information from the educational record.
- (f) Secure a copy of the institutional policy, which includes the location of all educational records.
- (g) File complaints with the Department of Education alleging failures of OSU to comply with the Act.

Information that OSU has declared to be directory information concerning each student:

- (a) Name and local and permanent addresses.
- (b) OSU identification number and Social Security number.
- (c) Telephone number.
- (d) Date and place of birth.
- (e) Major field of study.
- (f) Weight and height of a student participating in officially recognized sports.
- (g) Dates of attendance at OSU.
- (h) Degrees and awards granted.
- (i) Academic classification such as freshman, sophomore, junior, senior, etc.
- (j) **Sex.**

- (k) Class schedule.
- (l) Educational institutions previously attended.
- (m) Degree(s) held, date(s) granted, and institution(s) granting such degree(s).
- (n) Dissertation or thesis title.
- (o) Adviser and/or thesis adviser.
- (p) Participation in officially recognized organizations, activities and sports.
- (q) Parents' names and addresses.

During the first two weeks of the fall semester, a student may file with the Office of the Registrar a written request not to release directory information pertaining to him or her. Directory information will be released by the registrar until receipt of such a written request from the student asking that the information not be released.

Degrees Offered

Degrees offered are listed alphabetically along with an indication of the college(s) in which they may be earned.

B	Bachelor's	Bus	Business Administration
M	Master's	Ed	Education
D	Doctorate	En	Engineering
P	Professional	HE	Home Economics
A	Associate	Gr	Graduate College
S	Specialist	T	Technology
Ag	Agriculture	VM	Veterinary Medicine
A&S	Arts and Sciences		

Accounting (B,M)	Bus/Gr	Chemistry (B,M,D)	A&S/Gr
Aerospace Studies (B)	A&S	Civil Engineering (B,M,D,P)	En/Gr
Agricultural Economics (B,M,D)	Ag/Gr	Clothing, Textiles and Merchandising (B,M)	HE/Gr
Agricultural Education (B,M,D)	Ag/Gr	Computing and Information Sciences (B,M,D)	Gr
Agricultural Engineering (B,M,D,P)	Ag/En/Gr	Construction Management Technology (B,A)	T
Agriculture (M)	Gr	Corrections (M)	Gr
Agronomy (B,M)	Ag/Gr	Curriculum and Instruction (M,D,S)	Gr
Crop Science (D)	Gr	Distributive Education (M)	Ed/Gr
Soil Science (D)	Gr	Economics (B,M,D)	Bus/A&S/Gr
Animal Science (B)	Ag	Education	
Animal Breeding (D)	Gr	Educational Administration (M,D,S)	Gr
Animal Nutrition (D)	Gr	Elementary Education (B)	Ed
Animal Science (M)	Gr	Higher Education (M,D,S)	Gr
Dairy Science (M)	Gr	Secondary Education (B)	Ed
Poultry Science (M)	Gr	Special Education (B)	Ed
Applied Behavioral Studies (M,D)	Gr	Counseling and Student Personnel (M,D,S)	Gr
Applied Mathematical Sciences (M)	Gr	Electrical Engineering (B,M,D,P)	En/Gr
Architectural Engineering (B,M)	En/Gr	Electrical Power Technology (B)	T
Architecture (B,M)	En/Gr	Electronics Technology (B,A)	T
Art (B)	A&S	English (B,M,D)	A&S/Gr
Biochemistry (B,M,D)	Ag/A&S/Gr	Entomology (B,M,D)	Ag/Gr
Bioenvironmental Engineering (M,P)	Gr	Environmental Science (M,D)	Gr
Biological Sciences (B)	A&S	Executive Secretarial Administration (B)	Bus
Botany (B,M,D)	A&S/Gr	Family Relations and Child Development (B,M)	HE/Gr
Business Administration (M,D)	Gr		
Business Education (B,M,D)	Bus/Gr		
Chemical Engineering (B,M,D,P)	En/Gr		

Finance (B) Bus
 Fire Protection and Safety Technology (B,A) T
 Food, Nutrition and Institution Administration (B,M) HE/Gr
 Food Science (M,D) Gr
 Foreign Language
 French (B) A&S
 German (B) A&S
 Spanish (B) A&S
 Forest Resources (M) Gr
 Forestry (B) Ag
 General Agriculture (B) Ag
 General Engineering (B,M,D,P) En/Gr
 General Technology (B) T
 Geography (B,M) A&S/Gr
 Geology (B,M) A&S/Gr
 Health Education (B) A&S
 Health, Physical Education and Recreation (M) Gr
 History (B,M,D) A&S/Gr
 Home Economics (D) Gr
 Home Economics Education and Community Services (B,M,D) HE/Gr
 Horticulture (B,M) Ag/Gr
 Hotel and Restaurant Administration (B) HE
 Housing, Interior Design and Consumer Studies (B,M) HE/Gr
 Industrial Arts Education (B,M) Ed/Gr
 Industrial Engineering and Management (B,M,D,P) En/Gr
 Journalism (B) A&S
 Mass Communications (M) Gr
 Landscape Architecture (B) Ag
 Management (B) Bus
 Management Science and Computer Systems (B) Bus
 Marketing (B) Bus
 Mathematics (B,M,D) A&S/Gr

Mechanical and Aerospace Engineering (B,M,D,P) En/Gr
 Mechanical Design Technology (B,A) T
 Mechanical Power Technology (B,A) T
 Mechanized Agriculture (B) Ag
 Medical Technology (B) A&S
 Microbiology (B,M,D) A&S/Gr
 Military Science (B) A&S
 Music (B) A&S
 Music Education (B) A&S
 Natural Sciences (B,M) A&S/Gr
 Occupational and Adult Education (M,D,S) Gr
 Organizational Administration (B) Bus
 Petroleum Technology (B,A) T
 Philosophy (B,M) A&S/Gr
 Physical Education and Health (B) A&S
 Physical Sciences (B) A&S
 Physics (B,M,D) A&S/Gr
 Physiological Sciences (M,D) Gr
 Physiology (B) A&S
 Plant Pathology (B,M,D) Ag/Gr
 Political Science (B,M) A&S/Gr
 Pre-veterinary Science (B) A&S/Ag
 Psychology (B,M,D) A&S/Gr
 Radio-Television-Film (B) A&S
 Recreation (B) A&S
 Religious Studies (B) A&S
 Sociology (B,M,D) A&S/Gr
 Speech (B,M) A&S/Gr
 Speech Pathology (B) A&S
 Statistics (B,M,D) A&S/Gr
 Technical Education (B,M) Ed/Gr
 Theater (B) A&S
 Trade and Industrial Education (B,M) Ed/Gr
 University Studies (B) All colleges
 Veterinary Medicine (DVM) (D) VM
 Veterinary Parasitology (M,D) Gr
 Veterinary Pathology (M,D) Gr
 Wildlife Ecology (B,M,D) A&S/Gr
 Zoology (B,M,D) A&S/Gr

Summary of degrees offered:

Bachelor's 92
 Master's 68

Doctor's 46
 Other degrees 19

**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

Contents-Academic Regulations

1. Admission-Withdrawal
 - 1.1 Admission of Freshmen
 - 1.2 Transfer Admission from Other Accredited Four-year Institutions
 - 1.3 Transfer Admission from Junior Colleges
 - 1.4 Transfer Students with Less than a "C" Grade-point Average
 - 1.5 Admission to Certain Professional Programs
 - 1.6 International Student English Proficiency Requirement
 - 1.7 Enrollment in Good Standing
 - 1.8 Scholastic Requirements for Continuing Enrollment of a Student under Academic Probation in an Undergraduate College
 - 1.9 Academic Suspension
 - 1.10 Reinstatement after Academic Suspension
 - 1.11 Readmission
 - 1.12 Withdrawing from the University
2. Student Status
 - 2.1 Classification of Students
 - 2.2 Full-time Students
 - 2.3 Part-time Students
 - 2.4 Special Students
3. Requirements
 - 3.1 Date of Matriculation
 - 3.2 Changes in Degree Requirements
 - 3.3 Honors Programs
 - 3.4 General Education Requirements
 - 3.5 English Requirement
 - 3.6 English Proficiency Examination
 - 3.7 Substitution of Required Courses
 - 3.8 Waiving of Required Courses
 - 3.9 Changing Majors
 - 3.10 Deadline for Completion of Requirements
 - 3.11 Second Baccalaureate Degree
 - 3.12 Second Associate Degree
4. Credits
 - 4.1 Residence Credit
 - 4.2 Extension and Correspondence Credit
- 4.3 Advanced Standing Examinations
- 4.4 Validation Examinations
- 4.5 Graduate Credit Hours for Seniors
- 4.6 Semester Credit Hour
5. Registration
 - 5.1 Course Numbering System
 - 5.2 Maximum Semester Credit Hour Load
 - 5.3 Adding Courses
 - 5.4 Dropping Courses
 - 5.5 Concurrent Registration
 - 5.6 Prerequisites to Upper-division and Graduate Courses
 - 5.7 Class Enrollment Maximum
 - 5.8 Priority Pre-enrollment
 - 5.9 Late Registration
 - 5.10 Payment of Tuition and Fees
 - 5.11 Audit
6. Grades and Grading
 - 6.1 Official Transcripts
 - 6.2 Grade Interpretation
 - 6.3 Grade Point System
 - 6.4 Grade-point Average Calculating
 - 6.5 Progress Reports
 - 6.6 Pass-no pass Grading System
 - 6.7 Pass-fail Grading System
 - 6.8 Grade Reports
 - 6.9 Correcting Grades Reported in Error
 - 6.10 Grade Appeals
 - 6.11 Honor Rolls
7. Graduation
 - 7.1 Graduation Requirements
 - 7.2 Residence Requirements
 - 7.3 College Enrollment Requirement
 - 7.4 Residence Waiver for Certain Premedical Students
 - 7.5 Minimum Hours for Graduation
 - 7.6 Grade-point Average for Graduation
 - 7.7 Payment of Graduation Fees
 - 7.8 Requirements for Honors Degree
 - 7.9 Diploma Application
 - 7.10 Presence at Commencement Exercises

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

1. Admission-Withdrawal

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

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

1.3 Transfer Admission from Junior Colleges. Credits will be accepted by transfer from a junior college to meet lower-division (i.e., 1000- and 2000-level courses) requirements only. Credit accepted for transfer from a junior college may not exceed 65 semester credit hours. A minimum of 60 semester credit hours must be earned at a senior college.

1.4 Transfer Students with Less than a "C" Grade-point Average. Students who are accepted with a transcript with a grade-point average below "C" will be placed on academic probation, and none of the credits will be officially accepted or made a part of the student's academic record until: (a) the student has maintained a "C" grade-point average or better over all work attempted at OSU, and (b) these transferred credits plus the credits earned at OSU will meet all course requirements for the degree that the student is pursuing at OSU.

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

1.6 International Student English Proficiency. As a condition of admission to undergraduate study at OSU, all persons for whom English is a second language shall be required to present a score of 500 or above on the Test of English as a Foreign Language (TOEFL) regardless of the number of semesters or terms completed in other institutions of higher education or previous enrollment in English language programs. (See also "Admission" section of this *Catalog*.)

1.7 Enrollment in Good Standing. Students who are not under academic probation or suspension from the University and are judged to be making satisfactory progress toward their educational objectives shall be considered to be in good standing and are eligible to enroll in any of the

undergraduate colleges except as may be restricted. (See "Admission to Certain Professional Programs.")

1.8 Scholastic Requirements for Continuing Enrollment of a Student under Academic Probation in an Undergraduate College. A student who is not under suspension from the University is eligible to enroll. A student will automatically be placed on academic probation when the grade-point average of the last semester attempted is less than 2.00. A student may be placed on academic probation at the close of the semester in which the student fails to make satisfactory progress toward an approved educational objective. A student enrolling on probation should seek help from an adviser or a counselor in the University Counseling Services when deciding on an academic load and extracurricular activities. A student whose poor grades may have been caused by health problems should seek the help of a physician.

1.9 Academic Suspension. A student will be suspended when he or she earns less than a 2.00 grade-point average over the last semester attempted and (a) the cumulative grade-point average for the last two semesters is less than 1.40, or (b) the cumulative grade-point average for the last two semesters is less than a 2.00 and the cumulative grade-point 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 does not make satisfactory progress toward an approved educational 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.

1.10 Reinstatement after Academic Suspension. A student who has been suspended from the University for academic reasons may not ordinarily apply for readmission 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 and on the merits of the individual case.

1.11 Readmission. Students who have attended OSU but were not enrolled during the immediate past semester must file an application for readmission. If a student has attended another college or university since last attending OSU, he or she must file a transcript of all work taken elsewhere. His or her admission status will be determined after an evaluation of the previous work has been made.

1.12 Withdrawing from the University. A student who wishes to withdraw will initiate a withdrawal in his or her dean's office. A student who withdraws prior to the beginning of the 11th week of a regular semester and the 6th week of a summer session will not receive grades, and the courses will not appear on the student's permanent record. It will not be necessary to secure the instructor's signatures since no grades are required. A student may withdraw after the 10th week of a semester and after the 5th week of a summer session but prior to the beginning of "Pre-finals Week." The course will appear on the student's permanent record with a grade of "W" or "F" as assigned by the instructor.

2. Student Status

2.1 Classification of Students. Classification of students pursuing undergraduate degrees is determined for University purposes by the criteria below:

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

2.2 Full-time Students. Regular semesters: undergraduate students who are enrolled in 12 or more semester credit hours are classified as "full-time" students. Graduate students enrolled in nine or more semester credit hours are classified as "full-time." Summer session: undergraduate students who are enrolled in six or more semester credit hours, or graduate students who are enrolled in four or more semester credit hours, are classified as "full-time."

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

2.3 Part-time Students. Students who are enrolled but not meeting the definition of full-time students are classified as "part-time."

2.4 Special Students. Students enrolled for course work toward approved educational objectives at this institution, but who are not candidates for degrees, are classified as "special."

3. Requirements

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

3.2 Changes in Degree Requirements.

Although the curriculum may be revised before a student graduates, a student who meets all the requirements for the bachelor's degree in not more than six years from the time of matriculation (or an associate degree in three years) will be held responsible for the degree requirements in effect at the time of matriculation, plus any changes that are made, so long as these changes do not result in semester credit hours being added or do not prolong graduation. A student has the option of adopting the new requirements that have been established since matriculation.

3.3 Honors Programs. Some of the undergraduate colleges have honors programs leading to various forms of recognition for outstanding scholarship. Students should consult the director of the Office of Student Academic Services in the office of their academic dean for information.

3.4 General Education Requirements. Each college of OSU determines and publishes the general education requirements for each of its own degree programs. College requirements may exceed the minima for general education established by the University, which are: (a) 39 semester credit hours, including six semester credit hours of English composition and 33 semester credit hours of breadth requirements, (b) an international dimension requirement, and (c) a scientific investigation requirement.

The 33 semester credit hours of breadth requirements must include three semester credit hours of American history (HIST 1103 or 1483 or 1493), and three semester credit hours of American government (POLSC 1013), and, in addition, at least three semester credit hours of designated general education courses in each of the following areas: Social and Behavioral Science, Humanities, Natural Sciences, and Abstract and Quantitative Thought. At least 15 of the 33 semester 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 three semester credit hours in courses approved as having an international dimension) and the Scientific Investigation requirement (one course approved as having an investigative laboratory or comparable experience in scientific methodology) may be satisfied in any part of the 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, Office of Academic Affairs.

Courses that can be used to fulfill general education requirements are identified by code letters

which **appeaz** preceding the course titles listed in the back of this *Catalog* and in the class schedule. The code letters designate the general education category for which the course may be used:

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

Specially designated courses in the categories A, H, N, S which have been designed especially to provide general education experiences to students outside their major field are marked with SpD.

3.5 English Requirement. The University requires a minimum of six semester credit hours in English composition for a baccalaureate degree. The required sequence of courses is ENGL 1113 and ENGL 1323. For those who qualify, ENGL 1213 may be substituted for ENGL 1113. Students who earn an "A" or "B" in ENGL 1113 (or ENGL 1213) or who earn three semester credit hours in English composition by attaining a score of 28 or higher on the English section of the American College Testing (ACT) examination or by advanced placement 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.

3.6 English Proficiency Examination. All candidates for a baccalaureate degree must pass the University English 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 six hours of English composition as specified in Academic Regulation 3.5 and three hours of ENGL 2333, 3253 or 3323 (may not be used if substituted for 1323), with a minimum of "C" in each course. For those students who are required to pass the examination, this requirement cannot be waived. Students are required to take the English Proficiency Examination prior to filing a diploma application. The examination is offered in October, February and June, and is free of charge. Registration for the examination is handled in the Office of Student Academic Services of each college. Students may take the English Proficiency Examination only one time. Those who fail the examination will be able to satisfy the requirement only by successful completion of ENGL 3010, a non-credit tutorial lass 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.

3.7 Substitution of Required Courses. In special cases a student may be permitted to substitute a course of alternative or related 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. A lower-division course may not be substituted for an upper-division course requirement.

3.8 Waiving of Required Courses. No more than a total of six semester credit hours may be waived. Required courses in English, American history and American government cannot be waived, and the total number of semester credit hours required for the degree cannot be reduced. Waive cards must be signed by the student's adviser, the head of the student's major department and the dean of the college.

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

3.10 Deadline for Completion of Requirements. Degrees are conferred only at 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 in the commencement program.

3.11 Second Baccalaureate Degree. A student who receives a baccalaureate degree from OSU may apply all applicable courses toward a second bachelor's degree. A minimum of 30 semester credit hours of additional work, including all requirements of the second bachelor's degree, will be required.

3.12 Second Associate Degree. The same conditions as stated above apply for a second associate degree except that a minimum of 15 semester credit hours of additional work including all degree requirements will be required.

4. Credits

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

4.2 Extension and Correspondence Credit. Academic credit is awarded for courses offered through the extension offices of the several col-

leges within OSU, by the Independent and Correspondence Study Center of OSU, or by transfer of work certified as extension or correspondence credit by another fully accredited institution.

Extension Credit. OSU will accept, toward a degree, a maximum of eight semester credit hours earned through extension at another institution if that institution is fully accredited. Credits earned through extension cannot exceed one-fourth of the credits required for a bachelor's degree. (See also Academic Regulation 4.3.)

Correspondence Credits. OSU will accept, toward a degree, a maximum of eight semester credit hours earned through correspondence at another institution if that institution is fully accredited. Credits earned through correspondence cannot exceed one-fourth of the credits required for a bachelor's degree. (See also Academic Regulation 4.3.)

4.3 Advanced Standing Examinations.

OSU is a national testing center for the College Level Examination Program (CLEP) and Proficiency Examination Program (PEP). National testing centers offer two kinds of examinations: general examination and subject examination. OSU grants college credit for only the subject examination. OSU also grants credit to high school students for acceptable scores in the Advanced Placement Program (APP) as administered by the College Entrance Examination Board (CEEB). Academic departments on campus at OSU may offer advanced standing examinations in subject areas not offered by the CLEP, PEP or APP. These examinations are given on campus during scheduled testing dates. Information pertaining to application forms, testing dates and fees may be obtained from the Office of Admissions.

Acceleration of Academic Program. Any currently enrolled student whose travel, employment, extensive readings or educational experience appear to have given the student proficiency in a subject that is offered at OSU, equivalent to the proficiency ordinarily expected of those students who take the subject in a regular class, may apply for an examination on the subject.

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 OSU.
- (b) need 12 or more semester credit hours (excluding the hours in which currently enrolled) toward meeting the requirements for the degree. These 12 hours must be resident course work, i.e., exclusive of transfer, correspondence, extension or other advanced standing credit hours. (See also Academic Regulation 7.2)
- (c) need the course to meet some requirement for a certificate or degree that is being pursued at OSU.
- (d) not have taken an examination over the course within the preceding six months.

(e) have the recommendation of the Office of the Registrar and the approval of the head of the department in which the course is offered.

(f) have paid the fee of \$5.00 per credit hour. (This fee is not refunded even if the student receives no credit.)

Advanced standing credit awarded to a student must be validated by successful completion of 12 or more semester credit hours of academic work before the credit is placed on the student's transcript. 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.

4.4 Validation Examinations. A student who has earned credit in a course which OSU 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 the necessary evidence to prove that the student has taken the course.
- (c) get approval of the Office of the Registrar, the dean and 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.
- (e) take only one such examination in each subject.

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 who records a "P" grade if the examination result is "C" or above.

4.5 Graduate Credit Hours for a Senior. A senior who is graduating from OSU at the end of a semester or summer session may take a limited number of courses for graduate credit during the last two semesters or summer sessions. Such credit may be earned under the following conditions: (a) the student must meet the same admission requirements and be subject to the same possible probationary or provisional restrictions as students admitted in graduate status. The student must achieve an overall 3.00 grade-point average in *all* courses and make no less than a "B" in those courses for which he or she wants graduate credit; (b) the credits must not be required or needed for the bachelor's degree; (c) the total registration

must not exceed 18 credit hours for a semester or nine credit hours for a summer session; (d) the student must either complete the requirements for the bachelor's degree at the end of the semester or summer session or be within 12 semester credit hours of completing such requirements at the beginning of the semester or summer session in which graduate credit is requested; (e) admission to courses taken for graduate credit must have the approval of the course instructor, the head of the department in which the courses are offered and the dean of the Graduate College; (f) not more than 14 semester credit hours taken while a senior may be approved for graduate credit, and a minimum of 16 semester credit hours must be completed in residence after the student registers in the Graduate College. Courses taken for graduate credit during the senior year may not be accepted for graduate credit at institutions other than OSU; (g) the use to be made of the graduate courses will be determined by the adviser when the student registers in the Graduate College and submits a plan of study for an advanced degree.

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

5. Registration

5.1 Course Numbering System. All courses are identified by numbers composed of four digits. The first digit indicates the class year in which the subject ordinarily is taken, although enrollment is not exclusive as to student classification, and the last digit indicates the number of semester credit hours for which the course is offered. For example, a course numbered 1123 should be interpreted as a freshman, or beginning, level course carrying three hours of credit. A course number beginning with 0 indicates that the course does not carry University credit. Course numbers ending in 0 indicate that the course carries variable credit.

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

5.3 Adding Courses. Approval of the student's academic adviser is required for adding a course. The first day of the second week of classes of a regular semester or summer session is the last day a course may be added. A short course may be added no later than the first day of the short course.

5.4 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 10th week and before the beginning of "Pre-finals Week" in a regular semester, or after the 5th week and before the beginning of the 7th 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. A grade of "W" or "F" shall be recorded on the student's transcript.

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," "NP" 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 formal 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.

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

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

5.6 Prerequisites to Upper-division and Graduate-division Courses. When no prerequisites are listed for courses numbered 3000 or 4000, it is understood that the prerequisite is 60

credit hours of work completed, or 45 credit hours of work completed with an overall grade-point average of 3.25. The prerequisite for courses numbered 5000 or 6000 is graduate standing in addition to any other prerequisites listed. Instructors may waive prerequisites when the student's background justifies. Prior approval of the instructor may be required in problems courses, independent study, internships, thesis and dissertation courses, and courses taught in a professional school.

5.7 Class Enrollment Maxima. 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.

5.8 Priority Pre-enrollment. Full-time employees of the University who have approval for enrollment and students who accept University scholarships will be given priority in turning in trial schedules for class assignment. Scholarships that qualify students for priority in turning in trial schedules are University band, athletic, and graduate assistants with teaching or research assignments. (These are not to be considered inclusive, but the scholarship must require that the student perform a service for the University at a regular time specified by the University.) Working part-time for the University or outside the University does not qualify the student for priority in turning in a trial schedule.

5.9 Late Registration. A student will be permitted to enroll during the first week of a semester or a summer session or on the first day of a summer short course. A student enrolling during the first week of a semester or summer session will pay a late enrollment fee. The late enrollment fee will not be charged on or prior to the first day of a summer short course.

5.10 Payment of Tuition and Fees. Students are given information at the time they complete their enrollment on the procedures and deadlines for payment of tuition and fees. 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.

5.11 Audit. A student who does not wish to receive credit in a course may, with the approval of the instructor of the course concerned, audit the course. A student who applies to audit a course promises that he or she will not use the audit to avoid the rule against excessive hours, and that he or she will not petition or ask in any way for the privilege of taking an examination to obtain credit after he or she has audited the

course. (Lab courses, private music lessons and art courses are not open for audit.)

A student who is enrolled in residence credit during the semester he or she is auditing a course may have the course recorded on his or her transcript with the word "audit" appearing in place of the grade. Not later than one week after the close of that semester, the student must present to the Office of the Registrar the instructor's copy of the audit form with a signed statement from the instructor, on the reverse side, that it is appropriate for the course to be recorded on the student's transcript.

Any individual 65 years or older may obtain an audit form at no charge.

6. Grades and Grading

6.1 Official Transcripts. All official transcripts of students' academic records at OSU are prepared and released by the Office of the Registrar.

Correspondence Credits. OSU will accept, toward a degree, a maximum of eight semester credit hours earned through correspondence at another institution if that institution is fully accredited. Credits earned through correspondence cannot exceed one-fourth of the credits required for a bachelor's degree. (See also Academic Regulation 4.3.)

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

Descriptions of the grades are:

Grade "A" Superior performance

Grade "B" Good performance, but not superior

Grade "C" Average performance

Grade "D" Minimal passing performance

Grade "F" Failing

Grade "I." Awarded to students who satisfactorily completed the majority of the course work and whose work averaged "D" or better, but who have been unavoidably prevented from completing the remaining work of the course. The "I" grade may also be given in courses of continuing character (e.g., master's thesis, doctoral dissertation). The conditions, including appropriate time limits, for the removal of the "I" are indicated on the official class roll by the instructor. A condition that the student must repeat the course in order to remove the "I" is not permitted. The maximum time allowed for a student to remove an "I" is three years unless the instructor who gave the "I" requests an extension beyond three years. It is the responsibility of the student to satisfy the requirements stipulated by the instructor at the time the "I" is assigned; it is the responsibility of the instructor to initiate action to have the new grade

entered as soon as possible after the student fulfills the requirement.

Grade "P." This grade is given for passing work in OSU courses approved for pass-no pass and pass-fail grading systems. Both credit hours and grade points are ignored in calculating grade-point averages.

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

Grade "W." The grade of "W" indicates that the student dropped the course while doing passing work.

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

6.3 Grade Point System. The following grade point system is used in calculating the grade-point average:

Grade "A" yields 4 grade points per semester credit hour.

Grade "B" yields 3 grade points per semester credit hour.

Grade "C" yields 2 grade points per semester credit hour.

Grade "D" yields 1 grade point per semester credit hour.

Grades "F," "I," "P," "W" and "NP" yield 0 grade points per semester credit hour.

6.4 Grade-point Average 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," "P," "NP," "W" or the mark of "N" will not affect the overall grade-point average.

6.5 Progress Reports. The faculty will be requested to report grades for all freshmen on the dates as printed in the official University calendar. The dates will normally be ten class days before the deadline for dropping a class without a grade being reported.

6.6 Pass-no Pass Grading System. An undergraduate student may elect to take no more than four courses or 15 hours (whichever is greater) during his or her academic career with the pass-no pass grading option. The option is restricted to those students who (a) have passed 28 or more semester credit hours, (b) have at least a 2.50 grade-point average in all hours attempted, (c) have met all of the prerequisites for enrollment in the course in question, (d) do not

need the course in question for meeting *any* requirements for graduation or certification other than as a free elective, and (e) have approval of the academic adviser.

A student who chooses the pass-no pass option must do so by the last date on which a course may be added. Once the deadline has passed a student may not change the choice of grading systems. The pass-no pass option is not identified on the official class roll and thus is not known to the instructor. The instructor assigns a normal grade based on the quality of the work performed. The grades of "A," "B" and "C" are recorded on the transcript as "P"; the grades of "D" and "F" are recorded as "NP." "W" and "I" grades will be recorded without change. The pass-no pass grade will not affect the grade-point average.

Graduate students may enroll to take a course by the pass-no pass option. A course so taken cannot be used to meet graduate degree requirements.

6.7 Pass-fail Grading System. Some courses are taught only on a pass-fail basis. Such courses are so designated in the "Course Listings" section of this *Catalog*. Students who pass the course are awarded the grade of "P"; those who fail the course are awarded the grade of "F."

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

Progress reports are made available to freshmen students shortly after mid-semester. Copies are made available to the students' adviser and the students' deans.

6.9 Correcting Grades Reported in Error.

An instructor who reports an incorrect grade to the Office of the Registrar may request that Office to correct the grade. The request must be in writing and must have both the department head's and the dean's approval. In no case will a grade be lowered after the student has been graduated.

6.10 Grade Appeals. A student may appeal a grade given by an instructor in cases in which he or she believes the grade awarded is inconsistent with announced grading policy. (See *Student Rights and Responsibilities* pamphlet or contact the Office of the Vice-president for Academic Affairs and Research.)

6.11 Honor Rolls. Undergraduate students completing all enrolled hours (not less than 12 semester credit hours in a regular semester or six in a summer session) with an overall (not cumulative) grade-point average of 3.20 or higher, and with no grade of "I" in any course and no grade lower than a "C" are placed on the Dean's List of Distinguished Students. Students who have completed their courses

under the same requirements as outlined above, with a grade-point average of 4.00 (i.e., all "A's") are placed on the President's List of Distinguished Students. The grade of "P" may not be included in meeting the minimum enrollment required for honor rolls.

7. Graduation

7.1 Graduation Requirements. The responsibility for satisfying all requirements for a degree rests with the student. Advisers, faculty members and administrators offer help to the student in meeting this responsibility.

7.2 Residence Requirements. A minimum of one-half of the upper-division requirements in a student's major field must be earned in residence at OSU. (See "College Enrollment Requirements.")

The last 18 hours completed by a student immediately prior to graduation must be taken in residence at this institution. Including the last 18 semester credit hours (12 for an associate degree) the student must have earned a total of not less than 24 semester credit hours (16 for an associate degree) taken in not less than two semesters, or one semester and one summer session, or three summer sessions. Courses taken as part of a required internship, such as in medical technology, may not be used in meeting this requirement. In the College of Business Administration the last 30 hours must be earned in residence.

7.3 College Enrollment Requirement. A candidate for graduation must be enrolled in the college from which he or she wishes to receive the degree for at least two semesters, or one semester and one summer session, or three summer sessions immediately preceding graduation. For the award of a second baccalaureate degree, this requirement may be waived by the dean of the college awarding the second degree. (See "Residence Requirements" and "Second Baccalaureate Degree.")

7.4 Residence Waiver for Certain Premedical Students. Students who complete at least 94 semester credit hours in a recognized premedical science program and then transfer to a professional program leading to the doctoral degree at an accredited professional school of medicine, osteopathic medicine, veterinary medicine, dentistry or optometry will be awarded the appropriate baccalaureate degree upon the successful completion of 30 semester credit hours in basic medical science courses applicable to the OSU major. This option is available only to students who have completed all other degree requirements for the major and have taken at least the last 24 semester credit hours of work at OSU prior to transferring to a professional school. (See "Residence Requirements.")

7.5 Minimum Hours Graduation. Each degree program requires a specific minimum number of semester credit hours for graduation, as indicated elsewhere in this catalog. No degree program shall require fewer than 120 semester credit hours for graduation. No student shall be permitted to graduate having completed fewer total hours than the requirement specified for that degree. At least 40 hours of upper-division course work shall be required in every baccalaureate degree program.

7.6 Grade-point Average for Graduation. An overall grade-point average of "C" or better, in addition to 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 average requirement (not the major or minor requirement) by presenting 90 or more hours (49 for an associate degree) of approved work with a grade-point average of "C" or better and a total number of grade points equal to twice the number of hours required for the specified degree.

7.7 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.

7.8 Requirements for Honors Degrees. The individual colleges have specific requirements for degrees with honors. Students should consult the office of their academic dean for information. (See "Honors Programs.")

7.9 Diploma Application. Each candidate for graduation shall file a diploma application in the Office of the Registrar within two weeks following enrollment in a regular semester or one week in a summer session in which the student wishes to be graduated.

7.10 Presence at Commencement Exercises. The University will hold one Commencement each year at the close of the spring semester. Students who met the graduation requirements the preceding fall semester and students who plan to meet the graduation requirements at the close of the following summer session are invited and encouraged to participate in the Commencement exercises. Students who plan to meet requirements during the summer session (whether they are currently enrolled or not) should contact the Office of the Registrar for approval to participate in Commencement. The University encourages all candidates for degrees to be present at the Commencement exercises. Attendance is not compulsory. However, candidates who cannot be present should notify the Office of the Registrar of the addresses to which diplomas can be mailed.

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*

Paul D. Hummer, 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. Koeppel, Ph.D.

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

Forestry, Stanley B. Carpenter, Ph.D.

Horticulture and Landscape Architecture, David W. Buchanan, 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 of students 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 14 major fields of study. Option programs that emphasize production, science, business or other specific areas of specialization are provided in the various departments.

The vast industry of agriculture 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. The Bachelor of Landscape Architecture is also offered in the College of Agriculture.

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, animal nutrition, biochemistry, entomology, crop science, food science, plant pathology, 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 and Bachelor of Landscape Architecture degrees in Agriculture. For the Bachelor of Science degree, 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. The Bachelor of Landscape Architecture is a five-year program requiring 160 credit hours. 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.

Honors Program. The Honors Program in the College of Agriculture is designed to provide outstanding students with opportunities to pursue new challenges and academic excellence. Honors courses, seminars, and special honors contracts provide for discussions and independent thought by students who have the desire and ability to explore academic subjects beyond the normal classwork material.

Honors awards available in the College of Agriculture are:

- (1) General Education Honors
- (2) Departmental Honors
- (3) The bachelor's degree, with honors

Awards (1) and (2) may each be earned independently of the others. Award (3) is earned by satisfying the requirements of both (1) and (2). The completion of each award is noted on the student's transcript. Students who complete all three receive the bachelor's degree with honors diploma.

All entering freshmen who have ACT composite scores of 27 or above are eligible to become a part of the Honors Program. All other students who have an overall college-level grade-point average of 3.50 or above may enroll in the Honors Program

Additional information may be obtained from the director of the Agriculture Honors Program, Office of the Dean of Instruction, 136 Agricultural Hall.

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. 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 and 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 1603.
2. Microbiology: MICRO 2124.
3. Genetics: ANSI 3423 (or AGRON 3553 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 assistant dean for resident instruction 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 education and other 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): AGECE 1114.

Agricultural Communications

Associate Professor and Head Charles Voyles, M.S.

Assistant Professor J. G. Harrison, M.A.

(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 of production 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.; J. E. Ikerd, Ph.D.; D. D. Kletke, Ph.D.; R. D. Krenz, Ph.D.; H. P. Mapp, Ph.D.; J. R. Nelson, Ph.D.; T. R. Nelson, Ph.D.; J. S. Plaxico, Ph.D.; D. E. Ray, Ph.D.; D. F. Schreiner, Ph.D.; O. L. Walker, Ph.D.; C. Ward, Ph.D. Associate Professors R. A. Jobes, Ph.D.; L. K. Lee, Ph.D.; R. L. Oehrtman, Ph.D.; W. K. Searce, Ph.D.; D. S. Tilley, Ph.D.; J. N. Trapp, Ph.D.; J. E. Williams, Ph.D. Assistant Professors K. B. Anderson, Ph.D.; F. M. Epplin, Ph.D.; D. M. Henneberry, Ph.D.; G. J. Knowles, M.S.; R. O. Love, Ph.D.; L. D. Makus, Ph.D.; J. R. Russell, Ph.D.; R. J. Schatzer, Ph.D.; T. F. Tice, Ph.D.; M. L. Tilley, J.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, public policy and agricultural law.

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-solving 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. Van Eaton, Ph.D.; **ft34Associate Professors** James Mosley, Ed.D.; Wallace Smith, M.S.; Charles Voyles, M.S. **Assistant Professors** Paul Czarniecki, Ed.D.; Eddy Finley, Ed.D.; Wes Holley, Ed.D.; Roy R. Lessly, Ed.D.; Leon Moon, M.S.; Robert F. Reisbeck, Ed.D.; James Rutledge, M.S.; 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 licensure 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 primarily to qualify the bachelor's degree recipient for the Oklahoma Vocational Agriculture Teaching License. This license 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 required. Some students find it advantageous to elect a dual 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 or 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 of Science 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 Master of Agriculture is another degree option within the Department.

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.; F. W. Blaisdell, M.S.; 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.; J. E. Garton, Ph.D., 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.; J. F. Gerling, Ed.D.; G. A. Kranzler, Ph.D.; A. P. Lewis, M.S.; G. W. A. Mahoney, Ph.D., P.E.; C. E. Rice, Ph.D., P.E.; Richard W. Whitney, Ph.D., P.E. Assistant Professors H. W. Downs, M.S.; R. L. Elliott, Ph.D., P.E.; S. L. Harp, M.S.; R. L. Huhnke, Ph.D., P.E.; D. E. Temple, M.S.; J. B. Solie, Ph.D.; M. L. Stone, Ph.D.; J. D. Summers, Ph.D.; Bruce Wilson, Ph.D.

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

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 student 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. Computer programming and use is required.

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 the Farmers' Home Administration and the 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, Architecture and Technology. If they elect to enroll in the College of Agriculture, they should transfer to the College of Engineering, Architecture and Technology by the end of their first semester. 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. Microcomputer use is emphasized. 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

of steel, 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.; H.A.L. Greer, Ph.D.; G. V. Johnson, Ph.D.; J. S. Kirby, Ph.D.; F. E. LeGrand, Ph.D.; J. O. Lynd, Ph.D.; W. E. McMurphy, Ph.D.; O. G. Merkle, Ph.D.; L. G. Morrill, Ph.D.; J. C. Murray, Ph.D.; R. M. Reed, Ph.D.; L. M. Rommann, Ph.D.; E. E. Sebesta, Ph.D.; E. L. Smith, Ph.D.; J. H. Stiegler, Ph.D.; J. F. Stone, Ph.D.; J. F. Stritzke, Ph.D.; C. M. Taliaferro, Ph.D.; L. M. Verhalen Ph.D.; D. Weibel, Ph.D.; R. L. Westerman, Ph.D.; B. C. Wright, Ph.D. Associate Professors R. M. Ahring, Ph.D.; J. L. Caddel, Ph.D.; R. J. Crabtree, Ph.D.; C. E. Denman, M.S.; D. M. Engle, Ph.D.; D. L. Ketring, Ph.D.; E. G. Krenzer, Ph.D.; D. S. Murray, Ph.D.; D. L. Nofziger, Ph.D.; T. E. Peeper, Ph.D.; P. L. Sims, Ph.D.; , B. B. Webb, Ph.D.; Assistant Professors B. J. Carter, Ph.D.; K. J. Donnelly, Ph.D.; R. L. Gillen, Ph.D.; Hung "Henry" Nguyen, Ph.D.; R. C. Johnson, Ph.D.; J. A. Kovar, Ph.D.; W. L. Richardson, M.S.; Dale Rollins, Ph.D.; N. B. Thomas, M.S.

Agronomy is the science of soil management and production of field crops, forages and rangeland. Undergraduate options include crops and soils, business, science, range management and plant protection. Each of these options provides a thorough preparation in the sciences relating to its specialization.

Modern agricultural production requires a highly technical approach to problems such as soil and water conservation, crop and range improvement and management, prevention and abatement of agricultural sources of environmental pollution, and judicious use of agricultural chemicals. In the vast field of agribusiness, technical preparation in agronomy is essential in supplying agricultural producers with up-to-date information, as well as improved seed, fertilizers, management systems and pesticides. Processing, distribution and marketing of food, fiber and feed crops require an integration of production technology with economics at all levels. Agronomists are in demand for research and marketing positions in universities, industry and government. Concern for future food supplies creates an urgency for technological advancement in food production which 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 service for seed, fertilizer or agricultural chemical supply companies; federal employment in soil and range conservation; 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 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.; Gerald W. Horn, 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.; Associate Professors Joe G. Berry, Ph.D.; J. R. Kropp, Ph.D.; Keith S. Lusby, Ph.D.; Charles V. Maxwell, Ph.D.; Charles A. McPeake, Ph.D.; Jack D. Stout, Ed.D. Assistant Professors Earl P. Aalseth, Jr., Ph.D.; David S. Buchanan, Ph.D.; Howard G. Dolezal, Ph.D.; David W. Freeman, Ph.D.; Rodney D. Geisert, Ph.D.; F. Theodora McCollum, Ph.D.; James W. Oltjen, Ph.D.; Fred K. Ray, Ph.D.; Robert G. Teeter, Ph.D.; Donald R. Topliff, Ph.D. Instructors Glenden D. Adams, M.S.; Jarold E. Callahan, 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, animal reproduction and food science. The Master of Agriculture is also offered.

Animal science is concerned with the science, art and business of the production of beef cattle, dairy cattle, horses, poultry, sheep and swine. An animal scientist is concerned with the application of the principles of the biological, physical and social sciences to the problems associated with livestock and poultry production.

Animal science is also concerned with providing specialized training in the food industry, which is the largest and most important industry in the United States. The food industry option in the Department of Animal Science provides expertise in the processing, quality control and marketing of meat, dairy and poultry products.

The Ranch Operations option provides another area of study available for students in the Department of Animal Science. Ranching represents the second largest source of income and the most important renewable resource in Oklahoma. Study in this option will provide training in areas important in the successful operation of a ranching program.

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, positions 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, food industry, livestock merchandising, ranch operations, science or a double major with agricultural education to qualify to teach vocational agriculture. In addition, students have the opportunity to concentrate their studies on one of the animal groups (meat animals, dairy, horses or poultry). Internship programs providing 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 option, 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 and business areas.

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

Biochemistry

Professor and Head Roger E. Koeppe, Ph.D.

Professors Donald C. Abbott, Ph.D.; Margaret K. Essenberg, Ph.D.; Richard C. Essenberg, Ph.D.; Robert K. Gholson, Ph.D.; Franklin R. Leach, Ph.D.; Ta-Hsiu Liao, Ph.D.; Ulrich K. Melcher, 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.; Chang-An Yu, Ph.D. **Assistant Professors** Charles O. Gardner, Ph.D.; Andrew J. Mort, Ph.D. **Research Biochemist** Linda Yu, Ph.D. **Instructor** Judy A. Hall, M.S.

Biochemistry, the central scientific discipline linking the chemical, physical and biological sciences, exerts a profound influence on the progress of medicine and agriculture. By applying concepts and methods of chemistry and physics to the fundamental problems of biology, biochemists have made great progress in their effort to understand the chemistry of living organisms.

Biochemists are concerned with living things. They must acquire some knowledge of the biological sciences. Since a biochemist's tools are the physical sciences, he or she must receive sound training in mathematics, physics and chemistry.

Challenging positions for well-trained biochemists are available in colleges and universities, state and federal laboratories, research institutes, medical

centers and in an increasing number of industrial organizations, particularly the pharmaceutical and food industries. Biochemists are involved with research on the chemistry of processes occurring in plants, animals, and various microorganisms, and with the discovery and development of antibiotics, vitamins, hormones, enzymes, insecticides and molecular genetic techniques.

At the undergraduate level a major in biochemistry administered by the Department of Biochemistry is available through either the College of Agriculture or the College of Arts and Sciences. An honors program is available. The curriculum provides a broad background in chemistry and biological science and permits flexibility in meeting particular interests of the student. Courses in biochemistry are based on general, organic and analytical chemistry. The biochemistry 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 its graduate program leading to the M.S. or Ph.D. degree. This graduate program is an integral part of extensive basic research activities in the Oklahoma Agricultural Experiment Station. These research activities provide opportunities for part-time employment of undergraduate majors to improve their professional competence.

Entomology

Professor and Head D. C. Peters, Ph.D.

Professors R. C. Berberet, Ph.D.; Stanley Coppock, Ph.D.; W. A. Drew, Ph.D.; R. D. Eikenbary, Ph.D.; J. A. Hair, Ph.D.; O. N. Nesheim, Ph.D.; K. N. Pinkston, Ph.D.; R. G. Price, Ph.D.; J. R. Sauer, Ph.D.; K. J. Starks, Ph.D.; R. E. Wright, Ph.D.; J. H. Young, Ph.D. Associate Professors R. W. Barker, Ph.D.; D. R. Bernard, Ph.D.; R. L. Burton, Ph.D.; H. G. Koch, Ph.D.; J. O. Moffett, Ph.D.; G. A. Mount, Ph.D.; J. H. Webster, Ph.D. Assistant Professors G. W. Cuperus, Ph.D.; W. Scott Fargo, Ph.D.

Entomology is the science and study of insects and related organisms regarding their biology, structure, identification, physiology economic significance 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 Stanley B. Carpenter, Ph.D.

Professors Ralph W. Altman, Ph.D.; Max R. Craighead, M.S.; J. E. Langwig, Ph.D.; David W. Robinson, Ed.D. Associate Professors Thomas C. Hennessey, Ph.D.; David K. Lewis, D.Phil.; Charles G. Tauer, Ph.D.; Robert F. Wittwer, Ph.D. Assistant Professors Thomas B. Lynch, Ph.D.; Parker J. Wigington, Jr., Ph.D. Instructor Thomas Kuzmic, M.S.

America's forests are an important natural renewable resource. With proper decisions concerning management, our forests can provide a bounty of uses and values for generations to come. Professional foresters play a vital role in developing and utilizing the forest and its diverse resources: timber, water, wildlife, range forage, recreation and wilderness.

Professional foresters manage the planting, growth and harvest of trees, while at the same time, protecting forests from the harmful effects of fire, disease and insects. Foresters today are problem solvers using a blend of science, technology, economics and sociology to produce the products of the forest desired by society. Foresters work with private landowners and city planners, they teach and conduct research at universities, they administer parks and recreation areas, they manage the business of forest industry, and they manage the public forest land.

Graduates with a Bachelor of Science Degree may be employed by federal agencies, including the U.S. Forest Service, Bureau of Land Management, the Soil Conservation Service, the Fish and Wildlife Service, and the Bureau of Indian Affairs. In addition, state, county and municipal governments employ foresters in a variety of positions. Wood-using industries retain foresters for land management, land and timber acquisition and harvesting positions as well as in mill production and administrative work. Foresters work for associations promoting the use of forest products and in many other public relations jobs. Some foresters are self-employed as consultants, specializing in timber and land appraisals, management planning and a variety of special services. Recipients of advanced degrees, especially the doctorate, may conduct research for the federal or state governments, universities or industrial organizations, or may enter the teaching profession.

The Department of Forestry offers a major in forestry leading to a Bachelor of Science degree in Agriculture. A forest management degree option is offered for the individual with career aspirations in the U.S. Forest Service and other federal agencies, state and local forestry organizations, forest industry and consulting. The forest products option is designed for those interested in the business, manufacturing and sales aspects of forestry. For the student with

a research career in mind, a forest science option is available. Requirements for a B.S. degree include the successful completion of an eight-week summer session and a total of 144 credit hours of course work. The summer session is scheduled to follow the sophomore year and is held annually in different forest settings. Past summer sessions have been held across the U.S. from Maine to Oregon, from Montana to Florida, and even in Brazil. Students learn field forestry skills and observe state-of-the-art operations.

The Department of Forestry maintains a research station in south-eastern Oklahoma in the midst of the Ouachita National Forest and industrial timber holdings. Oklahoma has an active and progressive forest industry with one of the most modern highly-mechanized timber harvesting systems in the world. The largest paper mill in the southern United States is located in the pine-oak forests of southeastern Oklahoma. Field trips to this area comprise part of the instruction in many forestry courses.

The Department of Forestry also offers graduate work leading to the Master of Science degree in forest resources. Programs are designed to serve the needs of individual students and to fulfill certain speciality areas. Current areas of study include forest biometrics, forest ecology, forest economics, forest genetics and tree improvement, forest management, tree physiology, silviculture, forest regeneration, forest soils and watershed management.

Horticulture and Landscape Architecture

Professor and Head David W. Buchanan, Ph.D.

Professors James E. Motes, Ph.D.; 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.; Joe M. Maxson, Ed.D.; Paul J. Mitchell, M.S. **Assistant Professors** Stuart W. Akers, Ph.D.; C. Douglas Aurand, M.L.A.; A. Douglas Brede, Ph.D.; Barbara S. Fails, Ph.D.; Robert L. Green, Ph.D.; Brian A. Kahn, Ph.D.; Michael W. Smith, Ph.D.; Jerry R. Walkup, M.L.A.

Horticulture is the science and art associated with the culture and production of flowers, trees, shrubs, turfgrass, vegetables, fruits and nuts. It also includes 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, golf courses and other public areas.

Today, horticulture requires highly trained and capable people to help meet the food demands of society and to be involved in activities that lead to a better quality of life.

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. Students can prepare themselves for careers in public grounds administration, horticulture business, production, teaching, extension and research.

The training that the student obtains is related to the specific area of emphasis that is chosen. Regardless of one's interest, objectives, or area of emphasis, a good knowledge and understanding of horticulture is a necessity. A student can receive a Bachelor of Science (B.S.) degree and choose from the two following options:

(1) *Horticulture* provides the training and expertise for production of fruits, nuts, vegetables, nursery crops, flower crops, etc. Training can be general, have a business or science orientation, or the student may choose to emphasize a particular commodity area of horticulture;

(2) *Turf Management* provides the training for turfgrass production and for management of turfgrass in golf courses, in parks, home landscapes, along highways, etc. After the B.S. degree is completed, a qualified student may choose to pursue a graduate degree, specializing in any option.

Landscape architecture is the art of design, planning or management of the land and arrangement of natural and man-made elements thereon through application of cultural and scientific knowledge. It is also concerned with resource conservation and stewardship to the end that the resultant environment serves a useful and enjoyable purpose.

There are two options in the landscape area:

(1) *Landscape Architecture* is the study of art, business, construction, design, ecology, engineering and horticulture in a five-year professional program leading to the Bachelor of Landscape Architecture (B.L.A.) degree. Typical employers would include landscape architecture firms, architectural-engineering firms and governmental agencies dealing with land planning, urban planning and design, or parks and recreation.

In an effort to maintain an effective balance between students, faculty, and facilities, enrollment in the fourth and fifth year of the program is limited to 25 students each. Students will be evaluated during their third year by the faculty to select the most qualified candidates based upon academic achievement and professional potential. Minimum requirements may vary each year; however, a student must have completed a minimum of 60 credit hours with "C" average or above in all courses required as prerequisites to the last two years of the B.L.A. program.

(2) *Landscape Contracting* is a four-year study leading to the Bachelor of Science in Agriculture degree. It emphasizes the implementation and management phases of landscape development. Course work includes basic landscape architectural design, construction technology, business and horticulture. Graduates are employed by landscape nurseries, contracting companies, design/building firms and landscape maintenance companies. Qualified students may also pursue graduate degrees in either option.

Plant Pathology

Professor and Head William L. Klarman, Ph.D.

Professors George L. Barnes, Ph.D.; Francis J. Gough, Ph.D.; Hassan A. Melouk, Ph.D.; Charles C. Russell, Ph.D.; Roy V. Sturgeon, Jr., Ph.D.; **Associate Professors** Kenneth E. Conway, Ph.D. Larry L. Singleton, Ph.D.; Ervin Williams, Jr., Ph.D.; **Assistant Professors** Jacqueline Fletcher, Ph.D.; Dean W. Gabriel, Ph.D.; Robert M. Hunger, Ph.D.; John L. Sherwood, Ph.D. **Assistant Researcher** Alexander B. Filonow, Ph.D.

Plant pathology is a broad discipline that ranges from basic studies of physiological and genetic aspects of plant diseases to the development of practical plant disease controls. It encompasses the science required to understand the causes of plant diseases as well as the art of preventing or controlling these diseases. Thus, the plant pathologist must have knowledge of plant biology as well as practical plant culture.

At the undergraduate level, the Department of Plant Pathology offers the degree option Plant Health Management. This program is designed to provide students with a broad background in the important aspects of growing healthy plants, including good cultural practices and adequate pest control. The curriculum draws heavily on courses from other departments and during the first two years stresses plant biology and plant culture. During the third year, emphasis is directed toward learning the principles of pest management. The fourth year of the program is designed to consolidate information gained during the first three years into an effective and practical Plant Health Management concept.

Graduates of the Plant Health Management program have the opportunity to pursue a wide range of careers. Some of these career areas are: managers of plant-related industries such as nurseries, orchards, and golf courses; agricultural chemical company representatives; Cooperative Extension, 4-H, and the Federal Government; and, operation of family farms and ranches. Although this program is designed to prepare students for immediate employment, it has sufficient flexibility to provide a suitable background for entrance into the department's graduate program.

In order to become a fully trained plant pathologist, one or more graduate degrees in plant pathology are required. The Department offers both M.S. and Ph.D. programs with opportunities to specialize in a wide range of basic or applied research fields. Well-trained plant pathologists have the opportunity to pursue challenging careers in state and federal governments, colleges and universities, agriculture related industries, and private consulting.

A Master of Science in Agriculture degree also is offered for those who wish to obtain graduate training in plant pathology but who do not wish to pursue a research career.



College of Arts and Sciences

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

Neil J. Hackett, Ph.D., Associate Dean

Mary Rohrberger, Ph.D., Director of Curricular Affairs and Student Services

Ann Schneider, Ph.D., Director of Research

Stanley D. Green, M.M., Director of Extension

Heads of Departments and Directors of Schools

Aerospace Studies, Colonel Glen Nemecek, M.A.

Art, Richard A. Bivins, M.F.A.

Botany and Microbiology, Glenn W. Todd, Ph.D.

Chemistry, Neil Purdie, Ph.D.

Computing and Information Sciences, Donald D. Fisher, Ph.D.

English, Jack D. Campbell, M.A., (Acting)

Foreign Languages and Literatures, John A. Schillinger, Ph.D.

Geography, Richard D. Hecock, Ph.D.

Geology, Gary F. Stewart, Ph.D.

Health, Physical Education and Leisure

School Director: George H. Oberle, P.E.D.

Assistant Director: Betty W. Abercrombie, Ed.D.

Health, Elbert D. Glover, Ph.D.

History, Joseph A. Stout, Jr., Ph.D.

Journalism and Broadcasting

School Director: Marian D. Nelson, Ed.D.

Journalism, Advertising and Public Relations, Marian D. Nelson, Ed.D.

Leisure Sciences, E. Pauline Winter, M.A.

Mathematics, William H. Jaco, Ph.D.

Military Science, Col. Michael McWherter, M.A.

Military Studies Departments:

Coordinator: Smith L. Holt, Ph.D.

Music, James Woodward, Ph.D.

Philosophy, Neil R. Luebke, Ph.D.

Physical Education, John G. Bayless, Ed.D.

Physics, Geoffrey P. Summers, D.Phil.

Political Science, Joseph W. Westphal, Ph.D. (acting)

Psychology, James L. Phillips, Ph.D.

Radio-Television-Film, Philip E. Paulin, Ed.D.

Religious Studies, Kyle M. Yates, Jr., Th.D.

Sociology, Charles Edgley, Ph.D.

Speech Communication, James Hughey, Ph.D.

Speech and Language Pathology and Audiology, Cheryl Scott, Ph.D. (acting)

Statistics, J. Leroy Folks, Ph.D.

Theatre, James Woodward, Ph.D.

Zoology, Jerry Wilhm, Ph.D.

The College of Arts and Sciences not only offers within itself 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 pre-professional training. Its 30 academic units, of which 25 operate as departments and five are grouped in two schools (Health, Physical Education and Leisure; and Journalism and Broadcasting) offer more than 75 degree programs at the bachelor's level, and in conjunction with the Graduate College, 23 master's and 14 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 Department of Economics which belongs administratively to the College of Business Administration, offers 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 and options are set out in the book *Undergraduate Programs and Requirements*, available in all Oklahoma colleges and high schools. Separate sheets, stating the requirements for any particular degree, may be obtained by application to the department or college in which the degree is offered.

Bachelor of Arts (B.A.): art, economics, English, French, geography, German, history, mathematics, music, philosophy, political science, psychology, radio-tv-film (production and performance), religious studies, sociology (with options in anthropology, corrections, pre-social work, gerontology, juvenile treatment, and child services), Spanish, and speech communication.

Bachelor of Science (B.S.): aerospace studies, biochemistry, biological sciences (with biomedical and ecology options), 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, medical technology, microbiology, military science, physics, physiology, political science (with options in public affairs, international public administration and criminal justice administration, public affairs: public law and legal systems, public affairs: para-legal), psychology, radio-tv-film (news and public affairs, and sales and management), recreation (with options in outdoor recreation, administration and management and therapeutic recreation), sociology (with options in anthropology, corrections, gerontology, pre-social work, juvenile treatment, and child services), speech communication, speech pathology, statistics, wildlife ecology (with options in communication, management, research and enforcement) and zoology.

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 fitted to the particular needs of students may be devised with tilt approval of the student's advisers, dean and the Office of 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 "second 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 of award and total credit hours of the first degree, and indicate those courses which represent the minimum of 30 additional hours. The second degree plan should be sent to the College of Arts and Sciences Office of Student Academic Services within two weeks after the student's last 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 submit the request to the Office of Student 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 of outstanding academic ability 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. Those with ACT Composite scores below 27 may be invited to join if recommended by their high school principals. Others may join if they have an overall grade-point average at OSU of 3.50. 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, courses or independent study projects listed under the course prefix A&S; 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 department, or from the Arts and Sciences Student Academic Services office (201 LSE).

Area Studies Certificates

While completing requirements for a degree, and usually without increasing the total number of credit hours required, students may also earn 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 five 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 knowledge 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) *American 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 information on all Area Studies Certificates may be obtained from the Office of the Dean of the 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 may be obtained from any adviser or from the Office of Student Academic Services in the College of Arts and Sciences, or from the Office of Teacher Education in the College of Education.

Students who wish to qualify for teaching licensure should consult as early as possible with the adviser in their field of interest, and should apply for admission to teacher education as soon as possible, and preferably, before the end of their sophomore year.

It is usually possible to qualify for teaching licensure and the bachelor's degree within the 127 semester credit hours required for graduation. When it is not possible, students may meet the requirements for the degree and then complete the licensure requirements by taking additional courses 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.

Preprofessional Degree Programs

Premedical Advisory Committee

Chairman Maxine Leftwich, M.A.

Pre-dentistry, Premedicine, Pre-osteopathy, Pre-veterinary Medicine.

(See also *College of Agriculture*, Pre-veterinary options.) The preprofessional 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 and a major as freely as any other students in the College of Arts and Sciences. Most students concentrate on some aspect of biology or chemistry, but other

subject areas are acceptable. Medical schools encourage study in the social sciences and humanities that contribute to the understanding of human beings in their entirety—their history and environment, their attitudes and values, emotions, motivations, interpersonal relationships and cultural 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 127 semester credit hours at OSU, or (2) in physiology, a degree program which allows a "3 plus 1" approach, requiring at least 97 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 Medicine requires the School and College Ability Test (SCAT) and the aptitude test of the Graduate Record Examination (GRE).

Medical Technology: See *Department of Botany and 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 accounting, economics, English and American history, languages and literature. Verbal and analytical abilities are of particular importance.

Students who have no specific preference for an area of degree specialization may seek counsel from an adviser in the office of Student Academic Services.

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

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 of justice 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, 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, a 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 127. 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 127 **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 39 credit hours for the B.S. and B.A. degrees.

All degrees include a common core of 12 credit hours. *Three credit hours of American history and three hours of American government*, are required by state law. These must be satisfied by HIST 1103 or 1483 or 1493 and POLSC 1013. *Six credit hours of English composition*, is a University requirement, and 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 27 credit hours, must be distributed as follows: 6 credit hours of social sciences, 6 hours of humanities, 8 hours of natural sciences, 3 hours of abstract and quantitative thought, 3 hours of communication systems, and 1 hour of elective.

College Requirements. In addition to the 39 hours of general education, the college requires 1 credit hour of orientation, A&S 1111 for both the B.A. and the B.S. degrees. For the B.S., nine additional hours of natural or mathematical sciences are required, as well as 3 additional hours from the humanities or arts. For the B.A., nine additional hours of humanities or arts are required, as well as 3 additional hours of natural or mathematical sciences. College requirements define the Arts and Sciences degrees.

Foreign Language Proficiency Requirement. For the B.A., 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 and SPAN 4113, RUSS 3123, 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; 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 Office of the Dean of 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 Office of the Dean of Arts and Sciences.

The Non-Western, International Dimension, and Scientific Investigation requirements may be satisfied by courses used also to satisfy any other part of a student's degree program (i.e., in General Education, Departmental, Field of Concentration, or Electives requirements). No additional hours are required.

Additional College Requirements. For both the B.S. and the B.A.: 6 hours of general education or college requirements are to be taken at the 3000 level or above and 6 hours of college ENDWC (Enhanced Discussion/Writing Component) courses are to be included in a student's plan of study. A list of current college ENDWC courses may be obtained from any Arts and Sciences adviser or the Office of Student Academic Services.

The English Proficiency Examination. All candidates for a bachelor's degree must, unless they secure exemption, pass the University English Proficiency Examination. See *University Academic Regulation 3.6*.

Mathematics Proficiency Requirement. All candidates for a bachelor's degree must pass the Arts and Sciences Mathematics Proficiency Examination or satisfy one of the following conditions:

- (1) Receive a grade of "A" or "B" in MATH 1314, 1513, 1613, or 1715; or
- (2) Receive advanced standing credit for any one of the courses listed in number (1) above; or
- (3) Receive a grade of "C" or better in any calculus course, that is, MATH 2265, 2365, 2373, 2383, 2713.

Students are required to pass the Arts and Sciences Mathematics Proficiency Examination prior to filing a diploma application and are encouraged to take the examination toward the end of their junior year. The examination is administered, by appointment, to individual students by the Bureau of Tests and Measurements. A small fee will be charged for the administration and grading

of the examination. Students who fail the examination will be required to take it again until they have demonstrated proficiency.

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: 50 hours minimum. A student must successfully complete at least 50 semester hours of upper-division credit, i.e. credit in courses at the 3000 or 4000 level.

(These 50 hours will normally, but not necessarily, be listed in *Undergraduate Programs and Requirements* under "Field of Concentration.")

Hours in One Prefix: 42 hours maximum. If a student seeking a B.A. or B.S. degree takes more than 42 semester credit hours in one subject, including both lower-division and upper-division credit, the hours in excess of 42 will be added to the minimum total of 127 hours required by the College for a bachelor's degree. For example, if a department were to require 46 hours in one subject for a B.S. degree, the minimum requirement for a B.S. degree in that subject would be 133 hours. If a candidate for a B.A. in French has 46 hours of credit in French on his or her transcript, he or she must complete a total of 133 hours in order to graduate, instead of the stated total of 127.

This "42 hour maximum" applies to all courses taken in a subject, whether they are required or elective, with the exception of required courses in English composition and American history and government mandated by the state of Oklahoma.

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.

Checklist of Graduation Requirements.

- (1) **Total hours.** Minimum 127 (see degree sheet). *Note:* Hours of "F" or "I," or for repeated courses unless officially approved in course descriptions in this *Catalog*, do not count. English 0103 (offered only at Oklahoma City Technical Institute) is a non-credit course. Mathematics 1113 is not applicable to a degree. Students must ascertain that grade reports for the removal of "I's" have been sent to the Office of the Registrar by the instructor who gave the "I."

- (2) **Grade-point average.** See individual degree sheets for all grade-point minima, overall, in major, in concentration, in professional courses, in student-teaching, etc.
- (3) **Validity of credits.**
 - (a) No more than two courses in any one subject or (8 hours in biological science) may be used to satisfy the requirements in any area of General Studies. *Note:* HUMAN 2113 and 2111 may be counted together as one course; the same applies to HUMAN 2223 and 2221.
 - (b) A course used in the Field of Concentration may not be used to satisfy any other degree requirement.
 - (c) Pass-no pass Grading System. Courses taken on this campus under the Pass-no pass Grading System (see *University Academic Regulations*) **may be used only as elective hours.** They cannot satisfy any other requirement (General Studies, Departmental, Field of Concentration, certification).
- (4) Regulations governing resident and transfer credit must be satisfied. Transfer credit with a grade-point average below 2.00 can be used toward graduation only if a GPA of 2.00 is earned at OSU at the time of graduation. (See *University Academic Regulations*)
- (5) *All degree requirements listed above and specified in University Academic Regulations and Undergraduate Programs and Requirements must be satisfied.*
- (6) **Exemption.** A student who believes that he or she has a valid reason for exemption for a College requirement should file with the Office of Student Academic Services a written request which has been approved by his or her adviser. Although general and departmental requirements apply to transfer students, all or most of their previous work may be acceptable as substitutions. Students should consult their advisers.

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 majors 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 strongly recommended that high school students have: four units of English; three units of mathematics; three units of science; three units of social studies including American history, world history, and one-half unit of Oklahoma history; two units of foreign language; one unit of arts such as music, theater, painting.

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 should write to the Office of the Registrar for a schedule of advanced standing examinations. The most popular examinations are in foreign languages, English, mathematics and 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 Office 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.

Native Speaker Policy. It is the policy of the College of Arts and Sciences that native speakers of any foreign language (those whose language of instruction in high school was the language in question) may not normally be permitted to enroll or establish credit in courses in that language at the 1000 or 2000 level. There are no restrictions on higher level courses. Exceptions resulting from degree requirements may be determined by interview with the head of the Department of Foreign Languages and Literatures and the appropriate language section chairman.

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 Head Richard A. Bivins, M.F.A.

Professor Ronald P. duBois, M.A. **Associate Professors** Larry C. Avrett, M.F.A.; Nicholas W. Bormann, M.F.A.; Dean P. Bloodgood, M.F.A.; Ellen R. Murray Meissinger, M.F.A. **Assistant Professors** Richard L. Brown, Ph.D.; Lynda Halley, M.F.A.; **Susan** H. Hamlet, M.F.A.; Robert E. Parks, M.F.A.; Janice Pittsley, 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) minor in art for other majors.

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

Students wishing teacher certification should contact the Teacher Education Program in the College of Education or their art adviser. 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 in the Bartlett Center for the Studio Arts, with approximately 200 linear feet of exhibition space and 2600 square feet of floor space. Works by artists of national and international reputation, faculty and student works and cultural artifacts are shown.

Biochemistry: See *College of Agriculture*

Biological Sciences: See *(Department of) Zoology*

Botany and Microbiology

Botany

Professor and Head Glenn W. Todd, Ph.D.

Professors Eddie Basler, Ph.D.; Jerry J. Crockett, Ph.D.; James K. McPherson, Ph.D.; Paul E. Richardson, Ph.D. **Associate Professors** Becky B. Johnson, Ph.D.; James D. Ownby, Ph.D.; Ronald J. Tyril, Ph.D. **Assistant Professors** David A. Francko, Ph.D.; Arthur J. Pollard, Ph.D.; David W. Meinke, 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, lake and wildlife management.

To major in botany a student should have a strong interest in science with a good background in chemistry, physics and mathematics. Majors with a **B.S.** degree may qualify for secondary school science teaching licensure, for technical positions with the federal and state governments in plant inspection and plant introduction work, for plant breeding programs, and for various activities concerned with plants in private industry.

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. All of the faculty teach and do research in their specialty areas of botany: plant ecology, physiology, taxonomy, anatomy, development and limnology. Graduate study toward the M.S. and Ph.D. degrees is available in these areas.

Microbiology

***Professor and Head** Glenn W. Todd, Ph.D.

Professors Norman N. Durham, Ph.D.; Lavon P. Richardson, Ed.D. **Associate Professors** Mark R. Sanborn, Ph.D.; Helen Vishniac, Ph.D. **Assistant Professors** Mary Grula, Ph.D.; Richard A. Ortez, Ph.D.

Microbiology is the study of microorganisms (i.e., fungi, bacteria, and viruses) and their relationship to higher organisms. Areas of practical and theoretical consideration that require some understanding of microorganisms include: public health and sanitation; biotechnology, genetic engineering; food production and preservation; industrial fermentations which produce chemicals, drugs, antibiotics, alcoholic beverages, and various foods; prevention and treatment of diseases of plants, animals and man; and biodegradation of toxic chemicals and other materials present in the environment. Most of the recent

advances in our present understanding of genetics at the molecular level and in genetic engineering have resulted from research involving microorganisms.

Microbiologists work in federal and state departments of public health, the fermentation industry, laboratories of pharmaceutical companies, hospitals and medical schools, and research laboratories of universities, health centers, research foundations and private companies.

Students interested in careers in microbiology should have broad interests in the biological sciences and an aptitude for biology and chemistry. For some areas of specialization, an aptitude for mathematics and physics is also essential.

Departmental courses are designed to provide comprehensive training and the skills required for working with microorganisms, as well as a broad understanding of all aspects of microbial life. Many of the microbiology positions require graduate level studies. In addition to the B.S. degree, the department offers graduate studies leading to the M.S. and Ph.D. degrees in various areas of concentration including virology, microbial physiology, microbial genetics, microbial anatomy, immunology, and several applied areas.

Medical Technology. The program in medical technology is designed to give the student the broad general education and the highly technical skills that are required for a successful career in this important medical science. The minimum requirement for the B.S. degree in medical technology is three years of university work and one year of clinical laboratory education (internship) in an approved school of medical technology.

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

Baptist Medical Center, Oklahoma City, OK
Comanche County Memorial Hospital, Lawton, OK
Hillcrest Medical Center, Tulsa, OK
Jane Phillips Hospital, Bartlesville, OK
Mercy Health Center, Oklahoma City, OK
Muskogee General Hospital, Muskogee, OK
Norman Municipal Hospital, Norman, 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 Medical Center, Tulsa, OK
St. Mary's Hospital, Enid, OK
Valley View Hospital, Ada, OK

Students entering their twelve months of internship must enroll in Medical Science (MTCL) courses for 12 credit hours during the equivalent fall and

spring semesters and for 6 hours during the equivalent summer session, as follows: Fall - MTCL 4117, 4125; Spring - MTCL 4236, 4246; Summer - MTCL 4325, 4351. A grade of "I" may be given for the first two semesters of internship. Final letter grades will be awarded upon receipt of the final official transcript showing final letter grades in the six MTCL courses from the school of medical technology by the University medical technology coordinator. If a student fails to complete the entire 12 month internship, no course credit will be awarded. Students will pay the regular tuition for the credit hours in which they are enrolled, except that the facilities fees will be waived for the 30 hours of clinical laboratory education courses. Students who earn a B.S. degree prior to entering hospital internship will not be required to enroll and pay tuition during internship unless they desire to earn a second B.S. degree in medical technology.

Preprofessional courses. NAACLS requires a minimum of 16 hours of chemistry, including organic and/or biochemistry and 16 hours of biology, including immunology. The University requirement for the B.S. degree in medical technology is as follows: two semesters of general chemistry, organic chemistry and either biochemistry or quantitative analysis; immunology and 10 additional credit hours of upper-division microbiology (physiology can be included in this 10 hours).

Residence requirements. Although the MTCL courses are considered to be resident credit, the student is required to complete additional resident requirements from regular on-campus courses as follows: 24 hours of resident courses, including 18 hours of upper-division courses listed under the Field of Concentration on the current degree requirement sheet.

Grade point average requirements. Students, to be qualified for the B.S. degree, must earn a grade-point average of not less than 2.00 overall and 2.00 in upper-division major courses. Students with less than 2.80 overall grade-point average may find it difficult to gain acceptance to a school of medical technology under current conditions of competition.

Applications and 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 70 percent of students applying for internship are accepted, depending upon the degree of competition in any particular year. The decision on acceptance of any applicant is entirely at the discretion of the hospital-based school of medical technology. Enrollment is limited by the size of the classes in the affiliated hospital-based programs. Satisfactory completion of the clinical laboratory education is required for eligibility to take a certifying examination. The B.S. degree in medical technology is not dependent on a passing grade on the certifying examination.

Chemistry

Professor and Head Neil Purdie, Ph.D.

Regents Professors K. Darrell Berlin, Ph.D.; E. J. Eisenbraun, Ph.D.; Lionel M. Raff, Ph.D. **Professors** J. Paul Devlin, Ph.D.; I. Dwaine Eubanks, Ph.D.; Warren T. Ford, Ph.D.; Robert D. Freeman, Ph.D.; George Gorin, Ph.D.; Smith L. Holt, Ph.D.; Gilbert J. Mains, Ph.D.; Horacio A. Mottola, Ph.D. **Associate Professors** C. M. Cunningham, Ph.D.; John I. Gelder, Ph.D.; Elizabeth M. Holt, Ph.D.; Mark G. Rockley, Ph.D.; Donald L. Thompson, Ph.D.; Louis P. Varga, Ph.D. **Assistant Professors** Richard A. Bunce, Ph.D.; Linda B. McGown, 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 two bachelor's degrees: (1) a B.S. degree that is accredited by the American Chemical Society; and (2) a B.S. degree that requires less specialization. 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 Head Donald D. Fisher, Ph.D.

Professors Donald W. Grace, Ph.D.; George E. Hedrick, Ph.D. **Associate Professors** John P. Chandler, Ph.D.; Michael J. Folk, Ph.D.; Robert D. Gumm, Ed.D. (adjunct) **Assistant Professors** Mahir Ali, Ph.D.; Neal A. Fairley, Ph.D.; Arlen N. Long, M.S.; Sharilyn Thoreson, Ph.D. **Lecturers** John Jagoe, M.S.; Thomas G. Kyle, Ph.D. **Academic Counselor** Judith J. Edgmand

Computer science is concerned with theoretical and practical methods of storing, processing and communicating information by means of computers. Professional computer scientists obtain a formal education through the B.S., M.S. or Ph.D. degrees and apply their knowledge to many diversified fields of science, engineering, business and communications. Computer science offers opportunities to both specialists and generalists.

In little more than one human generation, the computer field has evolved from one associated primarily with engineering and scientific calculations of only casual interest to the layman, to a factor of significant influence in almost every aspect of modern life. Technical careers in computer architecture and software design, as well as applications in the business and scientific areas, require a thorough knowledge of the principles of computer science. In addition, most managers in any field require some familiarity with computers, not only to be able to understand and cope with them, but to incorporate them into their own decision-making processes.

The department offers the full range of degree programs-B.S., M.S. and Ph.D. The B.S. program consists of a computer science core curriculum with specialization in business applications, computer systems, scientific computation or computer architecture. Double majors linking computer science with other departments such as accounting and agricultural economics are available. The M.S. student may elect to specialize in programming languages, information systems, scientific computation or computer architecture. The Ph.D. degree is available to qualified students who wish to make original contributions to the field of computer science.

Most B.S. and M.S. graduates obtain positions in industry. About half of the Ph.D. graduates take university teaching and research positions and half are employed in industry.

An IBM 3081D with 16 megabytes of primary memory, supplemented by a VAX 11/780 and two IBM Series One computers, are available for both instructional assignments and research projects. In addition, a departmental UNIX-based Perkin-Elmer 3230 provides computational facilities for the Computing and Information Sciences experimental software development laboratory, a graduate student and faculty research laboratory.

The department participates in the CSNET and USENIX networks for computer science research and UNIX users. (UNIX is a trademark of Bell Laboratories.)

English

Professor and Acting Head Jack D. Campbell, M.A.

Professors David S. Berkeley, Ph.D.; Jane Marie Luecke, Ph.D.; John Milstead, Ph.D.; Mary H. Rohrberger, Ph.D.; Gordon Weaver, Ph.D.; Samuel H. Woods, Jr., Ph.D. Associate Professors Leonard J. Leff, Ph.D.; William H. Pixton, Ph.D.; Peter C. Rollins, Ph.D.; O. Bruce Southard, Ph.D.; Jeffrey B. Walker, Ph.D.; Thomas L. Warren, Ph.D. Assistant Professors Terry R. Hummer, Ph.D.; Paul J. Klemp, Ph.D.; Margaret F. Nelson, Ph.D.; Ravi Sheorey, Ph.D.; Sherry G. Southard, Ph.D.; Edward P. Walkiewicz, Ph.D. Instructors Mary E. Arrington, M.S.; Jimmie J. Cook, M.A.; 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 and Literatures

Professor and Head John A. Schillinger, Ph.D.

Professor Geoffrey Pill, D-es-L **Associate Professors** Cida S. Chase, Ph.D.; John J. Deveny, Jr., Ph.D.; Santiago Garcia, Ph.D.; Paul Y. Lin, Ph.D.; Robert L. Maurizzi, M.A.; Dorothy Schrader, Ph.D.; James D. Wells, M.A.; Harry S. Wohlert, Ed.D. **Assistant Professors** Hamilton H. Beck, Ph.D.; Luis Cortest, Ph.D.; Paul D. Epstain, Ph.D.; John E. Joseph, Ph.D.; Juan M. Marcos, Ph.D.; Marshall C. Olds, Ph.D.; David N. Wigtil, Ph.D. **Instructors** Dora M. Deveny, M.S.Ed.; Hildegund Wohlert, M.A.

The Department of Foreign Languages and Literatures offers French, German and Spanish as major fields of study. Minors may be earned in Chinese, French, German, Ancient Greek, Japanese, Latin, Russian and Spanish. Coursework in Italian is also offered, and other languages are scheduled whenever the demand justifies. Certificates of achievements are also awarded by the department for course work in German and Spanish.

In all languages offered by the Department, elementary courses are available for students with no previous experience. Special intensive courses in Chinese, French, Spanish (10 credit hours in 8 weeks) are offered in the summer session. Students with high school or equivalent foreign language experience will be placed at levels commensurate with their individual proficiency. A major in a foreign language is often supported by study of another language or work in other fields. Many language majors choose to qualify for an international area studies certificate. Several certificates, such as Russian and East European Studies, Asian Studies, and Ancient and Medieval Studies, are available. 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 new cultural insights breaks down insularity, fosters discipline of thought and expression and leads to a better understanding of one's native language. Foreign language majors may expect to find openings in a wide variety of careers in law, medicine, government, industry and commerce, all of which require a good liberal arts degree. Job opportunities are greatly enhanced for those who combine foreign language study with a major or minor in other disciplines. Moreover, there is a growing demand for foreign language teachers in secondary education. Bachelor of Arts candidates may qualify for teaching licensure without increasing the number of hours required for graduation.

Additional options for study include literature, civilization and culture, and linguistics courses regularly taught in English. Courses are also offered in French and German for students who need only a reading knowledge of the language.

The M.S. degree in curriculum and instruction, with a specialization in French, German or Spanish is available for prospective teachers of foreign languages in elementary and secondary education during regular and summer semesters.

Geography

Professor and Head Richard D. Hecock, Ph.D.

Professors George O. Carney, Ph.D.; Keith D. Harries, Ph.D.; Robert E. Norris, Ph.D.; John F. Rooney, Ph.D. **Associate Professors** Jerry D. Croft, Ed.D.; James H. Stine, M.S.; Stephen W. Tweedie, Ph.D.; John D. Vitek, Ph.D.; **Stephen J. Walsh, Ph.D. Assistant Professors** David R. Butler, Ph.D.; Stephen J. Stadler, Ph.D.

Geography is concerned with the surface of the earth and its immediate atmosphere. Geographers study the similarities, the differences and interactions among phenomena in this region. Geographers are interested in the economic, social, political and environmental qualities of places, and they are interested in how these attributes interact.

Geographers attempt to understand human behavior by answering such questions as: Where do people work? Where do they play? Where do they live? Why do people make these locational choices? What are the consequences of these decisions and behavior?

Because the physical environment is important in many explanations of spatial behavior and spatial patterns, geographers have traditionally concerned themselves with relationships between humans and their environment. What impact do people have on the land? What impact does the land have on people? How do people perceive their environment? How does this perception influence their activities?

Finally, geographers examine spatial patterns and behaviors in specific regional contexts. These analyses occur at many levels-world-wide, national and local. These kinds of studies lead to suggestions for change and improvement-the application of geography to contemporary rural, urban and regional problems. Thus many aspects of urban, regional and national planning are geographic in nature.

No academic discipline is closer to everyday practical life than geography, and the Department of Geography offers seven options that reflect the discipline's practical concern. Students may specialize in urban and regional planning, business or economic geography, environmental studies, area studies, geographic education, geographic techniques or remote sensing. A geography minor program is also available for those who see geography as complementary to another field of study.

Those who wish to study geography tend to be interested in their own surroundings and in other places. They also possess a curiosity for maps, the basic tool of the field. Students of geography will become familiar with remote sens-

ing, computer graphics, statistics, and cartography-tools which facilitate geographic analysis.

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. An advanced program leading to the Master of Science degree is also available. Geography graduate students may want to be affiliated with the Environmental Science or Historical Preservation degree programs.

The Department possesses a cartographic laboratory. The Center for the Applications of Remote Sensing directed by a geographer, has state-of-the-art digital processing capabilities. The department has direct access to the University's computing facilities through both standard and graphics terminals. Strong support for the economic-business and urban-regional planning geography programs are provided by the College of Business Administration and the School of Architecture. Resources management, remote sensing and physical geography options are supplemented by offerings in agricultural economics, forestry, geology, soils, biology, and civil engineering.

Geology

Professor and Acting Head Gary F. Stewart, Ph.D.

Professors Zuhair Al-Shaieb, Ph.D.; Douglas C. Kent, Ph.D.; Arthur Hounslow, Ph.D.; Wayne A. Pettyjohn, Ph.D.; John E. Stone, Ph.D. Associate Professors R. Nowell Donovan, Ph.D.; Stanley Finney, Ph.D. Assistant Professors Arthur Cleaves, Ph.D.; John Groves, Ph.D.; Ibrahim Cemen, Ph.D.; Vernon Scott, 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 and paleontology. 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 and 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.

School of Health, Physical Education and Leisure

George H. Oberle, *Director*

Betty W. Abercrombie, *Assistant Director and Coordinator of Graduate Studies*

Mary Frye, *Assistant Director, Leisure Services*

C. F. Schelsky, *Assistant Director, Colvin Center*

James H. Rogers, *Chairman, Department of Health and Outreach Coordinator*

E. Pauline Winter, *Chairman, Department of Leisure Sciences*

John G. Bayless, *Chairman, Department of Physical Education*

A. B. Harrison, *Program Director, Health and Fitness Center*

Mac L. McCrory, *Coordinator of Health and Fitness Center*

Kent Bunker, *Coordinator of Intramurals*

Kirk Wimberley, *Coordinator of Outdoor Adventure*

Ada Van Whitley, *Coordinator of Recreation*

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. Associate Professors Fred DeLacerda, Ph.D.; Betty M. Edgley, Ed.D.; Jerry J. Jordan, Ed.D.; Donna L. Payne, Ph.D.; Milton D. Rhoads, Ed.D.; Myr-Lou Rollins, M.A.; E. Pauline Winter, M.A. Assistant Professors Kent Bunker, M.R.Ed.; Lowell M. Caneday, Ph.D.; Karl W. Cloninger, Ph.D.; Steven W. Edwards, Ph.D.; Jeffrey Fair, M.S. (adjunct); Mary Frye, Ed.D.; Mac L. McCrory, Ed.D. (adjunct); Linda McElroy, Ph.D.; Vicki McKeeman, Ph.D.; Steven W. Moyer, Ed.D.; C.F. Schelsky, M.S.; Ada Whitley, M.S.; Kirk Wimberley, M.R.Ed. (adjunct) Adjunct Instructors Larry J. Bilhartz, M.S.; Florence Cottrell, M.S., A.T.C.; William R. Davis, M.S., A.T.C.; Margaret Rebenar, B.S. Academic Counselor Jane Mitchell, M.S.

The School of Health, Physical Education and Leisure (HPEL) is a multifaceted organizational unit encompassing three academic departments: health, physical education, and leisure, and three leisure service programs, recreation, intramurals 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 or leisure services. For more details on graduate plans and requirements, consult the *Graduate Catalog*.

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 and Annex are facilities for 32 activities including racquetball, gymnastics, basketball and swimming. In addition, areas for soccer, football, rugby, softball, archery, tennis, jogging, sailing, canoeing and hiking are made available for student and staff use.

Recreation. Through the recreation program, the staff of the Colvin Center offers a variety of noncredit instructional programs each semester to students, faculty, staff and their dependents. Specialty services include poolside dances and movies, International Olympics, married student recreation, freshman 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, country swing, ballet and belly dancing. Instructional programs for dependents include beginning gymnastics, intermediate gymnastics, beginning swimming, intermediate swimming, karate, creative dance and rhythmic gymnastics (3-4 years). Free children's activity programs are offered prior to the dependent's instructional program each Saturday morning.

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), as well as participation in co-recreational activities.

Sport Clubs. 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 is open to all students. If a group of students is interested in starting a sports club, the coordinator will assist them.

Active sports clubs are Auto Club, Bowling, Cricket, Crew, Cycling, Fencing, Karate, Lacrosse, Outdoor Adventure, Racquetball, Riflery, Rugby, Sailing, Scuba, Skydiving, Soccer, Squash, Volleyball, Waterskiing and Weightlifting.

Outdoor Adventure. Another thrust of the program is the OSU Outdoor Adventure Program. Organized trips are led by professional staff and trained students. The student's choice of activity will lead to the top of the mountains, over rocks and down rivers. The wilderness trips are designed to offer an opportunity for developing outdoor skills, but even more importantly, to develop and explore the individual, other people and the surroundings.

A children's summer camp at Camp Redlands, Lake Carl Blackwell, and a challenge ropes course at the Redlands site as well as the OSU Aquatic Center (Lake Carl Blackwell) are recent additions to the varied offerings.

An extensive rental of quality outdoor equipment is available through the Leisure Services Program at the Adams House.

Health

The Department of Health offers a selection of two major undergraduate professional preparation tracks. 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 an expertise in developing community-based instructional programs in community and public health agency settings. A student may combine both tracks by completing a student teaching internship required by track one and also completing a community health internship required by track two. A minor program is offered within the school health track, as well as in the community health track. A minor is also offered in athletic training that will meet state licensure requirements. 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.

Leisure

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 emphasis areas 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, fitness centers, schools, youth-servicing agencies, and institutions serving special populations such as the ill, disabled, handicapped, aged and incarcerated. A minor program is also offered in the recreation and leisure area.

The purpose of the general studies courses in the Department of Leisure Sciences 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 and skills necessary to appreciate the importance of activity and physical fitness for everyday living in both working and leisure time pursuits; to assist them in developing a satisfactory level of performance in such leisure time activities as sports, dance and aquatics, and to give a basic understanding of the body and its functions.

Physical Education

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, and subject to passing an appropriate curriculum examination, 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 adapted physical education.

History

Professor and Head Joseph A. Stout, Jr., Ph.D.

Oppenheim Professor LeRoy H. Fischer, Ph.D. Professors Theodore L. Agnew, Ph.D.; W. David Baird, Ph.D.; Bernard W. Eissenstat, Ph.D.; H. James Henderson, Ph.D.; Alexander M. Ospovat, Ph.D.; Robert M. Spaulding, Ph.D. Associate Professors Neil J. Hackett, Ph.D.; George F. Jewsbury, Ph.D.; Glenna C. Matthews, Ph.D.; Richard C. Rohrs, Ph.D.; James M. Smallwood, Ph.D.; Michael M. Smith, Ph.D.; John A. Sylvester, Ph.D. Assistant Professors John P. Bischoff, Ph.D.; Charles W. Cheape, Ph.D.; Paul J. Hiltpold, Ph.D.; James L. Huston, Ph.D.

History is the record, explanation and interpretation of the totality of man's activities. The study of history is unique in its concern for the time factor in man's development. History enhances the individual's knowledge of himself and gives perspective and deeper meaning to contemporary events. Courses in the Department of History are intended to give the student a broad understanding of the evolution of civilizations, peoples, countries and institutions, and an insight into the meaning of this evolution, as well as to prepare graduates for many types of employment.

Because history is basic to many special fields, the Department's instruction is designed to aid students interested in education, law, journalism, scientific and technical disciplines, public service and business administration. Students in colleges other than the College of Arts and Sciences who wish to pursue the study of history are encouraged to enroll in courses of interest. The Department of History offers a number of courses that satisfy general 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 and historic preservation.

School of Journalism and Broadcasting

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

Professor and Director Marian D. Nelson

Professors Harry E. Heath, Jr., Ph.D., Walter J. Ward, Ph.D. **Associate Professors** Marshall E. Allen, M.A.; Michael O. Buchholz, Ph.D.; Thomas R. Hartley, M.S.; Frederick L. Kolch, M.A.; Philip E. Paulin, Ed.D., William Rugg, Ph.D.; William R. Steng, Ed.D. **Assistant Professors** Michael J. Bugeja, M.S.; Charles A. Fleming, M.S.; Joanne Gula, Ph.D.; Jack G. Harrison, M.A.; Charles Overstreet, M.S.; Gregory Stefaniak, Ph.D.; John B. Thomas, M.S.; Robert A. Wegener, M.S.; Sheila Wisherd, M.S. **Instructor** William R. Jackson, M.A. **Lecturer** Lisa John

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

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

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

Graduate Study. The M.S. degree in mass communication and the Ed.D. degree in higher education with specialization in 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 all writing courses beginning with 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 advertising. 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 Accrediting Council on Education in Journalism and Mass Communications. This means it has the approval of leaders in both education and the advertising profession. The program is affiliated with the American Association of Advertising Agencies, the Advertising Federation of America and the Point of Purchase Advertising Institute.

Journalism

News coverage today has gone beyond routine reporting on police and city hall activities. The modern newspaper or broadcasting station tries to spotlight the diverse components of our complex society. This objective calls for writers with broad interests and special knowledge in politics, religion, science, business,

economics, art and public welfare. From the ranks of these reporters come the future print and broadcast journalists.

Options offered in journalism:

News-editorial-This program prepares students for writing and editing positions on newspapers, magazines, trade journals, in radio and television news departments, in book editing and publishing.

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

Teaching licensure-This program, taken in the College of Education, prepares students to teach journalism at the high school level.

Technical communication-Students may combine agriculture and journalism or home economics and journalism to prepare for specialized work in technical writing and editing. These programs are developed in cooperation with the Colleges of 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 range of courses both within and outside the School of Journalism and Broadcasting. This program is an individualized one and should be entered only with the advice and consent of the SJB Director.

Journalism majors assist in the publishing of a campus newspaper, *The Daily O'Collegian*, and in the newsroom of radio station 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, 2133, 3083 and 3123 is done on the O'Collegian or other publications.

The news-editorial curriculum is accredited by the Accrediting Council on Education in Journalism and Mass Communications, 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 Oklahoma Press Association, Southwestern Journalism Congress, Society of Professional Journalists, Association for Education in Journalism and Mass Communications and the Graphic Arts and Technical Foundation.

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 National 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 careers in broadcasting. They offer graduates a chance to develop abilities in announcing, production, copywriting, news, documentary, sports, sales and management.

The undergraduate degree is offered in these professional options: *Production and performance*-For 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 students who wish to write, edit and produce news, discussion and documentary programs for broadcasting stations, networks and cable companies.

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

Mathematics

Professor and Head William H. Jaco, Ph.D.

Associate Professor and Associate Head James W. Maxwell, Ph.D.
Professors Jeanne L. Agnew, Ph.D.; Douglas B. Aichele, Ed.D.; Hermann G. Burchard, Ph.D.; James R. Choike, Ph.D.; Donald S. Coram, Ph.D.; Paul F. Duvall, Ph.D.; Benny D. Evans, Ph.D.; Gerald K. Goff, Ed.D.; John M. Jobe, Ph.D.; Jerry A. Johnson, Ph.D.; Marvin S. Keener, Ph.D.; Ignacy I. Kotlarski, Ph.D.; Hiroshi Uehara, Ph.D. Associate Professors Alan C. Adolphson, Ph.D.; Dale E. Alspach, Ph.D.; Dennis E. Bertholf, Ph.D.; John E. Hoffman, M.A.; Yuly Makovoz, Ph.D.; J. Robert Myers, Ph.D.; John E. Wolfe, Ph.D. Assistant Professors Murray M. Blose, M.S.; J. Brian Conrey, Ph.D.; Amit Ghosh, Ph.D.; Joel K. Haack, Ph.D.; Wayne B. Powell, Ph.D.; Garrett Sylvester, Ph.D.; David C. Ullrich, Ph.D.; Rodney I. Yager, 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 *(Department of) Botany and Microbiology*

Microbiology: See *(Department of) Botany and Microbiology*

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 of Arts and Sciences. The two departments provide instruction under the basic and advanced Reserve Officers' Training Corps (ROTC) programs.

Scholarships. Both the Army and Air Force ROTC offer full scholarships each year for students enrolling in the program. ROTC scholarships provide full payment of tuition, fees and books 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 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 127 semester credit hours. It combines ROTC training with the College's general education and degree requirements and the opportunity to develop strong programs in a wide variety of other fields. The curricula for these degrees prepare the student for further professional work and for duty with the Armed Forces.

Flexibility. ROTC at OSU offers a variety of programs, giving the student considerable flexibility in charting a path to commissioning in the Army or the Air Force. Programs are designed so that individuals in all OSU colleges, departments and majors can tailor their academic/ROTC curriculum in order to attain commissioned status. Opportunities also exist in both Army and Air

Force ROTC for the student to "test the water" early in his or her academic program by participating in basic familiarization courses. Those interested in learning more about ROTC at OSU, or in enrolling, are urged to contact the professor of Aerospace Studies or professor of Military Science in Thatcher Hall on campus.

Aerospace Studies

Professor of Aerospace Studies and Head Col. Glen E. Nemecek, M.A.

Assistant Professors Maj. R. G. Bergdoll, M.B.A.; Cpt. D. R. Baker, M.A.; Cpt. A. A. Albert, M.S. **Staff** TSgt. B. R. Eischens; SSgt. D. E. Cavender.

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 leader in the U.S. Air Force. No military obligation is incurred for non-scholarship students enrolling in the freshman and sophomore courses. Students must successfully complete at least three hours of English composition and a mathematics reasoning course. Those students accepting an AF-ROTC scholarship must successfully complete at least one semester of a modern foreign language.

Students (male and female) completing the advanced Air Force ROTC program are commissioned as second lieutenants in the U.S. Air force. 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 thirteen hours of flight training at the Stillwater Airport.

Military Science

Professor of Military Science and Head Col. Michael K. McWherter, M.A.

Assistant Professors Maj. Thomas Lennox, M.B.A., M.S.; Maj. Thomas McCoy, B.S.; Cpt. Roger Pitchford, B.S.; Cpt. John John Matousek, B.S. Staff SGM. Domingo Lozano; SFC. Ronald Tomek.

Students desiring to expand the scope of their education while preparing for a dynamic and rewarding career as an officer in the United States Army, choose the Army Reserve Officer Training program as an adjunct to their chosen field of study. With courses dealing in a wide range of subjects from leadership to tactics, taught both indoors and out, the Army ROTC program trains 75 percent of all officers commissioned each year.

The Army ROTC program consists of a basic course and an advanced course. Students desiring to see what the program is like may enroll in up to nine hours of Military Science with no commitment to the United States Army. During this basic course, emphasis is placed upon leadership, war gaming, individual tactics, rappelling, land navigation and survival. All lower-division ROTC courses are open to the entire university community regardless of year in school.

Students committing themselves to a commission in the United States Army are permitted to enroll in the Army ROTC advanced course upon completion of the basic course or equivalent. The advanced course consists of ten hours of academic work taken during the junior and senior year. In addition, participation in a six week summer camp is mandatory. The advanced course emphasizes further development of leadership skills, offensive and defensive tactics, physical conditioning, ethics, military law, professional and basic military knowledge and skills. Additionally, advanced course students are responsible for use of required military skills as they act as assistant instructors during laboratory periods, plan leadership laboratories, plan and conduct field training exercises and are responsible for coordinating and supervising departmental extra-curricular activities.

Students interested in the Department of Military Science are encouraged to visit with departmental faculty at any time for further information concerning departmental course offerings and class sequencing. A number of two-, three- and four-year scholarships are available through the department. Prior enrollment in Military Science is not a prerequisite to departmental scholarship application.

Music

Professor and Head James Woodward, Ph.D.

Professors Hoover P. Fisher, D.M.E.; Stanley Green, M.M. Associate Professors Marian Abbott, M.M.; Peter Amstutz, D.M.A.; John Enis, M.M.; Gerald Frank, S.M.M.; Paul Friesen, M.A.; William McMurtry, Ph.D.; Paul Montemurro, M.A.; Wayne Muller, M.E.; Carol-Jean Planthaber, M.M.; Evan Tonsing, M.M.; Sunny VanEaton, M.A. Assistant Professors Robert Anderson, M.M.; Karen Carter, M.S.; Glenn Dowlen, M.M.; Eric Fried, D.M.A.; Richard Kastendieck, M.A.; Gwen Powell, B.M.; Thomas Walker, M.M.; Instructor Thora duBois, M.M.

The study of music at OSU is designed to increase the student's understanding and appreciation of music through the development of skills as listener, composer and performer. The student desiring a major in music chooses from the following: (1) Bachelor of Music (B.M.) in Performance, (2) B.M. in Vocal Music Education, (3) B.M. in Instrumental Music Education, (4) B.M. in Vocal and Instrumental Music Education, (5) B.M. in Music with Elective Studies in Business, and (6) Bachelor of Arts (B.A.) in Music. In addition, the Bachelor of University Studies allows the interested music student to major in music while earning a second major in an outside field.

Professional instruction is provided for the student preparing for a career in performance; teaching of music in public school, college or private studio; and the music business. The OSU undergraduate degrees are also excellent preparation for church positions and for graduate school.

The student planning to major in music at the university level should consider his or her background carefully. It should include a strong interest in music during high school years and a talent for performance in vocal or instrumental music. Individual lessons, fundamental theory knowledge, and basic piano ability will also be helpful.

Opportunities are also available to the student not majoring in music. All ensembles (choirs, opera, marching band, wind ensemble, jazz bands and orchestra), individual lessons, and courses are open to the major and non-major alike and offer academic credit.

An active scholarship program provides assistance to majors as well as non-majors. Students are invited to write for audition information.

Music on campus yields an enriching flow of concerts and recitals by students and faculty. The department also supports an active extension program, providing opportunities for individuals outside of the University.

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

Philosophy

Professor and Head Neil R. Luebke, Ph.D.

Professor John E. Susky, Ed.D. **Associate Professors** Richard W. Eggerman, Ph.D.; Edward G. Lawry, Ph.D.; David L. Levine, Ph.D.; Robert T. Radford, Ph.D.; Walter G. Scott, Ph.D. **Assistant Professor** John R. Bosworth, M.A.

Philosophy is an intellectual activity to be practiced and a subject matter to be studied. As an activity, philosophy seeks to analyze, evaluate, and often reformulate the ideas, principles and arguments by which 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. The writings produced by great philosophers are worthy of study as models of thought and as artifacts of historical influence and cultural significance. In this latter role philosophy is historically related to the development of every academic discipline.

Courses offered in philosophy fall into three general groups: broad introductory courses which cover a variety of topics, historical courses which proceed chronologically through a sequence of thinkers, and special topic or field courses. Some offerings combine the latter two characteristics. No undergraduate course is intended primarily for majors. 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 of concentration, as a minor, as a major leading to a B.A. degree, as a second major or in connection with a graduate program. The 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 which permit up to 38 hours of related and elective study in other areas. 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

Professor and Head G.P. Summers, D.Phil.

Professors Larry E. Halliburton, Ph.D.; E.E. Kohnke, Ph.D.; E.E. Lafon, Ph.D.; J.N. Lange, Ph.D.; J.J. Martin, Ph.D.; R.C. Powell, Ph.D.; D. L. Rutledge, Ed.D.; Mark A. Samuel, Ph.D.; Leon W. Schroeder, Ph.D.; H. L. Scott, 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** Bruce J. Ackerson, Ph.D.; George S. Dixon, Ph.D.; Kimball Milton, Ph.D.; **Assistant Professors** C. Y. Allison, Ph.D.; L.I. Fleishman, Ph.D.; H.J. Harmon, Ph.D.; S. W. McKeever, 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.

The physics program provides a common basis of physics, mathematics and other sciences for the first two undergraduate years. A 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. A physics minor is also possible.

Physiological Sciences: See *Zoology*

Political Science

Associate Professor and Acting Head Joseph W. Westphal, Ph.D.

Regents Service Professor Harold V. Sare, M.A.

Distinguished Lecturer Henry L. Bellmon, B.S. 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.; Ann L. Schneider, Ph.D.; Franz A. Morales von Sauer, Ph.D.; Assistant Professors Barrie E. Blunt, Ph.D.; Anthony E. Brown, Ph.D.; James A. David, Ph.D.; Robert E. England, Ph.D.; William M. Parle, Ph.D.; Instructor Danny M. Adkison, Ed.E.

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

Political science seeks to reveal the patterns of behavior associated with politics, to discern the decision-making process in government, to explain the functioning of political and governmental institutions, to appraise alternatives to public policy and to assess government's role in society.

The principal fields of study in political science are political theory, public law, comparative politics, international relations, public administration, public policy, and American political behavior. Students may receive the Bachelor of Arts degree in political science with a concentration in any of the fields of study. The Bachelor of Science degree in political science is offered with a concentration in public affairs-international public administration, public affairs-public law, public affairs-paralegal, and public affairs-criminal justice administration.

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

The Department of Political Science offers graduate work leading to the M.A. degree with a concentration in one of the following seven fields: theory, public law, public policy, comparative politics, international relations, public administration and American political behavior. The public administration and public policy program emphasizes policy design, policy analysis and policy evaluation as well as administration.

Pre-law: Many degrees are applicable. See Arts and Sciences preprofessional degree programs.

Pre-med and Pre-vet: Many degrees are applicable. See Arts and Sciences preprofessional degree programs.

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.; William W. Rambo, Ph.D.; Kenneth D. Sandvold, Ph.D.; Robert S. Schlottmann, Ph.D.; Robert F. Stanners, Ph.D.; Robert J. Weber, Ph.D. Associate Professors Vicki Green, Ph.D.; Bob Helm, Ph.D.; Larry Hochhaus, Ph.D.; Bill C. Scott, Ph.D. Assistant Professors Diana Byrd, Ph.D.; Pam Dorsett, Ph.D.; James Price, Ph.D.; Durhane Wong-Rieger, Ph.D. Adviser Iris Eby, M.S. Adjunct Instructor Brenda Patterson

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 Office 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 of graduate 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 psychology, organizational psychology, community psychology, developmental psychology and quantitative psychology. Moreover, an applied M.S. program is available in mental health.

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

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

Religious Studies

Professor and Head Kyle M. Yates, Jr., Th.D.

Professors Lionel Arnold, Ph.D.; Hyla S. Converse, Ph.D. **Associate Professors** Joseph F. Byrnes, Ph.D.; Azim A. Nanji, Ph.D.; **Robert F. Weir, Ph.D.** **Assistant Professors** Kenneth Dollarhide, Ph.D.; Dennis E. Smith, Th.D.; James S. Thayer, 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.

A degree program in religious studies is available for the student desiring a major or minor in the field of study. 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.

Sociology

Professor and Head Charles Edgley, Ph.D.

Professors Gene Acuff, Ph.D.; Donald Allen, Ph.D.; Donald Brown, Ph.D.; Jack Bynum, Ph.D.; Ivan Chapman, Ph.D.; Richard Dodder, Ph.D.; Larry Perkins, Ph.D.; Harjit Sandhu, Ph.D.; Dan Wesley, Ed.D. Associate Professors George Arquitt, Ph.D.; Werner Gruninger, Ph.D.; Larry Hynson, Ph.D.; Kenneth Kiser, Ph.D. Assistant Professors Patricia Bell, Ph.D.; Kathleen McKinney, Ph.D.; Donald Tennant, Ph.D.; Marjorie Schweitzer, Ph.D.; Edgar Webster, Ph.D. Adjunct Assistant Professor Carol Olson, Ed.D. Adviser Martha McMillian, Ed.D.

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 a 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 that 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 courses in sociology are designed to help the student (1) understand the influence of society on individuals, (2) apply this understanding to social issues, and (3) provide the technical skills needed to do both. Topics covered include anthropology, corrections, social problems and deviance, research methods, social organization, social psychology, social work 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 advise students.

B.A. and B.S. degrees are offered in sociology. Both B.A. and B.S. degrees include applied options in corrections, pre-social work, social gerontology, juvenile treatment and child services. The general sociology degree has career path options including social aspects of law, social aspects of medicine, organizations and administration, social research and analysis, urban/population trends and issues, and minorities/women's studies. At the graduate level, master's and doctoral programs in sociology and a master's in corrections are available.

Anthropology

Anthropology is the study of humankind in all its similarities and differences, both biological and behavioral. As an academic discipline it covers a wide range of subject matter ranging from fossil remains related to early human forms and the biological characteristics of contemporary human populations (physical anthropology) to scientifically excavated remains of past societies (archaeology) to behavior within contemporary human societies (cultural anthropology). Offerings in anthropology provide students with a basic introduction to the ideas and principles found in these three subdisciplines.

Regular course offerings include an emphasis on North American Indian culture and archeology, women's roles in different cultures, and aging from a cross-cultural perspective. Other courses deal with anthropological methods and theory.

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 Head James Hughey, Ph.D.

Associate Professors Paul Harper, Ph.D.; Lamar Reinsch, Ph.D.; 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

Associate Professor and Acting Head Cheryl Scott, Ph.D.

Associate Professors Thomas A. Fields, Ph.D.; Fred Kolch, M.A.; Nancy Monroe, Ph.D. Assistant Professor Gary J. Beeby, M.A.; Arthur L. Pentz, Ph.D. Instructors Ann Davidson, M.A.; 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 disabilities. 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 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 and language pathology. In addition, almost all students elect to earn the state teaching certificate or licensure.

Statistics

Professor and Head J. Leroy Folks, Ph.D.

Professors Lyle Broemeling, Ph.D.; P. Larry Claypool, Ph.D.; Richard Dodder, Ph.D.; Ignacy I. Kotlarski, Ph.D.; **Ronald W. McNew, Ph.D.;** **David L. Weeks, Ph.D.** **Associate Professors Robert Darcy, Ph.D.;** Donald Holbert, Ph.D.; Nitish Mukhopadhyay, Ph.D.; William D. Warde, Ph.D. **Assistant Professors William S. Stewart, Ph.D.;** Linda J. Willson, Ph.D.; Timothy A. Wittig, 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

Professor and Head James Woodward, Ph.D.

Professor Jerry L. Davis, Ph.D. **Associate Professors** Daniel W. Alkofer, Ph.D.; Kenneth Cox, Ph.D.; Martha Sharp, M.F.A. **Assistant Professors** Billye Sue Harmon, M.F.A.; Mary Anne Hempe, M.F.A.

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

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

Ambitious seasons of varied productions offer practical experience for both majors and non-majors. A vigorous student organization, the University Theatre Guild, develops theatre-related projects and provides many services to the production program.

Students with a major interest in theatre may elect either a Bachelor of Arts or a Bachelor of Science degree in theatre. Students interested in preparing to teach theatre and speech in grades 7-12 may choose B.A. or B.S. degrees in speech-theatre education in the College of Education. A strong component of theatre courses may also be included in the individualized curriculum leading to the Bachelor of University Studies degree.

Wildlife Ecology See *Zoology*

Zoology

Professor and Head Jerry Wilhm, Ph.D.

Professors Calvin G. Beames, Jr., Ph.D.; L. Herbert Bruneau, Ph.D.; Bryan P. Glass, Ph.D.; Eugene Maughan, Ph.D. (adjunct); Rudolph J. Miller, Ph.D.; Stanley Newcomer, Ph.D.; John W. Thornton, Ph.D.; Dale W. Toetz, Ph.D. Associate Professors John A. Bantle, Ph.D.; John S. Barclay, Ph.D.; James T. Blankmeyer, Ph.D.; Sterling L. Burks, Ph.D.; Calvin C. Cunningham, Ed.D.; Anthony Echelle, Ph.D.; Stanley F. Fox, Ph.D.; James Harmon, Ph.D.; Jerry G. Hurst, Ph.D.; Helen Miller, Ph.D.; James H. Shaw, Ph.D. Assistant Professors Tracy Carter, Ph.D. (adjunct); Michael E. Douglas, Ph.D.; Margaret S. Ewing, Ph.D.; James Lish, Ph.D. (adjunct); Deborah Meinke, Ph.D. (adjunct); Scott Shalaway, Ph.D.; Larry Talent, Ph.D. Academic Counselor Luann S. Waters, M.S.

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

Zoology, the study of animals, provides a background for many applied and professional careers. Environmental and evolutionary biology receive major emphases in the zoology program. Since most of the important problems facing man today are ecological, the department has developed a broad program with emphasis on ecology.

The B.S. degree curriculum in zoology is designed to provide a background of basic biology and some 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, statistics, and botany. The B.S. degree in zoology requires courses in cell biology, ecology, evolution, genetics, and vertebrate and invertebrate zoology.

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

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 projects and disseminate information obtained through such research. The units function in cooperation with the department of zoology in which unit leaders hold academic rank and serve as members of the faculty.

Both the M.S. and the Ph.D. degrees are offered specifically in wildlife ecology. For course offerings in wildlife ecology, see listings under Wildlife (WILDL) in this *Catalog* and in each semester's class schedule book.

Biological Sciences

A **B.S.** degree in biological sciences is available for students wishing to obtain a broad program encompassing all of the life sciences. By including appropriate course work in their programs, students 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. For course offerings in biological sciences, see listings under Biological Sciences (BISC) in this *Catalog* and in each semester's class schedule book.

Physiology

Physiology is a division of zoology that deals with the mechanisms and controls of the life processes of animals including man. Since its goal is to explain these processes on the basis of chemical and physical laws, the students of physiology must obtain a strong background in both the physical and biological sciences. The bachelor's degree in physiology requires participation in undergraduate seminars and course work in general biology, genetics, gross and microscopic anatomy, algebra, trigonometry, general physics, general chemistry, organic chemistry, biochemistry, and quantitative and analytical chemistry, as well as course work in mammalian and cellular and comparative physiology and pharmacology.

The undergraduate degree in physiology is intended primarily as preparation for graduate school or a medically-related professional school (human or veterinary). With its relatively large number of free electives, the B.S. degree in physiology is also an excellent liberal arts experience.

Graduate programs leading to the M.S. or Ph.D. degrees in physiology are offered by this faculty in conjunction with the graduate faculty of the Department of Physiological Sciences of the College of Veterinary Medicine. For course offerings in physiology see listings under Physiological Sciences (PHSI) in this *Catalog* and in each semester's class schedule book.

COLLEGE
OF
BUSINESS
ADMINISTRATION



College of Business Administration

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

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

Gerald M. Lage, Ph.D., Interim Director of Business and Economic Research

James G. Hromas, Ph.D., Director of Extension

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

Department Heads

Accounting, James R. Boatsman, Ph.D., C.P.A.

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

Economics, John D. Rea, Ph.D.

Finance, W. Gary Simpson, Ph.D.

Management, R. Dennis Middlemist, 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 and other economic units 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, organizational administration with an information processing option, and a major in organizational administration with a business administration option, jointly administered by the Department of Management.

Economics, with a major in economics and an option in business economics-quantitative studies.

Finance, with a major in finance and an option in insurance.

Management, with majors in management with options in international management and personnel management; management science and corn-

puter systems; and organizational administration with an option in public administration.

Marketing, with a major in marketing.

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, or economics. Enrollment in all graduate courses is limited to persons who have been admitted to a graduate program. For further information see the *Graduate Catalog*. Only persons admitted to a graduate degree program may take graduate courses in the College of Business Administration.

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 Economics and Finance, Management, and Marketing and the School of Accounting. For further information see the *Graduate Catalog*.

Placement Service. Representatives of more than 150 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 Office of the Dean of the CBA.

All students should tentatively select a major during their sophomore year. Each student will then be assigned to a faculty adviser from the major field of study. Thereafter, counseling will be provided by the assigned faculty adviser.

The dean and associate dean, as well as the director of 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 up to 59 semester credit hours are required. The student also may select additional hours from courses in these areas, with the opportunity of achieving either further breadth or a certain degree of depth by concentrating these hours in a particular area of interest. As part of the student's general education, one course must be selected that is identified as satisfying the International Dimension requirement.

During the freshman and sophomore years the student will complete courses in each of the following areas:

Behavioral and social sciences: American history, 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 (no more than two courses per field): art, humanities, literature, music, philosophy, religion and theatre.

Natural science and mathematics: A minimum of 10 semester credit hours with the specific number of required hours in mathematics and natural science varying with the major chosen. Specific requirements for each major are published by the University in the book *Undergraduate Programs and Requirements*.

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 lower-division requirements. (Business education majors must take an additional two hours from any HPEL activity or aerospace studies and military science courses.)

Credits earned during the freshman and sophomore years in another institution may not be substituted for junior and senior course requirements in majors in the College of Business Administration.

Accounting

Professor and Head James R. Boatsman, Ph.D., CPA

Regents Professor Milton F. Usry, Ph.D., CPA Professors Lanny G. Chasteen, Ph.D., CPA Associate Professors Dale E. Armstrong, Ph.D., CPA; Patrick B. Dorr, Ph.D., CPA; Lawrence H. Hammer, D.B.A., CPA; Don R. Hansen, Ph.D., CMA; Janet I. Kimbrell, Ph.D.; CPA; John W. Wilguess, Ph.D., CPA Assistant Professors James E. Groff, M.B.A.; M. E. Lacy, Ph.D., CPA; Gary K. Meek, Ph.D., CPA; Maryanne M. Mowen, Ph.D., CMA; Kevin E. Murphy, Ph.D., CPA; Charles R. Ransom, Ph.D., CPA; James G. Swearingen, Ph.D., CPA; Charlotte J. Wright, Ph.D., CPA

The School of Accounting offers three degree programs in accounting: (1) B.S. in Business Administration with a major in accounting, (2) M.S. in accounting, and (3) Ph.D. in business administration with 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 for accounting career development, the objective of the M.S. in accounting is to provide candidates with a greater breadth and depth in accounting than is possible in the B.S. program, in order to prepare graduates for careers as professional accountants in financial institutions, industry, nonbusiness organizations, and public practice.

Students who are considering a professional accounting career should have above-average aptitudes in mathematics and English, disciplined work habits, an interest in working with people and an attitude of service 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.; Clayton B. Millington, Ph.D.; Arnola C. Ownby, Ed.D. Zane K. Quible, Ph.D. Associate Professors Richard A. Aukerman, Ph.D.; Hal W. Ellis, J.D.; Joe W. Fowler, J.D.; E. Moses Frye, J.D.; G. Daryl Nord, Ph.D.; Jeanine N. Rhea, Ed.D. Assistant Professors Jane N. Hammer, Ed.D.; Jeretta A. Horn, , Ed.D.; James F. Jackman, J.D.; Dennis 1. Knox, M.S.; Joan K. Pierson, 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 nonfederally 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, 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, automated office applications, 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 communication, data processing and economic education.

The Doctor of Education degree may be earned in business education, where emphasis may be given in such areas as communication, data processing and 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

Professor and Head John D. Rea, Ph.D.

Regents Professor Richard H. Leftwich, Ph.D. Professors Michael R. Edgmand, Ph.D.; Joseph M. Jadlow, Jr., Ph.D.; Gerald M. Lage, Ph.D.; Ronald L. Moomaw, Ph.D.; Kent W. Olson, 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 Orley M. Amos, Jr., Ph.D.; Michael J. Applegate, Ph.D.; Robert C. Dauffenbach, Ph.D.; Pauline W. Kopecky, Ph.D.; Joseph Shaanan, Ph.D. Assistant Professors David G. Bivin, Ph.D.; Gregory P. Hoelscher, Ph.D.; Edward O. Price, III, Ph.D.; Keith D. Willett, Ph.D.; Lee O. Zinser, Ph.D.

Economics is a science of choice. The study of economics centers around individuals' attempts to improve their living standards. It provides a comprehensive view of how a society is organized to transform the limited resources available into want-satisfying goods and services. It investigates the principles underlying the operation of the economic system, and seeks to determine its weaknesses and to prescribe policy measures that will improve its operation. In the process it ranges over a host of the most important problems confronting contemporary society—the causes of and remedies for depression and inflation, the determinants of and methods for improving income distribution, poverty problems and welfare measures, the role of the government in economic activity, the requisites for economic growth and development, pollution and congestion and their control.

The primary objectives sought in the undergraduate curriculum are to develop a broad understanding and perspective of the economic aspects of man's activities, coupled with thorough training in the fundamental tools of economic analyses. Toward these ends, the development of elementary mathematical and statistical skills is highly desirable, as is complementary study in the social and behavioral sciences, accounting and business administration.

A major in economics prepares students for positions with business firms, nonprofit private organizations and government agencies. 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. A degree option in business economics and quantitative studies is offered to provide additional training in analytical methods and communication skill for both public and private sector occupations.

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

Associate Professor and Head W. Gary Simpson, Ph.D.

Associate Professors Howard L. Brewer, Ph.D.; James F. Jackson, Jr., Ph.D.; Assistant Professors Harry A. Comesky, Ph.D.; Keshav Gupta, Ph.D.; Ronald K. Miller, Ph.D.; John Polonchek, Ph.D.

The primary objective of the undergraduate curriculum is to develop a broad understanding and perspective of the financial aspects of man's activities, coupled with thorough training in the fundamental tools of economic and financial analyses. Toward these ends, the development of elementary mathematical and statistical skills is highly desirable, as is complementary study in economics, accounting and business administration. The major in finance is intended to prepare students for positions with organizations that require a special understanding of financial 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 that 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, investment theory, securities markets and financial institutions. OSU offers a balanced program of graduate as well as undergraduate training in finance, leading to both Master of Business Ad-

ministration 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, investments, financial management and international finance.

Management

Professor and Head R. Dennis Middlemist, Ph.D.

Professors Mitchell O. Locks, Ph.D.; Wayne A. Meinhart, Ph.D.; J. Scott Turner, Ph.D. **Associate Professor** Charles R. Greer, Ph.D. **Assistant Professors** Steven H. Barr, Ph.D.; David C. Ho, M.B.A.; Tim C. Ireland, Ph.D.; Marilyn G. Kletke, Ph.D.; Chalmer E. Labig, Jr., M.A.; Benjamin M. Oviatt, M.S.; Fritz Rieger; Ramesh Sharda, Ph.D.; Jack Sullivan

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 of an organization is the concern of the personnel manager. This includes labor relations and collective bargaining, forecasting the demand for personnel, attracting potential employees, orienting them and then developing the careers of those employed. For those who enjoy working with 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 managers in complex businesses or nonprofit organizations. There is a high demand for persons with advanced computer competency with a knowledge of business systems. Many students have a special interest in building concentrations in management systems and computer science. The management science and computer systems program is ideal for this purpose. Examples of topics covered include managerial decision theory,

operations research, systems analysis, management information systems and operations management. The study of management science and computer topics may be combined with advanced work in related disciplines for those with appropriate interests. Management science and computer systems majors typically enter business or public organizations as management systems analysts, computer systems analysts, or management trainees. Many also undertake graduate study to further their professional education.

Graduate Programs 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 James W. Gentry, Ph.D.; B. Curtis Hamm, Ph.D.; William G. Zikmund, D.B.A. **Associate Professors** George C. Jackson, Ph.D.; William M. Kincaid, Ph.D.; L. Lee Manzer, Ph.D.; John C. Mowen, Ph.D. **Assistant Professors** Raymond P. Fisk, Ph.D.; Joanne S. Hopper, Ph.D.; Ruth H. Krieger, Ph.D.; Raymond W. LaForge, Ph.D.; Joshua L. Wiener, 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 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, 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
and Director of Student Services**

Steven K. Marks, Ed.D., Coordinator of Clinical Experiences

**Thomas J. Smith, Ed.D., Director of Education Extension
and Coordinator of University Center at Tulsa**

**Kenneth H. McKinley, Ph.D., Director of Education Research and Projects
and Associate Director of Education Extension**

Heads of Departments and Director of School

Applied Behavioral Studies, Bill F. Elsom, Ed.D.

Curriculum and Instruction, Douglas B. Aichele, Ed.D.

Educational Administration and Higher Education, Thomas A. Karman, Ph.D.

**School of Occupational and Adult Education, Melvin D. Miller, Ed.D., Director
Aviation Education, Bruce D. Hoover, M.S.**

System Design and Computer Services, H. Gene Smith, Ed.D.

The College of Education administratively includes the departments of Applied Behavioral Studies, Curriculum and Instruction, Educational Administration and Higher Education, 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 within the 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 (elementary school principal)
- Administrator (occupational and vocational education)
- Administrator (school superintendent)
- Administrator (secondary school principal)
- Audiovisual specialist
- School counselor
- School psychologist
- School psychometrist

II. Instruction

Elementary School Certificate (K-8)

Elementary education

Elementary-secondary School Certificate (K-12)

Art

Physical education

Secondary School Certificate (7-12)

Foreign language

Industrial arts

Journalism

Language arts

Mathematics

Science

Social studies

Speech/Drama

Trade and industrial 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

Adult and continuing education

Curriculum and teaching

Human resources development

Occupational education administration

Occupational education research

Social psychology

Technical education

Vocational rehabilitation counselor 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 non-teaching major in education should contact the College of Education Office 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.; Rondal R. Gamble, Ph.D.; Frank E. McFarland, Ed.D.; James M. Seals, Ph.D.; Paul G. Warden, Ph.D. **Associate Professors** Kay S. Bull, Ph.D.; Noma Jo Campbell, Ed.D.; Alfred F. Carozzi, Ed.D.; John M. Dillard, Ph.D.; Joseph Pearl, Ph.D.; Brent M. Snow, Ph.D.; Barbara Wilkinson, Ph.D. **Assistant Professors** Charles R. Davis, Ph.D.; Michael E. Kerr, Ph.D.; Deborah K. Kundert, Ph.D.; Imogene L. Land, Ed.D.; David S. Lane, Jr., Ph.D.; Evangie McGlon, Ph.D.; Diana L. Newman, Ph.D.; Katye M. Perry, Ph.D.; Michael M. Warner, Ph.D.

The Department of Applied Behavioral Studies in the College of Education serves the University Teacher Education program and offers degree programs at both the undergraduate and graduate levels. Areas included in this

Department are special education, counseling and student personnel, educational psychology and educational research and evaluation. A primary mission of the Department is to apply knowledge derived from psychological and related behavioral studies to the provision of educational and social services.

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 experiences leading to state certification. 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 counseling and student personnel area includes the following comprehensive programs leading to a master's degree: community counseling, school counseling (elementary and secondary), higher education counseling, rehabilitation counseling, and higher education student personnel administration. Doctoral programs are available in student personnel administration, counseling and counselor education, and counseling psychology. Applications to the Ph.D. program in counseling psychology must be received by February 15 for enrollment the following fall semester.

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, educational/instructional school psychology or human development. Research and evaluation is available as an area of emphasis at both the master's and doctoral level.

Coursework applicable to the Master of Science degree in applied behavioral studies with program emphases in counseling and student personnel, special education, and educational psychology is available through the University Center at Tulsa as well as on the Stillwater campus. Further information regarding this degree may be found in the "Master's degree" section of the *Graduate*

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.; Gene L. Post, Ed.D.; Darrel D. Ray, Ed.D.; William E. Segall, Ed.D.; Daniel Selakovich, Ed.D.; Vernon E. Troxel, Ed.D.; Kenneth E. Wiggins, Ed.D. Associate Professors Carolyn Bauer, Ed.D.; Kathryn S. Castle, Ed.D.; Cida S. Chase, Ph.D.; Anne K. Hoyt, M.S.L.S.; Elizabeth M. Max, Ed.D.; Sharon P. Muir, Ph.D.; Audrey E. Oaks, Ed.D.; Bruce A. Petty, Ph.D.; Milton D. Rhoads, Ed.D.; Charles L. Smith, Ed.D. Assistant Professors Helen N. Cheek, Ed.D.; Martha N. Combs, Ed.D.; Nelson J. Ehrlich, Ed.D. (adjunct); Joyce S. Friske, Ph.D.; Woodfin G. Harris, Ed.D. (adjunct); J. Randall Koetting, Ph.D.; Steven K. Marks, Ed.D. (adjunct); David Yellin, Ph.D. Instructor Norma J. Cole, M.S. Lecturers Connie J. Mansfield, M.S.; Marva J. Moreland, 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 emphasis include preparation of elementary and secondary teachers, reading specialists, instructional media and technology specialists, and supervisors/curriculum coordinators. 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 an elementary Oklahoma license (K-8). This program of study includes course work in general education, in a field of specialization, 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 a secondary (7-12) Oklahoma license. Students emphasizing art or health and physical education also receive a degree in secondary education and qualify for an elementary/secondary (K-12) Oklahoma license. Each of these secondary degree programs includes general education courses, extensive specialization course work in the discipline area, and professional education courses motivated by substantial field-based practicum experiences.

Programs leading to an Oklahoma license as a reading specialist, and as an audiovisual specialist are also available through the Department.

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

The Department also sponsors the Microcomputer Technology Instructional Laboratory and is closely involved with the Dean's Grant on Mainstreaming, the nationwide NASA educational program, and the Natural Resources and Environmental Education Center.

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 to enter public or private elementary and secondary schools as teachers, 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.

The master of science degree in curriculum and instruction with program emphasis in curriculum/supervision, elementary education, instructional media and technology, or reading is available through the University Center at Tulsa. Further information concerning this degree may be found in the department statement, Master's Degree Policies and Regulations, available in 302 Gundersen Hall and in the "Master's Degree" section of the OSU *Graduate Catalog*.

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.; Kenneth H. McKinley, Ph.D.; Donald W. Robinson, Ph.D.; Thomas J. Smith, Ed.D.; J. Kenneth St. Clair, Ed.D. **Associate Professors** Patrick B. Forsyth, Ed.D.; E. Moses Frye, J.D.; John J. Gardiner, Ph.D.; W. Deke Johnson, Ed.D. **Assistant Professors** Ann E. Austin, Ph.D.; Deborah Inman, Ed.D.; Thomas M. Keys, Ed.D.; A. Kenneth Stern, Ed.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 or the director of graduate studies 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 development; 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.

The master of science in higher education and certificate programs in school administration with emphasis on the standard certificate for school superintendents are available through the University Center at Tulsa. Further information concerning these programs may be obtained in the departmental office, 309 Gundersen Hall.

School of Occupational and Adult Education

Aviation Education, Distributive Education, Industrial Arts Education, Technical and Adult Education, Trade and Industrial Education

Melvin D. Miller, Ed.D., *Director*

Bruce D. Hoover, M.S., *Manager, Aviation Education*

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. Dugger, Ed.D.; Wayne B. James, Ed.D.; Clyde B. Knight, Ed.D.; Harold J. Polk, Ed.D.; H. Gene Smith, Ed.D.; John B. Tate, Ed.D.; Wm. Venable, Ph.D.; Linda Vincent, Ed.D. Assistant Professors Craig Anderson, Ph.D.; Jerry G. Davis, Ph.D. Instructors Bruce Hoover, M.S.; Joey McKinney

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, technical education, and trade and industrial education, each of which offers a bachelor's and a master's degree. Adult education and human resources development majors are available through both the master's and doctoral programs. The School also includes the service unit of aviation education and the Systems Design and Computer Services Unit. The latter unit provides 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 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 are prepared for approved certification 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 education 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, human resource development, curriculum and teaching, and 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 training courses and aviation theory courses for academic credit. The Department is administered in the College of Education; however, it serves students from all colleges of the University in meeting their aviation needs.

The program consists of basic and advanced aviation theory courses, aviation management, aviation law, 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 Department is fully certified by the Federal Aviation Administration as an air agency with examining authority.

Flight training and theory courses 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 and petroleum industries. 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 of flight 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 nonscheduled airlines.

Persons majoring in aviation education earn the Bachelor of University Studies degree. This attractive degree program prepares them for numerous careers in the aviation industry.

Distributive Education. The degree program at Oklahoma State University includes 50 credit hours of lower-division and general education requirements. A distributive education major also will take 24 hours of core requirements in business administration, including courses in marketing, management, business law and business finance. An additional 20 hours of specialization includes such courses as promotional strategy, consumer behavior, administrative communication, marketing research, advertising copy and layout, and merchandise display essentials. Thus, a distributive education major will enroll in 44 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 exceeds 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:

- (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 as well as industrial training opportunities.

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: corn-

munication (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.

The students 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, interdisciplinary cooperative education, machine shop, photography, printing, plumbing, sheet metal, small engines, tailoring, upholstery, welding 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 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 program includes an option which will provide the student with the academic requirements necessary for certification to teach in area vocational-technical schools.

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 is coordinated with other departments in the planning of study programs leading to the Doctor of Education degree.

Systems Design and Computer Services. The Systems Design and Computer Services Unit provides contract services to the Oklahoma State Department of Vocational Technical Education (OSDVTE). Services include **install-**

ing data base management systems, developing management information systems and developing data processing systems for computers Computing equipment operations located at the OSDVTE is also a major responsibility of this Unit.

The Master of Science Degree in Occupational and Adult Education with program emphasis in human resources development or adult and continuing education is available through the University Center at Tulsa. Further information concerning the degree can be found in the "Master's Degree" section of the OSU *Graduate Catalog* or in the departmental office, 406 Classroom Building.

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*

Steven K. Marks, Ed.D., *Coordinator of Clinical Experiences*

OFFICERS OF TEACHER EDUCATION COUNCIL

Donald W. Robinson, Ph.D., *Chairperson*

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Professional Certificate Program Faculty Group

Bruce A. Petty, Ph.D., *Chairperson*

Secondary Education Faculty Group

David Baird, Ph.D., *Chairperson*

Vocational Education Faculty Group

Linda Vincent, Ed.D., *Chairperson*

The Office of Teacher Education coordinates all programs approved by the State Department of Education for the preparation of teachers and school service personnel. Upon completion of an approved program, passing the appropriate curriculum exam(s), and upon the recommendation of the University, the candidate will be eligible for licensure/ certification to serve in the schools of Oklahoma. All candidates completing an approved program or applying for teaching license after February 1, 1982, will be subject to all rules and regulations specified by the Oklahoma Teacher Reform Bill of 1980. Accordingly, candidates will be recommended by the University for licensure.

Programs are offered at various levels, but all require the earning of at least a bachelor's degree for recommendation for a standard certificate. Graduate programs leading to the master's degree, the education specialist degree, and both the Doctor of Education and the Doctor of Philosophy degrees are offered in several areas. In addition, there are programs at the graduate level

which lead to certification but which may or may not lead to graduate degrees.

In addition to state approval, Teacher Education programs 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.

All teacher education programs are coordinated by the director of teacher education through the Office of Teacher Education, 101 Gundersen Hall. Undergraduate teacher education programs are offered in the College of Education as well as in the colleges of Agriculture, Arts and Sciences, Business Administration and Home Economics. The student may choose the college in which the degree is to be earned; however, the student must meet the requirements of the University's Teacher Education program as well as the degree requirements of his or her particular college. Each student who desires to enter a Teacher Education program must make formal application to do so and must meet the admission standards specified.

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 (no more than two years beyond the normal four-year bachelor's degree requirements) will be held responsible only for the course 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.

In general, undergraduate programs of teacher preparation consist of three parts: general education of approximately 50 semester credit hours; professional education, the amount of which varies with the curriculum selected, but with a minimum requirement of 30 semester credit hours; and a subject matter specialization or major of 40 to 60 hours, depending upon the field of specialization.

Teacher 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) early childhood education; (10) elementary education; (11) foreign languages (Spanish, French, German); (12) health and physical education; (13) general home economics; (14) occupational home economics; (15) vocational home economics; (16) industrial arts education; (17) journalism education; (18) language arts education; (19) mathematics education; (20) instrumental music; (21) vocal music; (22) combined vocal/instrumental music; (23) science educa-

tion; (24) social studies education; (25) special education-mentally retarded; (26) speech and drama education; (27) 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. Master's degrees are available in virtually all of the above programs and doctorates are available in many.

Areas of concentration in several of these fields may be included as part of a master's degree program if approved by the department head and the dean of the Graduate College.

Post-master's level certification programs are available in: (1) elementary school principal; (2) school superintendent; (3) secondary school principal; (4) school psychology; and (5) professional school counselor.

Inquiries concerning any aspect of Teacher Education program at Oklahoma State University should be addressed to the Office of Teacher Education or the head of the department offering the program.

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 teacher 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 student is not considered a fully qualified participant in a Teacher Education program until he or she has been formally admitted to Teacher Education.*

Declaration of Intention to Pursue a Program in Teacher Education.

During the first semester of the academic program, the student must complete the *Declaration of Intention to Pursue a Program in Teacher Education and present earned American College Testing (ACT) scores (English, math, science and social studies)*. This form can be obtained in each college's Office 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 colleges of Agriculture, Business Administration or Home Economics.

Provisional Admission to Teacher Education. The completion of the *Declaration of Intention to Pursue a Teacher Education Program* form, along with form *Part I: Provisional Admission*, and presentation of ACT scores is generally accomplished while enrolled in an appropriate orientation course in Teacher Education.

Under Provisional Admission to Teacher Education, students *must* enroll in laboratory and clinical experiences and *may* elect to enroll in course work in the following Pre-professional education areas:

- (1) sociological foundations;
- (2) exceptional child; or
- (3) human development.

Full Admission to Undergraduate Teacher Education. The student should complete *Part II: Full Admission to Teacher Education* and meet the following criteria:

Overall GPA of 2.50; . A minimum cumulative GPA of 2.50. The total GPA is based on no fewer than 40 credit hours of courses which are expected to include lower-division general education requirements as specified in the student's program.

ACT Scores. All Teacher Education students are required to present their ACT scores (English, math, science and social studies) when the Declaration of Intention form is completed.

- (1) If a student does not achieve a score of 18 or above in each area (English, math, science and social studies), or achieve the current state average for college-bound high school seniors-whichever is higher, the student must earn a cumulative GPA of 2.50 in the area(s) at the time of Admission to Teacher Education. If not, additional courses or retakes must be completed in the area(s) until a 2.50 is achieved.
- (2) In programs where only one class is taken in a particular area, a grade of "B" or better must be earned.

National Teachers Exam (NTE)-Communications Skill Test. This test is required of all Teacher Education students and is composed of reading, writing essay and grammar, and listening. If a student does not meet the established score, the adviser in consultation with the student shall suggest remedial course work. The student will retake the Communication Skills Test when recommended by the adviser. The NTE is administered each semester by the Bureau of Tests and Measurements, 109 N. Murray Hall.

Admission to Teacher Education Interview. All candidates for Full Admission to Undergraduate Teacher Education must be formally interviewed by a committee selected from the OSU Teacher Education faculty.

Orientation to Teacher Education and Laboratory and Clinical Experiences must be completed with a grade no lower than "C."

The student must apply for and be granted full admission to the Teacher Education program prior to enrolling in student teaching methods and the student teaching internship. A student may not be permitted to enroll in the remaining courses in the professional sequence if full admission to the Teacher Education program has not been earned. Certain vocational programs may vary from this requirement due to state guidelines. Students should apply for full admission to Teacher Education as soon as possible. This usually occurs no later than the end of the second semester of the sophomore year.

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 present their ACT scores, take the NTE-Communications Skills

Test, and complete the admission interview. All of these admission requirements must be completed as soon as possible during the student's first semester at OSU in order to be considered for 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 a license or certification, the student must maintain all specified requirements for admission to the Undergraduate Teacher Education area.

Application for Student Teaching Placement. *Part III: Application for Student Teaching Placement must be completed by the student during the semester prior to the time of student teaching.* The application form and Student Teaching Profiles 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 their student teaching profiles to the Office of Teacher Education 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) Must have achieved *full* admission to a Teacher Education program;
- (2) Must have achieved an overall grade-point average of *at least 2.50*;
- (3) Must have a grade-point average of at least 2.50 in courses listed on the current approved program for licensure/certification in the areas of professional education and specialization. No grade lower than a "C" will be accepted in either of these areas.
- (4) In determining grade-point averages, only the last grade is considered for repeated courses (exact repeats, not substitutions.).
- (5) All pre-professional education course work must be complete and must include at least one course in sociological foundations, early laboratory and clinical experiences, exceptional child, and human development, with no grade lower than "C" accepted in any of these courses.

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.

(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 visitation by an OSU supervisor in addition to the visitations performed by the cooperating institution. *The student must achieve grades of "B" or better in all sections of student teaching in order for the student to be recommended for a license and a standard certificate upon completion of the program. A grade of "C" in any section of student teaching will result in a recommendation for provisional certification after the licensure period and 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 a license or any level of certification.*

Appeals Decisions regarding admission/retention in Teacher Education are described in the "Guidelines of the Council on Teacher Education." Information pertaining to the appeals process is available through the Office of Teacher Education, located in Gundersen Hall, Room 101.

Oklahoma Certification Testing Program. Due to Oklahoma legislation, all students who graduate from a Teacher Education program after January, 1982, will be required to complete the curriculum examination(s) in his or her teaching field(s) with a score of "70" or above before a license can be issued. The examinations are administered by the State of Oklahoma four times each year. Registration booklets are available in the Office of Teacher Education, 101 Gundersen Hall. To qualify to take the examination(s) the student must:

- (1) be fully admitted to Teacher Education;
- (2) have 90 hours of college credit completed on his or her transcript; and
- (3) meet minimum requirements for the standard teaching certificate and minor teaching credentials as presented by the State Department of Education.

Personnel in the Office of Teacher Education will process and deliver the registration form and required fees to the Oklahoma State Department of Education.

Copies of the Objectives and Study Guides for the Curriculum Examinations have been placed in the library listed as *Objectives for Oklahoma Certification Testing Program*.

An Oklahoma State University student must pass the Oklahoma Curriculum Examination in his or her major teaching area(s) before taking any tests in minor areas outside the major.

Recommendations for License and Certification. Oklahoma State University will not make a recommendation for a license or any level of teacher certification until all criteria have been met that pertain to the approved Teacher Education program and a passing score has been achieved on the curriculum examination. Applications for an Oklahoma license or certificate can be obtained in the Office of Teacher Certification, 102 Gundersen Hall

Entry-year Assistance Program. A candidate with a license will 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, an administrator of the local district, 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.

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

- (1) The student must have completed an approved Teacher Education program and hold a valid Oklahoma license or Provisional, Standard, or Professional Certificate; or
- (2) Satisfy the master's degree program requirements through the department offering the certificate, have a minimum cumulative GPA of 2.50, and complete laboratory and clinical experiences with a grade of "C" or better; or
- (3) Graduate students not wishing to enter the master's program, will be subject to undergraduate criteria as previously stated. The student must also have an overall GPA of 2.50 and must complete laboratory and clinical experiences with a grade of "C" or better.



College of Engineering, Architecture and Technology

Kenneth A. McCollom, Ph.D., P.E., *Dean*

Robert L. Swaim, Ph.D., P.E., Associate Dean

Anthony L. Hines, Ph.D.; P.E., Associate Dean for Research

Bill L. Cooper, Ed.D., Director of Extension

Larry D. Zirkle, Ph.D., P.E., Director of Student Services

Jerry D. Rackley, B.B.A., M.S., Manager of Support Services

School Heads

Agricultural Engineering, C. Thomas Haan, Ph.D., P.E.

Chemical Engineering, Billy L. Crynes, Ph.D., P.E.

Civil Engineering, Robert K. Hughes, Ph.D. P.E.

Electrical and Computer Engineering, James Baker, Ph.D., P.E.

General Engineering, Bennett L. Basore, Sc.D., P.E.

Industrial Engineering and Management, Allen C. Schuermann, 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.

Division of Engineering Technology, J.E. Bose, Ph.D., P.E.

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, engineering technology or architecture while at Oklahoma State University.

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 and supported by 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 College of Engineering, Architecture and Technology offers a complete spectrum of educational opportunities designed to give graduates the capability and the flexibility to meet the ever-changing requirements of our society—a society heavily committed to technological innovation. To be prepared to make continuing contribution engineers, architects and technologists must have at their command not only the modern tools and processes of industry, but a firm and rigorous education in mathematics and the physical sciences. In order that those contributions be sensitive to genuine human needs, the engineer, architect or technologist must also be schooled in the social sciences and humanities that provide the understanding of non-technical factors that must shape technological innovation.

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, Architecture and Technology culminate in the following degrees:

Schools of Engineering:

Bachelor of Science in Agricultural Engineering, Chemical Engineering (petroleum and premedical options), Civil Engineering, Electrical Engineering (computer engineering option), General Engineering, Industrial Engineering and Management, Mechanical Engineering (aerospace, petroleum and premedical options).

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.

Division of Engineering Technology:

Associate Degree

Bachelor of Science in Engineering Technology

School of Architecture:

Bachelor of Architecture

Bachelor of Architectural Engineering

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 Engineering 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 specialties 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 a 4.00 scale, computed taking the last grade in any repeated course or courses, and with a 2.50 GPA 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.

In addition to the above criteria, if the number of qualified professional school applicants to a given professional school exceeds the number that can be provided a quality program with the resources available, the number admitted each semester to that professional school will be limited. In that event, priority for admission will be given first to Oklahoma resident pre-engineering students and second to the non-resident students in pre-engineering on a best qualified basis as determined by the grade-point average in courses taken and completed at OSU. This practice will preserve the high standards demanded of a quality educational experience sought by students and necessary so that OSU graduates will continue to be highly regarded.

A common prerequisite 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, 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, Architecture and Technology offers an experience-based program, Cooperative Education (Co-op). Co-op allows engineering and technology students to achieve a balanced education through the combination of theoretical and practical knowledge during their early years of professional development. The student's education is a cooperative effort between the University and industry. Students alternate semesters on campus with work semesters in industry during their junior and senior years. The periods of employment constitute an essential element in the educational

process. Students gain practical knowledge which is carried back to the classroom, giving academic programs a sense of reality. By the time they receive their degrees, students have accumulated the equivalent of a year-and-a-half of progressively challenging work experience.

Participation in Co-op is voluntary; transfer students must successfully complete at least one semester at OSU prior to their first placement. Students may obtain further information about the program from the coordinator, Room 101A, 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 Architecture Honors students and at least 26 for Technology Honors students.

All other OSU students and transfer students who are classified as freshmen (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 study. (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 50 to 57 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* published by the University.

High School Preparation. Enrollment in chemistry and mathematics for an entering student in the College of Engineering, Architecture and Technology is determined by his or her score on placement tests and/or on the amount of mathematics or chemistry completed in his or her high school program. Where credit has been obtained by advanced standing examination or by College Level Examination Program (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, Architecture and Technology can be obtained through the Office 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, Architecture and Technology 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. Non-resident students applying for transfer must have at least a 2.70 GPA in previous college courses.

Advisement. The College's Office of Student Services advises all pre-engineering students and first-year students in Architecture. (Consult the heading *Division of Engineering Technology* for specific information regarding advisement for students in Technology programs.) The Office of 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 this Office, the Office of Student Services also arranges for industrial representatives to interview students for employment opportunities. Appointments are made through this 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, Architecture and Technology. 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 Office 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, Architecture and Technology, permission must be obtained in advance. It is the belief of the faculty of the College that such enrollment detracts from the educational process at this institution, and can be justified only in the most unusual circumstances. Normally, if the material for which such permission is sought is available at OSU, permission will not be granted, nor will retroactive permission be granted in any circumstances.

Calculators. An engineering, architecture or technology student is expected to be equipped with an appropriate calculator or computer. 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.; F. W. Blaisdell, M.S.; P. D. **Blome**, Ph.D., P.E.; Wendell Bowers, M.S., P.E.; G. H. Brusewitz, Ph.D., P.E.; B. L. Clary, Ph.D., P.E.; J. E. Garton, Ph.D., 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.; J. F. Gerling, Ed.D.; G.A. Kranzler, Ph.D.; A. P. Lewis, M.S.; G. W. A. Mahoney, Ph.D., P.E.; C. E. Rice, Ph.D., P.E.; Richard W. Whitney, Ph.D., P.E. **Assistant Professors** H. W. Downs, M.S.; R. L. Elliott, Ph.D., P.E.; S. L. Harp, M.S.; R. L. Huhnke, Ph.D., P.E.; J. B. Solie, Ph.D., P.E.; M. L. Stone, Ph.D.; J. D. Summers, Ph.D.; P. E. Temple, M.S.; Bruce Wilson, Ph.D.

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 Commission 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 involvement 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 laboratory, 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.; Alan Brunken, M.Arch., A.I.A.; W. George Chamberlain, M.Arch., A.I.A.; Bob E. Neatly, M.Arch.; James F. Knight, M.Arch., A.I.A.; Aryln A. Orr, M.Arch.Engr., P.E.; Robert Wright, M.Arch. Associate Professors A.E. Erdely, Dip.Arch.; Walter E. Grondzik, B.Arch.Engr., M.S. Assistant Professors William H. Haire, M.S.M.; David Hanser, M.Arch.; John O. Houston, M.Arch.; Richard Dunham, M.Arch.; Cheryl Morgan, M.Arch. 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 undergraduate degree programs are in architecture, architectural engineering/structures and architectural engineering/environmental controls. Each of the above undergraduate programs are professional degrees and require five years to complete. The School of Architecture also offers both one- and two-year long master's programs. The one-year master's programs are designed for candidates with five-year degrees while the two-year programs are for candidates with four-year preprofessional degrees in architecture or architectural engineering. The architecture program is accredited by the National Architectural Accrediting Board (NAAB), and the architectural engineering program by the Engineering Accreditation commission of the Accrediting Board for Engineering and Technology.

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 program. The minimum requirements for admission to the upper division (third year) of the 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.

Transfers. Due to the 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 among 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., P.E.

Professors Kenneth J. Bell, Ph.D., P.E.; Robert H. Heidersbach, Ph.D., P.E.; Robert N. Maddox, Ph.D., P.E.; Robert L. Robinson, Jr., Ph.D., P.E. Associate Professors W. Payne (adjunct); Mayis Seapan, Ph.D.; Jan Wagner, Ph.D., P.E. Assistant Professors Gary L. Foutch, Ph.D.; Archibald G. Hill, Ph.D.; Robert A. Wills, Ph.D.

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 unconventional 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 sciences to chemical engineering problems. Engineering design and laboratory courses integrate the more fundamental studies and demonstrate that engineering is a process of assembling knowledge from many fields and sources into a practical answer to a real problem.

At the B.S. level three degree options are offered: (1) The regular course option prepares a graduate for a wide range of employment opportunities; (2) The petroleum option is specifically for those students interested in the energy field of petroleum and natural gas production, and (3) The premedical option is for those who wish preparation for medical school or seek employment in

medically related professions. All of these options prepare a student for success in M.S. or Ph.D. study at OSU or at other universities.

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 basic level by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

Civil Engineering

Professor and Head Robert K. Hughes, 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.; A. E. Kelly, Ph.D., P.E.; D. F. Kincannon, Ph.D., P.E.; J. P. Lloyd, Ph.D., P.E.; P. G. Manke, Ph.D., P.E.; G. D. Oberlender, Ph.D., P.E.; James V. Parcher, Ph.D., P.E. Associate Professors Marcia Bates, Ph.D., P.E.; C. E. Canada, Ph.D. P.E.; J. W. Harvey, Ph.D., P.E.; D. R. Sneath, 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. P.E.; V. A. Mast, Ph.D.; J. N. Veenstra, Ph.D.

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, alteration and utilization. Civil engineers engage in planning, designing and constructing highways, waterway and railway systems, harbors and shipping facilities, systems for the treatment and distribution of water and for the collection and treatment of sewage and industrial waste, dams and hydroelectric works, airports and terminals, structures of every kind including buildings, bridges, towers, industrial plants, 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 need-

ed 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, bio-environmental 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 and Computer Engineering

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

Professors H. Jack Allison, Ph.D., P.E.; Charles M. Bacon, Ph.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.; 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.; Louis G. Johnson, Sc.D.; David L. Soldan, Ph.D. Assistant Professors Randy Reininger, Ph.D.; Allan Steinhardt, 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 and computer engineering may be an excellent and exciting choice.

Electrical Engineering By selecting electrical engineering as a profession, the student enters a 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 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 and computer engineering program at Oklahoma State University prepares each graduate for a life-long professional career. During the first two years, students complete a carefully designed pre-engineering program consisting of mathematics, physical sciences, engineering sciences and selected courses in the humanities and social sciences. During the final two years of the program, each student concentrates his or her study on electrical and computer engineering subjects and can elect from the following areas: computer engineering, electronics, energy systems, communications, control systems, electromagnetics, solid state devices and network theory/signal processing.

Computer Engineering. A special program option in computer engineering is offered by the School of Electrical and Computer Engineering. This option is designed for students who have a strong interest in computers and desire to gain a full understanding of both the electronic hardware and the programming software aspects of modern computer systems. A student in computer engineering will also gain a detailed knowledge of one or more applications where computers are being used as integral components of advanced engineering systems; examples are instrumentation and test facilities, communication systems, power systems and process control systems. Students in computer engineering will work directly with microprocessors, microcomputers, and minicomputers and develop special electronic circuits for interfacing these computers to various peripheral devices.

In addition to the laboratories devoted to research, separate instructional laboratories give students "hands-on", experience in microcomputers, minicomputers, digital logic design, electronics, electrical machinery, networks, instrumentation and electromagnetics. In most instances, the student is guided through laboratory exercises which are closely related to classroom lectures. Here the student has the opportunity to verify theoretical principles and design concepts presented in the lectures. In other courses, the laboratory formats are more open-ended, allowing the student to experiment freely and exercise individual discretion in discovering experimental results.

The School of Electrical and Computer Engineering offers a full range of undergraduate and graduate program options. The undergraduate program leading to the bachelor's degree and the graduate program leading to the Master of Electrical Engineering degree are accredited, respectively, 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's degree and the Ph.D. degree are also offered. A degree in electrical or computer engineering is also an excellent foundation for graduate work in other professional fields such as medicine and law. Many graduates also pursue advanced programs in business and management after earning a degree in engineering. For more information on either the electrical engineering or

computer engineering programs at Oklahoma State University, contact the School of Electrical and Computer Engineering at (405) 624-5151.

General Engineering

Head Bennett L. Basore, Sc.D., P.E.

For the student with interests that extend beyond any of the traditional engineering disciplines, OSU offers a structured interdisciplinary program that continues the breadth developed in all engineering students in the engineering sciences coursework.

General engineering embodies the fundamentals of four major engineering disciplines (civil, electrical, industrial and mechanical), in a broad curriculum assuring proficiency in basic science and engineering fundamentals regardless of the area in which these concepts are 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 a 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.

The resources of the College, both faculty and laboratory facilities, are available to the general engineering student who pursues coursework alongside majorists in each of their traditional disciplines.

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, each student is encouraged to plan a program leading to a master's degree, and with it a competitive level of competence in more than one engineering discipline. The program in General Engineering at OSU is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

Industrial Engineering and Management

Regents Professor and Head Allen C. Schuermann, Ph.D., P.E.

Professors Kenneth E. Case, Ph.D., P.E.; Hamed K. Eldin, Ph.D., P.E.; Carl B. Estes, Ph.D., P.E.; Earl J. Ferguson, Ph.D., P.E.; James E. Shamblyn, Ph.D., P.E.; M. Palmer Terrell, Ph.D., P.E.; Wayne C. Turner, Ph.D., P.E.; Philip M. Wolfe, Ph.D., P.E. **Associate Professors** John W. Nazemetz, Ph.D.; D. Scott Sink, Ph.D., P.E. **Assistant Professor** C. Patrick Koelling, Ph.D.

Industrial engineering is one 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.; E. C. Fitch, Jr., Ph.D., P.E.; David G. Lilley, Ph.D.; Richard L. Lowery, 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.; **Bilgin Kaftanoglu**, Ph.D. (visiting); Merlin L. Millett, Jr., Ph.D. (adjunct) **Associate Professor** Larry D. Zirkle, Ph.D., P.E. **Assistant Professors** James J. Allen, Ph.D.; Afshin J. Ghajar, Ph.D.; James K. Good, Ph.D.; Flint O. Thomas, Ph.D.; Gary E. Young, Ph.D. **Instructors** Gary B. Ferrell, M.S.; Craig R. Friedrich, M.S. **Lecturers** Howard E. Conlon, M.S., P.E.; Thomas A. Cook, M.S.; Y.I. **Sharaf-Eldeen**, Ph.D.

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 is small or large, simple or complex—from power lawn mowers to automobiles, fuel cells to nuclear power plants, gas turbine engines to interplanetary space vehicles, artificial limbs to life support systems, 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, manage-

ment, 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 premedical 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, 3M, General Dynamics and Boeing. These industrial firms also are representative of those hundreds of firms that employ mechanical and aerospace engineers.

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.

Division of Engineering Technology

James E. Bose, Ph.D., P.E., *Director*

Craig B. Robison, Ed.D., *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 great 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. These students particularly appreciate the engagement of technical specialty courses beginning with the first semester and continuing throughout the course of study. The relevance of the technical science and related technical courses adds further satisfaction.

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 Division of Engineering 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

Two-year technical programs

Electronics

Fire Protection and Safety

Mechanical Design

Mechanical Power

Petroleum

Bachelor of Science Degree

Engineering Technology Programs

Construction Management

Electrical Power

Electronics

Fire Protection and Safety

General

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 129 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

Associate Professor and Head K. Dean Imel, M.S., P.E.

Associate Professor Jerrold F. Bradley, M.S., P.E.; Clarence L. Martin, M.A., A.I.A., 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, surveying, structures, construction planning and scheduling, construction law and insurance, field and office management and construction procedures provide students with the background necessary for today's construction industry. These specialized courses, in addition to a blend of the basic sciences, business, and general studies, produce a well-balanced curriculum for students in construction.

Students with an interest in building structures may select courses in the "building option" of construction management which provides 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 provides 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 Head Perry R. McNeill, Ed.D., P.E.
Associate Professor James K. Shelton, M.S., P.E. **Assistant Professor** Samuel I. Kraemer, M.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 graduate 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 electrical power upper-division program 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. The electrical power program is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology.

Electronics

Professor and Head Perry R. McNeill, Ed.D., P.E.
Associate Professors Rodney B. Faber, M.S.; Russell L. Heiserman, Ed.D., S.E.T.; Howard M. Johnson, Ph.D.; Larry D. Jones, Ed.D.; James K. Shelton, M.S., P.E.; Neal A. Willison, Ed.D., C.E.T. **Assistant Professor** Samuel I. Kraemer, M.S., P.E.; **Visiting Assistant Professor** Robert G. Hayes, M.S.

The electronics technology curriculum provides preparation for outstanding career opportunities not only in the electronics industry itself but also in many other areas in modern industry which depend upon electronics for con-

trol, communications or computation. Many opportunities exist for graduates to work in the areas of digital electronics, microcomputers and main-frame computers.

The work of the electronics graduate may range from assisting in the design and development of new equipment in the laboratory or applying modern microprocessors 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 Head Larry Borgelt, M.S., C.S.P., P.E.

Assistant Professors 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 by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology.

General Technology

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

Adviser Craig B. Robison, Ed.D.

The general technology curriculum is designed to provide a bachelor's degree program that will prepare men and women for employment as engineering technologists in more than one specific area. Normally, there are two 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 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 Technology

Professor and Head Raymond F. Neathery, Ph.D., P.E.

Professor Gary G. Hansen, Ph.D. **Assistant Professors** Dan D. Ashcraft, M.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 is enjoyed in the United States. Essential to this system are the manufacturing industries which comprise that segment of our economic society directly responsible for the conversion of raw materials into usable products. Today these industries face numerous and complex challenges, which if met, offer promising careers to men and women who have interests in manufacturing. These career positions include such areas as tool design, cost evaluation and control, plant operations product design and development, and manufacturing methods.

The manufacturing technology option provides educational experiences in the core areas of manufacturing processes, industrial materials, graphic communication 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 concentrated in the last two years allowing for efficient transfer from other OSU programs or from other colleges or universities. The program is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology.

Mechanical Design

Professor and Head Raymond F. Neathery, Ph.D., P.E.

Professor Gary G. Hansen, Ph.D. **Associate Professors** D. Jack Bayles, Ph.D., P.E.; Gerald R. McClain, M.S., C.E.T. **Assistant Professors** Dan D. Ashcraft, M.S.; John E. Harvey, M.S., S.E.T.; John C. Scheihing, B.S.; G. Richard Thomas, B. Arch. **Instructor** Larry D. Simmons, 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 Head Marvin D. Smith, Ph.D., P.E.

Professor Eugene K. Buchholz, Ph.D., P.E. Associate Professor 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 itself is a 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 Head Marvin D. Smith, Ph.D., P.E.

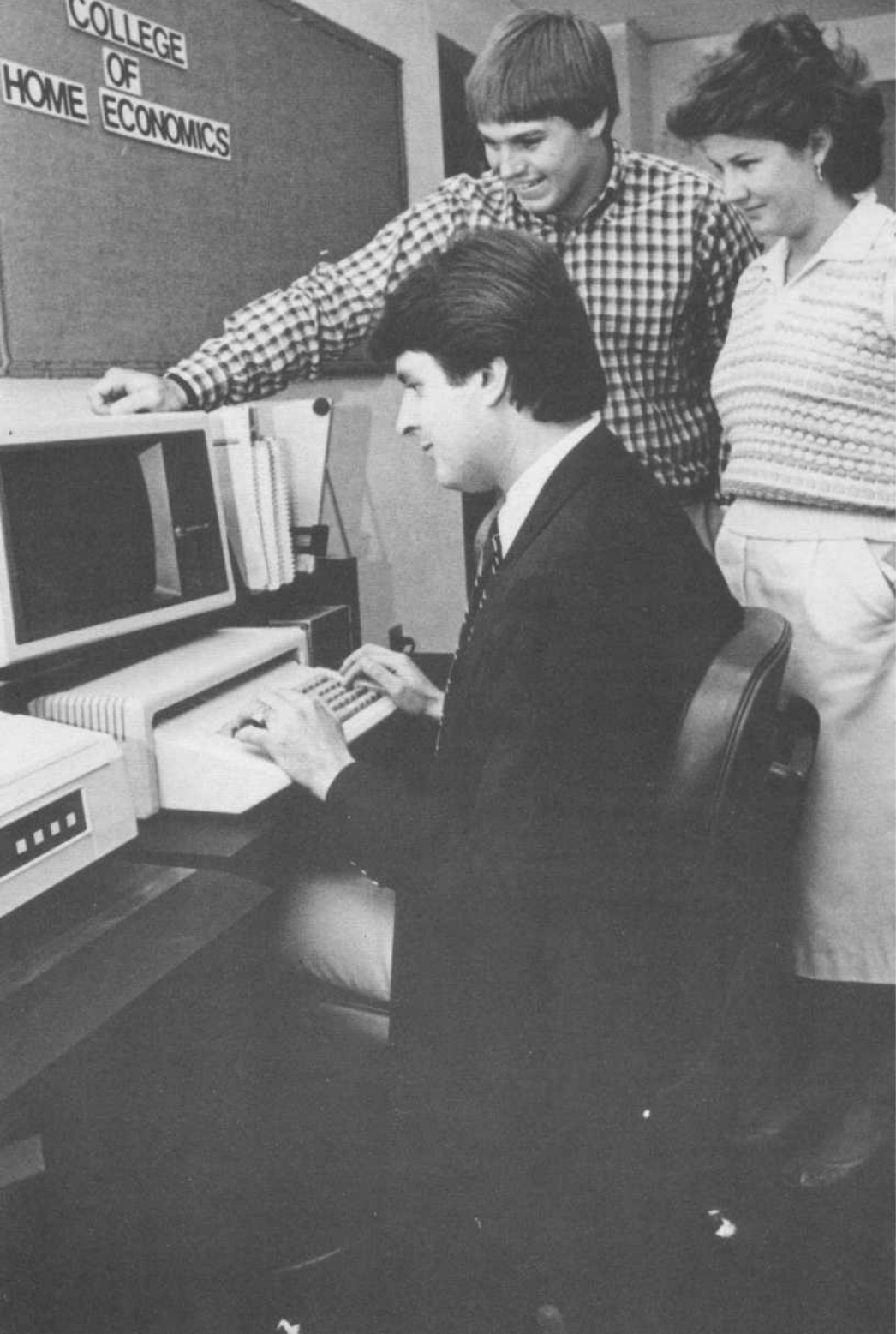
Professor Don Adams, Ph.D. **Associate Professor** Franklin F. Eckhart, M.S., P.E. **Assistant Professor James G. Mayberry, M.S.**

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. Retrieving 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



College of Home Economics

Beverly Crabtree, Ph.D., *Dean*

Marguerite Scruggs, Ph.D., Associate Dean for Research

Peggy Meszaros, Ph.D., Director of Academic Affairs

Sharon Nichols, Ph.D., Director of Family Study Center

Beulah Hirschlein, Ph.D., Director of Home Economics University Extension

Mary Miller, M.S., Director of Student Services

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, **Elaine** Jorgenson,
Ed.D.

Housing, Interior Design and Consumer Studies, E. Carl Hall, Ed.D.

School of Hotel and Restaurant Administration, Baker Bokorney, Ed.D.

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 Services; and Housing, Interior Design and Consumer Studies.

Each department prepares graduates to pursue professional careers in home economics in such areas as education, business, extension, research, communications, social welfare, public health, international service and careers in a variety of other agencies, organizations and institutions.

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 improving the quality of family life. Home economics integrates knowledge from its own research and other areas such as 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. The degree of Bachelor of Science in Home Economics 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 undergraduate program granting the degree, Bachelor of Science in Home Economics, is fully accredited by the American Home Economics Association. 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 courses.

Curricula. The program of studies composing the curricula 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 curricula for the B.S. in Home Economics are organized to include (1) courses which contribute to a liberal education, (2) common requirements in home economics, and (3) professional requirements which vary according to the area of specialization chosen by the student. The B.S. in Hotel and Restaurant Administration includes (1) courses which contribute to a liberal education, (2) professional requirements which vary according to the area of specialization chosen by the student.

A minor may be pursued in each of the departments within the College,

in the School of Hotel and Restaurant Administration, and in general home economics. More details about specific requirements may be obtained from the respective areas.

Guidance and Counseling. Faculty members provide guidance and counseling as an integral part of the total program. The faculty-student guidance system helps maintain close interrelationships, thus providing an atmosphere conducive to goal accomplishment.

Graduate Programs. Graduate study is available in all departments of the College of Home Economics.

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 community services; and housing, interior design and consumer studies.

The *Doctor of Education* degree is offered in the Department of Home Economics Education and Community Services. Students may have an area of emphasis in another field within the College of Home Economics.

The *Doctor of Philosophy* degree is an interdisciplinary degree program available through any of the departments in the College of Home Economics. Individualized programs lead to an area of specialization in any one of the departments and complementary strengths.

The *Doctor of Philosophy* degree in environmental science is an interdisciplinary degree program available through any of the departments in the College 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. (Further information about available degree programs may be found in the *Graduate Catalog*.)

Clothing, Textiles and Merchandising

Professor and Head Grovalynn Sisler, Ed.D.

Professor Kathryn M. Greenwood, Ed.D. **Associate Professors** Donna Branson, Ph.D.; Marilyn Burns, Ph.D. **Assistant Professors** Laura Jolly, Ph.D.; Tana Stufflebean, Ph.D. **Instructors** Ruth Maxon, M.S.; 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:

b(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. A minor is also available in the department; information on requirements may be obtained from the department head.

Clothing and textiles is for the student who is interested in a career in the apparel and textile fields, in cooperative extension, in consumer services or in government. The design emphasis, both fashion and functional, focuses on developing creative ability, a knowledge of textiles and the consumer, and an understanding of the mass production of apparel. The textile emphasis provides an essential background for those who conduct, interpret, and use research involving fibers, fabrics or finishes for the consumer.

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. Minors may be selected in 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 specialization 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** Godfrey Ellis, Ph.D.; David Fournier, Ph.D.; Leone List, M.S.; Althea Wright, Ed.D. **Assistant Professors** Mona Lane, M.S.; Wayne Matthews, Ph.D.; Lois Mickle, M.S.; Ann Mills, M.S.; John Rusco, D.Min.; Joseph Weber, Ph.D.; Elaine Wilson, M.S. **Instructors** Susan Avrett; Barbara Heister, M.S.; Janet Gambill, M.S.; Kay Murphy, 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.

Five 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;
- (3) family services, which offers preprofessional preparation for social and community service;
- (4) gerontology, which offers a program specifically designed for those who wish to work with the elderly and their families.
- (5) child development, which offers a program designed for those students who wish to prepare for positions such as child life specialist, licensing worker, or child development specialist and for administrative positions in agencies and institutions serving children.

All five 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. A minor is also available in the department; information on requirements may be obtained from the department head.

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.

Students in the department may earn bachelor's, master's and doctoral degrees. The Ph.D. degree in the College of Home Economics is interdisciplinary and offers specialization in family and child studies. The Ed.D. degree is also available through a doctoral specialization in cooperation with the Department of Home Economics Education and Community Services. 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** Lea Ebro, Ph.D.; Bernice Kopel, Ed.D.; Donna Watson, M.S. **Assistant Professors** Allene Brown, M.S.; Barbara Brown, M.S.; Ellen Corey, M.S.; Rosemary Good, M.S.; Dee Ann Hess, M.S.; N. Sue Knight, Ph.D.; Earl Palan, M.S.; Judy Stadler, M.S. **Instructor** Andrea Arquitt, M.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 this professional major. The ultimate goals are teaching and motivating people to attain optimum health through applied nutrition.

The undergraduate program provides two areas of emphasis which meet the requirements of Plan IV of the American Dietetic Association. These are general dietetics and food service management. Graduates become eligible for membership in the American Dietetic Association after graduation and an internship. A second option offers an emphasis in nutrition. The Bachelor of Science, Master of Science and the Ph.D. degrees are offered in the Department.

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 dietitians, nutritionists, food service managers, consultants, teachers and researchers. 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, and including psychology, sociology and economics. Professional courses in management and 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.

A minor is available in the department; information on requirements is available from the department office.

A dietetic internship with management emphasis is offered in the department at OSU. Students receive qualifying experience for membership in the American Dietetic Association and at completion are eligible to take the registration examination. The internship program is accredited by the American Dietetic Association.

Graduate programs in the department prepare students for positions in teaching and research in colleges and universities, in government agencies, in management in dietetics positions and in the food service industry.

Home Economics Education and Community Services

Professor and Head Elaine Jorgenson, Ed.D.

Professors Anna M. Gorman, Ed.D.; Beulah M. Hirschlein, Ph.D. Associate Professors Margaret Callsen, Ph.D.; Bettye Gaffney, Ed.D. Assistant Professors Donna Cadwalader, M.S.; Renee Daugherty, M.S.; Sheila Forbes, M.S.; Shirley Hastings, M.S.; Pat Trotter, M.S.

Four options are available in the department. They are (1) vocational certification and extension, (2) general certification and extension, (3) occupational certification, (4) communications, community services and extension.

The undergraduate curriculum 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.

Study for 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 in Home Economics, Master of Science, Doctor of Education, and Doctor of Philosophy degrees are offered in the department.

The Ph.D. degree provides for specialization in home economics education and administration.

A minor in the department is available for students who would like some background in teaching adults or youth in informal settings. Information concerning requirements for a minor may be obtained from the department head.

Many job opportunities in business, industry, education and government are available for students majoring in home economics education and community services. Students may also develop double majors with many departments. For example, students may develop double majors in home economics education and community services with journalism and broadcasting. A minor in any of these areas or a combination of more than one area 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, Interior Design and Consumer Studies

Professor and Head E. Carl Hall, Ed.D.

Coordinator, housing and Interior Design, and Associate Professor Margaret Weber, Ph.D. **Professor** Art Johnson (adjunct); William Johnston, Ed.D. **Associate Professors** Sue Herndon, M.S.; Sharon Nickols, Ph.D.; **Assistant Professors** Betsy Gabb, Ph.D.; Leslie Huneycutt (adjunct); Kenneth Larson, B.Arch., A.I.A. (visiting); Claudia Peck, Ph.D.; Sue Williams, M.S.; Ann Dellenbarger, M.S. **Instructor** Emily Shuter, M.S.

The undergraduate curriculum in housing, interior design and consumer studies 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. A minor is available in the department; information on requirements is available from the department head.

The *housing* option incorporates an interdisciplinary approach to the study

of housing in relation to other disciplines such as economics, political science, sociology, psychology, technology and design. At the micro level, housing provides the basic needs of individuals and families for shelter. At the macro level, it includes theoretical elements from a variety of disciplines that impact on housing decisions. Possible career opportunities for graduates include placement in government, housing and urban development offices, community planning, financial institutions, building industry operations or housing-related associations.

The responsibilities in the *interior design* option encompass interior spaces within the human environment. Competency includes fundamental design, design analysis, space planning and programming, selection of furnishings including design of all interior spaces, and an understanding of related aspects of environmental design. Technical development includes knowledge of structure with emphasis on interior construction; knowledge of building systems, equipment and components; and ability in communication skills. Career opportunities are found in interior design professional practice, work with architectural firms, historical restoration and preservation, facility management and development, and merchandising.

The *consumer studies* option includes the traditional emphasis on management of financial and other family resources, but also reflects a strong commitment to preparing graduates for careers in corporate and/or governmental consumer affairs. The need to improve consumer competence for individuals and families is balanced with the development of skills and understandings necessary to be effective in shaping and implementing the social, political and economic environments that impact on consumer behavior. Graduates from consumer studies are employed in both the private and public sectors by extension, and businesses in consumer studies and consumer affairs.

A Master of Science and Ph.D. degree program are available through the Department. Graduate degree students assume responsible positions in university teaching, research, extension, government agencies and family economic counseling. An interdisciplinary Ph.D. degree program in home economics provides for specialization in housing, interior design and consumer studies.

Hotel and Restaurant Administration

Professor and Director Baker Bokorney, Ed.D.

Assistant Professors Allene Brown, M.S.; Sue Knight, Ph.D.; Earl Palan, M.S.; Richard Tas, Ph.D. **Instructor** Donald Rose, 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 entrepreneurship, professional advancement and growth are unlimited.

Business and industry in hotels, motels, clubs, restaurants and discothe-

ques 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, tastefully decorated space with modern appointments; 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, industrial and fast 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 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 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 in the major area.

A minor in Business Administration is available. Information on requirements is available from the department head.

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 hospitality-related courses are excellent background courses.



College of Veterinary Medicine

Patrick M. Morgan, D.V.M., Dr.P.H., *Dean*

J. Mack Oyler, D.V.M., Ph.D., Associate Dean and Professor

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., Director of the Boren Veterinary Medical
Teaching Hospital

Donald D. Holmes, D.V.M., M.S., Director of Laboratory Animal Resources

Lloyd C. Faulkner, D.V.M., Ph.D., Director of Research

Department Heads Medicine and Surgery, Louie G. Stratton, Ph.D., D.V.M.,
(Interim)

Parasitology, Microbiology, and Public Health, Robert W. Fulton, D.V.M.,
Ph.D. (Interim)

Pathology, Lloyd C. Faulkner, D.V.M., Ph.D. (Interim)

Physiological Sciences, James. E. Breazile, D.V.M., Ph.D. (Interim)

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. 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 or 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 technical/professional report writing-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, premedical 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, light and modern physics.

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 15 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.

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.

Applicants who are legal residents of Oklahoma will be given first priority. However, beginning with the academic year 1985-86, up to ten percent of the first-year students may be selected from a pool of non-resident applicants. Questions about residency should be directed to the Office of the Registrar, Oklahoma State University. Requests for application materials should be directed to the coordinator, Veterinary Medicine admissions, College of Veterinary Medicine.

Students are admitted as candidates for the Doctor of Veterinary Medicine degree on the basis of records of academic performance in preparatory studies, 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, 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 Interim Head *Louie G. Stratton, D.V.M., Ph.D.

Professors *Ralph G. Buckner, D.V.M., M.S.; Lester Johnson, D.V.M.; Eugene M. Jones, D.V.M.; Thomas Monin, D.V.M.; *Fayne H. Oberst, D.V.M., M.S.; J. Mack Oyler, D.V.M., Ph.D.; *Lawrence E. Rice, D.V.M., M.S.; *Charles R. Root, D.V.M., M.S.; Thomas R. Thedford, D.V.M.; *Eric I. Williams, F.R.C.V.S., M.S. Associate Professors *Robert J. Bahr, D.V.M.; Kenneth E. Bartels, D.V.M., M.S.; *Art J. Quinn, D.V.M.; Richard V. Shawley, D.V.M., M.S.; *Robert A. Smith, D.V.M., M.S. Assistant Professors Selwyn J. Barron, B.V.Sc, M.S.; Mary H. Bowles, D.V.M.; John S. Chitwood, D.V.M.; Lionel J. Dawson, B.V.Sc, M.S.; R. Dennis Heald, D.V.M.; John P. Hoover, D.V.M., M.S.; Frank K. Lochner, D.V.M., M.S.; Charles G. MacAllister, D.V.M.; Gregor L. Morgan, B.V.Sc., M.V.Sc.; Roger C. Penwick, V.M.D.; *Steven H. Slusher, D.V.M.; Kent D. Smith, B.V.Sc., M.V.Sc. Instructors Sharon L. Nash, D.V.M.; Max Purdy, D.V.M.

Parasitology, Microbiology and Public Health

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

Professors Paul B. Barto, V.M.D., Ph.D.; *Sidney A. Ewing, D.V.M., Ph.D.; **Werner** P. Heuschle, D.V.M., Ph.D. (adjunct); 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.; Brian H. Espe, D.V.M., M.S. (adjunct); Joseph C. Fox, 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** James A. Jackson, Ph.D.; *Rebecca J. Morton, D.V.M., M.S.; James C. Wright, D.V.M., Ph.D. **Teaching Associate** Carol Emerson, D.V.M.

Pathology

Professor and Interim Head *Lloyd C. Faulkner, D.V.M., Ph.D.

Professors *Bertis L. Glenn, D.V.M., Ph.D.; Donald D. Holmes, D.V.M., M.S.; *Andrew W. Monlux, D.V.M., Ph.D.; *Roger J. Panciera, D.V.M., Ph.D.; *Jeffie F. Roszel, V.M.D., Ph.D.; *E. L. Stair, D.V.M., Ph.D. **Associate Professors** *Anthony W. Confer, D.V.M., Ph.D.; *Charles W. Qualls, Jr., D.V.M., Ph.D.; *Delbert L. Whitenack, D.V.M., Ph.D. **Assistant Professors** *Billy J. Johnson, D.V.M.; *Katherine M. Kocan, M.S. P.H., Ph.D.; *Ronald D. Tyler, D.V.M. **Instructors** Dan Lochner, D.V.M.; Mark A. Zimmer, D.V.M. **Residents** Robert Engelman, D.V.M.; Stephen M. Hall, D.V.M.; Monica Howard, D.V.M.; Derek A. Mosier, D.V.M.

Physiological Sciences

Professor and Interim Head James E. Breazile, D.V.M., Ph.D.

Professors *George E. Burrows, D.V.M., Ph.D.; Jonathan D. Friend, D.V.M., M.S.; Duane R. Peterson, D.V.M., M.S.; Everett C. Short, Jr., D.V.M., Ph.D.; Theodore E. Staley, D.V.M., M.S. **Associate Professors** *William C. Edwards, D.V.M., M.S. (adjunct); Duane L. Garner, Ph.D.; Charlotte L. Ownby, Ph.D.; **Assistant Professors** Lester L. Rolf, Ph.D.; Anne C. Rusoff, Ph.D.; Subbiah Sangiah, D.V.M., Ph.D. **Assistant Researcher** (Physiologist) **Bruce A. Lessley**, Ph.D. **Research Associate** Iris B. Wilson, B. A.

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 and Assistant Microbiologist** *Rebecca J. Morton, D.V.M., M.S. **Microbiologist** *Anthony E. Castro, D.V.M., Ph.D. **Pathologists** *Ray W. Ely, D.V.M., Ph.D. *Billy J. Johnson, D.V.M.; Delbert L. Whitenack, D.V.M., Ph.D. **Toxicologist** William C. Edwards, D.V.M., M.S. **Toxicology Residents** Terry Martin, D.V.M.; Sandra E. Morgan, D.V.M.

*Board Certification in Specialty Area



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 Agriculture, 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. Proud of its land-grant heritage, the University 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 42,000 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 as well as 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 Faculty 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, the School of Journalism and Broadcasting, and the School of Health, Physical Education, and Leisure Services.

The College of Business Administration. Includes Business Research and the Business Extension Service.

The College of Education. Includes Education Research and the Education Extension Service.

The College of Engineering, Architecture and Technology. Consists of the School of Engineering, the Division of Engineering Technology, the School of Architecture, CEAT Research and CEAT Extension.

The Division of Home Economics. Consists of the College of Home Economics, the School of Hotel and Restaurant Administration and Home Economics Research and Extension.

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 are large and small animal clinics, areas for radiology and special medicine.

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 of University 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 Administra-

tion 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 of 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 nearly 1,400,000 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 located throughout the building for patron convenience. The Library is open more than 100 hours each week when classes are in session. The hours are reduced slightly when classes are not in session.

An ON-LINE computer-assisted literature search and retrieval service provides instantaneous access to more than 150 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 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.

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. The Veterinary Medicine and Architecture Libraries are housed outside the main Library.

Documents. Located on the fifth floor of the Library, the documents collection, considered by many to be the best in the Southwest, contains information on almost every subject. The department serves as a patent depository library and houses over four million U.S. patents. The documents area also serves as a depository for all publications distributed by the United States Government Printing Office and the State of Oklahoma. Nondepository materials acquired from federal agencies supplement the depository collection. Publications of states, foreign governments, and international organizations are obtained to support fields of special interest to the University.

Maps. The Map Room of the Edmon Low Library houses one of the largest and most comprehensive collection of maps in the state. This collection contains nearly 150,000 maps, as well as aerial photographs of Oklahoma. The Map Room is a depository for maps from both the Defense Mapping Agency and the United States Geological Survey. The collection provides complete USGS topographic coverage of the United States.

Microforms. Numerous manuscripts, research reports, theses, books, periodicals, documents, and newspapers are available on the more than 1,400,000 pieces of microform which are housed in the Non-Book Room and the Documents Department. In addition to the back files of newspapers on microfilm, including the *New York Times* and the *London Times*, the collection in the Non-Book Room 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, Oklahoma history, rare books and manuscripts. Books and journals in the OSU, Oklahoma, 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 uncataloged material in the OSU collection, the vertical file collections and the manuscript collections. 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. 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 Office of University Research Services and the Of-

lice 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. In addition to maintaining state-of-the-art equipment in the various colleges, the University supports a number of research centers and institutes. The University Center for Water Research and the University Center for Energy Research 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. Other centers 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 addressed in the Environmental Sciences program. As part of the environmental program, many departments cooperate by offering master's and doctoral level students the opportunity to develop special understanding and proficiencies in the environmental 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 related courses. Students can select courses from the behavioral, social, biological, and physical sciences which relate to environmental problems and solutions. The core was 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 many disciplines.

Students interested in environmental sciences should consult with faculty members in their department or with the Program Coordinator of Environmental Sciences in the Graduate College to determine specific admission 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.

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	\$19.30 General fee
	<u>2.35</u> Required student activity fee
	\$21.65 Total per credit hour
Upper-division courses	\$22.60 General fee
	<u>2.35</u> Required student activity fee
	\$24.95 Total per credit hour

Graduate-division courses	\$27.30 General fee
	<u>2.35</u> Required student activity fee
	\$29.65 Total per credit hour

Nonresidents of Oklahoma

Lower-division courses	\$19.30 General fee
	2.35 Required student activity fee
	<u>50.20</u> Nonresident tuition
	\$71.85 Total per credit hour

Upper-division courses	\$22.60 General fee
	2.35 Required student activity fee
	<u>58.20</u> Nonresident tuition
	\$83.15 Total per credit hour

Graduate-division courses	\$27.30 General fee
	2.35 Required student activity fee
	<u>70.00</u> Nonresident tuition
	\$99.65 Total per credit hour

At OSU 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	\$ 765.35 General Fee per semester
Non-residents of Oklahoma	765.35 General Fee per semester
	1,727.70 Non-resident Tuition per semester
	\$2,493.05 Total per semester

In addition to the above fees and tuition, College of Veterinary Medicine students will pay \$2.35 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 to 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.

Student service facility fee	\$ 4.30 per credit hour
	\$64.50 maximum per semester

Students will not be billed facility fees and will not have access to the facilities when enrolled (a) *only* in a specialized course(s) offered for a special-interest group and not in any other course(s) in the University or (b) 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

Application fee for nonresident students	\$10.00
Audit, without credit	same as regular in-state fee
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
Off-campus at military bases	30.00 per semester hour
On-campus courses	20.00 per semester hour
Specialized courses	50.00 per semester hour
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, Doctor of Education degrees	20.00
Thesis binding fee	6.00 each
Dissertation microfilming fee	35.00
Special fees:	
Advanced standing examination fee	5.00 per credit hour
Automobile parking permit	
Campus residents	15.00 per year
Off-campus residents	25.00 per year
International student status maintenance fee	15.00 per semester 10.00 per summer term
Irregular examination fee	1.00
Late payment fee	1.00 per day, 5.00 maximum
Late registration fee	5.00 first day, 10.00 maximum
Music fees:	
Beginning class lessons in music	7.50 per semester hour
Group lessons in music	15.00 per semester hour
Individual lessons in music	15.00 per semester hour
Organ practice	7.50 per semester hour

Maximum charge per semester for music instruction	60.00
Re-enrollment after withdrawal	5.00
Speech clinic service	25.00 per course
Transcript (per copy after first one)	1.00

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

International students who need, or may be required by their sponsors to have, extra assistance which extends beyond the content of the regular academic program of the University may make such arrangements through their sponsors. It is the practice of Oklahoma State University to negotiate with the student's sponsor an additional administrative/management/programming charge with the amount to be based on the level of professional assistance needed. The negotiation will consider appropriate amounts for such items as special training, research costs, enrichment, necessary travel and transportation, and other costs required to provide an appropriate program of education for international students.

Withdrawal and Drop Fee Policy. A student withdrawing from the University or 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:

Prior to the first week of classes of a semester or summer session

00% if course dropped

00% if withdrawing from University

During the first week of classes of a semester or summer session

00% if course dropped

20% if withdrawing from University

During the second week of classes of a semester

20% if course dropped

20% if withdrawing from University

During the third or fourth week of classes of a semester or the second week of a summer session

50% if course dropped

50% if withdrawing from University

During the fifth or sixth week of classes of a semester or the third week of a summer session

75% if course dropped

75% if withdrawing from University

After the sixth week of classes of a semester or the third week of a summer session

100% if course dropped

100% if withdrawing from University

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 OSU 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. To be eligible for an exception to this fee policy, an employee-student must submit a completed *Request for Faculty/Staff Fee Waiver* form to the Office of the Registrar prior to the beginning of classes. If the form is not on file prior to the beginning of classes, the student will *not* be granted the waiver in fees.

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 Office of 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).

Full-time staff members may audit courses after securing an audit card for a fee of one-half the regular tuition fee per course.

For early pre-enrollment, a full-time staff employee must obtain approval from the appropriate administrator authorizing his or her enrollment in the University. The employee will attach a letter of support from his or her supervisor to the enrollment trial study. The trial study and letter of support may be turned in to the Office of the Registrar any time after the class schedule book is available. An effort will be made to schedule classes of full-time employees to minimize conflict with their University employment.

Teaching and Research Assistantships

The University yearly awards numerous teaching and research fellowships and/or 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 department and are based on scholarship and scholarship/need.

Housing

University owned apartments, furnished with two bedrooms are available to married students. More information about them may be obtained by writing to the Director, Married Student Family Housing, Oklahoma State University, Stillwater, Oklahoma 74078.

Unmarried students may obtain room and board in University residence halls. Information about these accommodations may be obtained by writing to Residence Halls Housing, Room 230, 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

Oklahoma State University is as interested in the students' physical and emotional well being as it is in their intellectual and cultural development. The

University Hospital and Clinic maintains a staff of 8 full-time physicians, 2 clinical psychologists, 15 registered nurses, 3 laboratory and X-ray technicians, a dietitian and other necessary supportive and ancillary personnel who provide the best possible care at the least possible expense for students. Along with this full-time help, part-time specialists are available in internal medicine, psychiatry and radiology. Specialists in all other fields are available for individual cases as consultants if needed. 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.

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.

No charges are made for office visits to see the physicians. This service is 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.

Graduate Degree Programs

Accounting, MS
 Agricultural Economics, MS, MA, PhD
 Agricultural Education, MS, MA, EdD
 Agricultural Engineering, MEngr, MS, PhD
 Agronomy, MS, MA
 Animal Breeding, PhD
 Animal Nutrition, PhD
 Animal Science, MS, MA
 Applied Behavioral Studies, MS, EdS, PhD
 Applied Mathematics, MS
 Architectural Engineering, MArchEng
 Architecture, MArch
 Biochemistry, MS, PhD
 Bioenvironmental Engineering, MEngr, MS
 Botany, MS, PhD
 Business Administration, MBA, PhD
 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, PhD
 Corrections, MS
 Counseling and Student Personnel, MS, EdS, EdD
 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, MA, PhD
 Entomology, MS, MA, PhD
 Environmental Science, MS, PhD
 Family Relations and Child Development, MS
 Food, Nutrition and Institution Administration, MS
 Food Science, MS, PhD
 Forest Resources, MS, MA
 General Engineering, MEngr, MS, PhD
 Geography, MS

Geology, MS

Health, Physical Education and Leisure Studies, MS
 Higher Education, MS, EdS, EdD
 History, MA, PhD
 Home Economics, PhD (Clothing, Textiles and Merchandising; Family Relations and Child Development; Food, Nutrition, and Institution Administration; Home Economics Education and Community Services; Housing, Interior Design and Consumer Studies)
 Home Economics Education and Community Services, MS, EdD, PhD
 Horticulture and Landscape Architecture, MS, MA
 Housing, Interior Design, and Consumer Studies, MS
 Industrial Arts Education, MS
 Industrial Engineering and Management, MEngr, MS, PhD
 Mass Communications, MS
 Mathematics, MS, PhD

Statistics, MS, PhD
 Technical Education, MS
 Trade and Industrial
 Education, MS
 Veterinary Parasitology, MS,
 PhD
 Veterinary Pathology, MS,
 PhD
 Wildlife Ecology, MS, PhD
 Zoology, 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, MAg,
 PhD
 Political Science, MA
 Poultry Science, MS
 Psychology, MS, PhD
 Sociology, MS, PhD
 Soil Science, PhD
 Speech, MA (Speech
 Communication; Speech
 and Language Pathology
 and Audiology; Theatre)

Abbreviations:

MA	Master of Arts
MS	Master of Science
MAg	Master of Agriculture
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 the coin-

pleted application form in *duplicate*, to the Graduate College, 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.
- (2) To be official, the transcript must show the complete scholastic record, bear the official seal of the institution, and be signed by the issuing officer.

To assure adequate time, application forms and transcripts should be received by the Graduate College at least 30 days prior to expected enrollment. 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 the TOEFL examination by March 1 for Fall enrollment and by July 1 for Spring enrollment. (See page 71, English Proficiency Test for International Students.)

As a condition of admission to regular graduate study at Oklahoma State University, all persons for whom English is a second language shall be required to present a score of 550 or above on the Test of English as a Foreign Language (TOEFL) regardless of the number of semesters or terms completed in other institutions of higher education or prior enrollment in English language programs. Persons who present a TOEFL score of 500 or above and who demonstrate unusual academic promise may be admitted to graduate study on probationary status, but the number of such persons will not exceed two percent of the regularly enrolled graduate student population of the previous Fall semester.

Submission of the TOEFL score with the application is never waived. Every international student must meet this condition of admission regardless of previous experience at Oklahoma State University or other universities.

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 through the Graduate College. It does not necessarily imply that the student has been or will be admitted to a program leading to an advanced degree or that the student will be able to obtain a graduate degree. Opportunities for receiving graduate credit and graduate degrees are dependent on the admission status granted to the student 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. International students with an F-1 visa may not enroll as special students.

- (1) A special student must meet all of the academic requirements described for unqualified admission except that he/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 further 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 formal application and submit all credentials including a complete official transcript of college and university work. Participating 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.*

English Proficiency Tests for International Students

Before international students can complete their first enrollment at Oklahoma State University they are required to take an English proficiency test administered by the Oklahoma State University Department of English. This test, scheduled on campus before each semester and summer session by the Graduate College in cooperation with the Bureau of Tests and Measurements, is given prior to Orientation for International Students. This

test is required in addition to the English proficiency test (TOEFL) which was submitted as a part of the application for admission to the Graduate College.

Should a student's composite score on the English Proficiency Test indicate a need for further work in English, the student is required to enroll in a nongraduate-credit English course until the deficiency is removed.

Spoken English Proficiency. The policy of Oklahoma State University requires all persons for whom English is a second language to demonstrate an acceptable level of spoken English before being employed as a member of the faculty, as a teaching assistant or teaching associate, or for other instructional-related assignments. Employment requires a score of 220 or above on the Test of Spoken English (TSE.) This test may be taken on campus or at any of the many testing sites provided by ETS (Educational Testing Service.) This test score is used as a condition of employment, not a condition for admission to the Graduate College.

Graduate Credit Hours for Seniors

Seniors who are graduating at the end of a semester or summer session from Oklahoma State University may take a limited number of courses for graduate credit during the last two semesters or summer sessions.

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.

Such credit may be earned under the following conditions:

- (1) 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. To receive graduate credit, the student must achieve an overall 3.0 grade point average in all courses and make no less than a **B** in those courses for which they want graduate credit.
- (2) The credits must not be required or needed for the bachelor's degree.
- (3) The total registration must not exceed 18 credit hours for a semester or 9 hours for the summer session.
- (4) 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.
- (5) Admission to courses taken for graduate credit must have the approval of the course instructor, the head of the department in which the course is offered and the Dean of the Graduate College.
- (6) 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. Courses taken for graduate credit during the senior year may not be accepted for graduate credit at institutions other than Oklahoma State University.
- (7) The uses 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.

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 Program Requirements

Departmental or program requirements are in addition to the general requirements, and the student should consult the *Department 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 admission and for a degree* should write to the department in which he or she desires to major.

Registration and General Information

Registration (enrollment) blanks for graduate students may be secured at the office of the Dean of the Graduate College. 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.

All students enrolling at Oklahoma State University for the first time are *required* to 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. 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 the student may be better served by the University.

Enrollment Procedure

DEGREE CANDIDATE

MAJOR DEPARTMENTAL
ADVISER
SIGNS TRIAL STUDY

SPECIAL STUDENT
ADJUNCT STUDENT
UNCLASSIFIED

GRADUATE COLLEGE
APPROVES TRIAL STUDY
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.

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.

If the student is studying for an advanced degree, the trial study form (enrollment form) must be approved by the adviser. A special student (see Special Student Status) must have approval and stamp 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.

Maximum and Minimum Enrollment Regulations

Any graduate student using the facilities and faculty resources of the University must be enrolled. Every graduate student is expected to satisfactorily complete no fewer than six semester credit hours during the academic year (Fall, Spring and Summer). Students may satisfy this requirement by enrolling for

the required hours during any one term or by continuous enrollment during the three terms. The total registration shall not exceed 18 credit hours for a semester or 9 credit hours for a summer session. Regardless of the number of hours taken, a student may not count more than 16 credit hours taken in the fall or spring semester nor more than 9 semester credit hours earned in a summer session toward a degree. For short-course sessions less than 8 weeks in length, enrollment shall not exceed 1 credit hour for each week. Students in the Graduate College who are not taking any courses for graduate credit may register for the number of credit hours recommended by their adviser and approved by the Dean of the Graduate College.

Faculty Members. No member of the faculty with the rank of associate professor or above or equivalent rank at the time of completing the requirements may be granted a degree from this institution. This regulation applies to staff members in the Schools of Engineering holding the rank of assistant professor or above.

Full-time Employees. 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 Assistants and Fellows. Graduate students employed by the University part time may register only for the amount of credit recommended by the head of the major department 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 of coursework for a semester and 5 hours during a summer session. Other employment will permit registration for an appropriate number of hours. Graduate students whose employment is such that results will be used for a thesis, however, may register for additional thesis credit as recommended by the research adviser and approved by the Dean of the Graduate College.

Any person holding a University appointment, assistantship, 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. If a graduate assistant enrolls in more credit hours than allowed for percentage of time employed (see page 76), a petition, available from your department head or the Graduate College, must be completed and returned to the Graduate College for approval.

<i>Petition to take:</i>		<i>If employed:</i>
<i>Fall/Spring</i>	<i>Summer</i>	
more than 4 hours	more than 2 hours	100% or full-time
more than 7 hours	more than 3 hours	75% or 3/4 time
more than 8 hours	more than 4 hours	60% time
more than 10 hours	more than 5 hours	50% or 1/2 time
more than 12 hours	more than 6 hours	30-40% time
more than 13 hours	more than 7 hours	25% or 1/4 time

Enrollment of Students During the Research Phase of the Program

Because enrollment reflects the involvement of University faculty members, the graduate student must maintain continuous enrollment in thesis and/or problems courses for credit during the entire research phase of the program. Such enrollment is not limited by the maximum number of credit hours of thesis which may apply toward a degree. 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 dissertation, 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.

Graduate-Credit Courses

Courses numbered 5000 and above are primarily for graduate students, and only graduate students and seniors who have obtained prior approval may enroll. Seniors graduating from the Oklahoma State University who may wish to take 5000 level courses for graduate credit should read, and be familiar with, and meet all deadlines as described in the section entitled "Graduate Credit Hours for Seniors"

Courses numbered 3000 and 4000 that are identified by an asterisk in the course list of the *catalog* can be taken by graduate students. Graduate students enrolled in these courses will be considered as taking the courses for graduate credit and expected to fulfill all academic requirements as proposed by the professor. Courses numbered 3000 and 4000 may be used to meet requirements for a graduate degree on the plan of study if approved by the student's advisory committee and the Dean of the Graduate College. Courses that are not identified by an asterisk may not be used to fulfill requirements for a graduate degree.

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. 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. 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.

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

Students may take one-half of the requirements for the master's degree at a Graduate Center 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.

Application for Diploma-Graduation

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 re-enrollment. *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 stored in the office of the Registrar in Whitehurst Hall. Requests for grades, transcripts and diplomas should be made to that office.

A graduate student who does not complete the requirements in time to receive the degree at the end of the semester may secure a statement from the 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 (e.g. GRE, GMAT) before being admitted to a program of study. The head of the major department should be consulted.

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 may assign an adviser or advisory committee to assist the student in planning and pursuing the entire program for a degree. The advisory committee must include a minimum of three members of the Graduate Faculty.

Plan of Study

The preliminary plan of study 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 forms from the Graduate College, develop the plan with the 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 of study 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 no more than 10 semester credit hours or fewer of the prerequisites required by the major department or field may count these 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 including the creative component. The Plan III program *must* contain a creative component which is explicitly identified on the plan of study. For example, the creative element may be a special report, an annotated bibliography, a project in research or design, or other creative activity.

The major department, with the approval of the Dean of the Graduate College, decides which alternative the candidate shall pursue. Some departments also require a minimum number of semester credit hours of upper-division and graduate courses in the major field, including courses taken as an undergraduate.

Residence Requirements

Candidates for a master's degree must complete a minimum of 21 semester credit hours in residence if they follow Plan I, or 23 semester credit hours if they follow Plan II or III. The exception is that 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 utilized, 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 appropriate department.

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.

If a foreign language is required, the head of the major department must certify that it has been met before a final examination can be scheduled.

A foreign language requirement for a master's degree may be met either by examination or by college credit, according to individual department requirement.

Written Examinations

Some departments require a written examination covering the major and minor fields. It is usually taken before the thesis or report has been completed. Arrangements for taking the examination should be made with the department at least three weeks in advance. The written examination must be passed before a final examination is scheduled.

A student who fails all or part of the written examination should consult the chairman of the examination committee to find out what must be done before taking another examination.

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 purchase 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 of 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-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 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 \$6 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. It must be bound in a pressboard cover as described in the *Thesis Writing Manual*. By paying \$6 per copy, the student may have extra copies of the report bound by the University. 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	Initiate through Approved by	Time
1. Apply for admission. (Follow instruction sheet carefully. See requirements for admission to Teacher Education under departmental announcements, <i>Curriculum and Instruction</i> .)	Dean Dean	Complete 30 days prior to enrollment. (60 days prior for International students.)
2. Read General <i>Regulations</i> and <i>Master's Degree</i> 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. 4. Plan program with advice of department head or designated graduate faculty member and submit plan of study.	DH & TA Dean Adviser 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. 6. Complete the Application for Diploma card in the enrollment packet; make any corrections needed on plan of study. 7. Take comprehensive written examinations as required by major department.	Adviser GCO Adviser	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.)
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.

<p>clearly. The format must follow the <i>Thesis Writing Manual</i> recommendations, unless a waiver is requested by the adviser. Formal requests for waivers should be submitted 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 submitted to the Graduate College.</p>		
<p>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.</p>	<p>Comm. Dean</p>	
<p>10. Committee chairman notifies Graduate College of the examination results immediately following conclusion of the examination (Form T-2).</p> <p>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.</p> <p>12. Pay binding fee in the Bursar's office and return form to the Graduate College.</p>	<p>Adviser Dean Adviser Dean GCO</p>	<p>Deadlines published yearly.</p> <p>Deadlines published yearly.</p> <p>Form to be obtained from the Graduate College after the thesis has been formally accepted by that office.</p>
<p>13. Arrange for cap, gown and hood at Student Union Bookstore and attend Commencement exercises.</p>		

Master of Agriculture

This degree is described under Agriculture.

Master of Architecture and Master of Architectural Engineering

These degrees are described in the announcements of the School of Architecture.

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 and Computer 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. Admission as an undergraduate requires 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 coursework 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 coursework.

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 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.

The Doctor of Philosophy Degree

The Doctor of Philosophy degree is granted in recognition of high achievement in scholarship and 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 for 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.

Because 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 speculation. 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. The plan should include approximately 75% of courses at the 5000-6000 level and at least 15 hours thesis credit. Forms for making the plan of study will be sent to the student by the Graduate College.

Because the acceptance of work which the student desires to use toward the degree rests with the advisory committee, it is important to plan a complete program and have it approved by the Dean of the Graduate College as soon as possible.

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 or Field

As a means of giving depth and breadth to their doctoral programs, most departments require work in a minor field or at least a selection of extra-departmental courses. To minor in a subject or field, as a minimum, the graduate student must complete graduate level work beyond requirements for an undergraduate degree in the minor department. A department in which a student indicates a minor must certify to the Dean of the Graduate College the satisfactory completion of requirements for a minor.

Credit Requirements 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 commencement in which the Doctor of Philosophy degree will be received.

Before being admitted to candidacy, the student must have passed the qualifying examination, and have an approved plan of study and 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 specifications 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 the 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* recommendation 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, a re-examination decision will be made by the examining committee. The examination is open to all members of the Graduate Faculty and may be attended by anyone else who obtains the permission of the committee.

The committee will notify the Graduate College immediately of results of the final examination 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 the committee to the Graduate College.

Three copies of the dissertation in final form and six copies of the abstract must be submitted to the Graduate College office no later than the stated deadline date (see Calendar). The final copies of the dissertation are accom-

panied 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 \$6 per copy payable at the office of the Bursar.

All dissertations are microfilmed by University Microfilms, Inc. The student is required to pay a \$35.00 fee for microfilming the complete document and for publication of an abstract of 350 words. The student must complete a University Microfilms Agreement Form after the dissertation has been accepted by the Graduate College. Copyrighting the dissertation is not required, but can be done at a small additional cost with the approval of the Dean of the Graduate College.

Time Limit

Students are expected to complete the requirements of the Ph.D. degree within 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.		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 proficiencies.		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 to Commencement in which degree will be conferred.

Procedure	Initiate Through 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 Diploma 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 complete and legible. Ordinary proofreading marks and minor handwritten additions, changes, etc., are permitted, but the copy should be in such condition that it can be read easily and understood clearly. The format must follow the <i>Thesis Writing Manual</i> 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	Initiate Through 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 shows 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-semester 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 of study, (3) preparing and administering the qualifying examination, (4) assisting in planning and conducting the research, (5) supervising the writing and subsequent approval of the dissertation, and (6) conducting 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 of study 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).

Credit Requirements 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 of full-time graduate study (a minimum of 60 semester credit hours) beyond the master's degree. The plan should include approximately 75% of courses at the 5000 and 6000 level and must include 10 hours on 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 doctoral 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 must 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 examina-

tion 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.

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 con-

sidered 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

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*; 1969, 1962.

ALAN C. ADOLPHSON, B.A. (Western Washington Univ.), Ph.D. (Princeton Univ.); *Associate Professor of Mathematics*; 1983.

THEODORE L. AGNEW, JR., B.A. (Univ. of Illinois), M.A. (ibid), M.A. (Harvard Univ.), Ph.D. (ibid); *Professor of History*; 1960, 1947.

MOHAMED SAMIR AHMED, B.S. (Cairo Univ.), (Ain-Shams Univ.), M.S. (McGill Univ.), Ph.D. (Univ. of Oklahoma); *Assistant Professor of Civil Engineering*; 1980.

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.

KATHRYN S. AICHELE, B.A. (Univ. of Oklahoma), M.A. (Emory Univ.), Ed.D. (Univ. of Virginia); *Associate Professor of Curriculum and Instruction*; 1979, 1975.

HANSEL JACK ALLISON, B.S. (Louisiana State Univ.), M.S. (ibid), Ph.D. (O.S.U.); *Professor of Electrical and Computer Engineering*; 1976, 1961.

ZUHAIR F. AL-SHAIEB, B.S. (Univ. of Damascus), M.S. (Univ. of Missouri-Rolla), Ph.D. (ibid); *Professor of Geology*; 1981, 1972.

DALE ALSPACH, B.S. (Univ. of Akron), Ph.D. (Ohio State Univ.); *Associate Professor of Mathematics*; 1982, 1979.

ORLEY M. AMOS, JR., B.A. (Wichita State Univ.), M.S. (Iowa State Univ.), Ph.D. (ibid); *Associate Professor of Economics*; 1983, 1979.

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.

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 and Computer 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.
- CAROLYN B. BAIRD, B.S. (O.S.U.), M.S. (ibid), Ed.D. (ibid); *Associate Professor of Curriculum and Instruction*; 1977, 1966.
- 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 A. BANTLE, B.A. (Eastern Michigan Univ.), M.S. (ibid), Ph.D. (Ohio State Univ.); *Associate Professor of Zoology*; 1981, 1976.
- JOHN SCRIBNER BARCLAY, B.S. (Univ. of Maine), M.S. (Pennsylvania State Univ.), Ph.D. (Ohio State Univ.); *Associate Professor of Zoology*; 1975, 1970.
- ROBERT W. BARKER, B.S. (Northeastern Oklahoma State Univ.), Ph.D. (O.S.U.); *Associate Professor of Entomology*; 1980, 1976.
- 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 and Computer 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.
- 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); *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.
- JOE G. BERRY, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Kansas State Univ.); *Associate Professor of Animal Science*; 1980.
- HANS RUDOLF BILGER, Ph.D. (Univ. of Basel); *Professor of Electrical and Computer Engineering*; 1975, 1963.
- LEO VERNON BLAKLEY, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Chicago); *Professor of Agricultural Economics*; 1969, 1947.
- JAMES T. BLANKEMEYER, A.B. (Temple Univ.), M.A. (ibid), Ph.D. (ibid); *Associate Professor of Physiological Sciences*; 1982, 1977.
- PETER D. BLOOME, B.S. (Univ. of Illinois), M.S. (ibid); Ph.D. (ibid); *Professor of Agricultural Engineering*; 1979, 1970.

- JAMES R. BOATSMAN, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Texas); *Professor and Head of Accounting; 1983, 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., 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.*
- LESTER L. BOYER, JR., B.Arch.Engr. (Pennsylvania State Univ.), M.S. (ibid); Ph.D. (University of California, Berkeley); *Professor of Architecture; 1979, 1970.*
- DONNA H. BRANSON, B.A. (Rosary College), M.S. (Univ. of Rhode Island), Ph.D. (Michigan State Univ.); *Associate Professor of Clothing, Textiles and Merchandising; 1983.*
- JAMES E. BREAZILE, B.S. (Univ. of Missouri), D.V.M. (ibid), Ph.D. (Univ. of Minnesota); *Professor and Acting Head of Physiological Sciences; 1984, 1978.*
- HOWARD L. BREWER, B.S. (Cal. State Univ.), M.B.A. (Univ. of Southern Calif.), Ph.D. (Univ. of Iowa); *Associate Professor of Economics and Finance; 1981.*
- LYLE D. BROEMELING, B.A. (Texas A.&M. Univ.), M.S. (ibid), Ph.D. (ibid); *Professor of Statistics; 1978, 1968.*
- DONALD N. BROWN, B.A. (Harvard Univ.), M.A. (Univ. of Arizona), Ph.D. (ibid), *Professor of Sociology; 1982, 1971.*
- 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.*
- D. W. BUCHANAN, B.S. (U.T. Martin), M.S. (Miss. State Univ.), Ph.D. (Rutgers Univ.); *Professor and Head of Department of Horticulture and Landscape Architecture; 1983, 1967.*
- 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.*
- KAY SATHER BULL, B.S.B.A. (Roosevelt Univ.), M.B.A. (ibid), Ph.D. (Univ. of Wisconsin); *Associate Professor of Applied Behavioral Studies; 1983, 1979.*
- 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. M.S. (Washington State Univ.), Ph.D. (ibid); *Professor of Physiological Sciences; 1983, 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.); *Professor of Sociology; 1982, 1972.*
- JOHN LEVIS CADDEL, B.S. (Texas A. & I. Univ.), Ph.D. (O.S.U.); *Associate Professor of Agronomy; 1981, 1977.*

- H. STEPHEN CALDWELL, A.B. (Hanover College), M.S. (DePauw Univ.), Ph.D. (Purdue Univ.); *Professor of Psychology*; 1980, 1971.
- NOMA JO CAMPBELL, B.S. (O.S.U.), M.S. (Kansas State Univ.), Ed.D. (Virginia Polytechnic Inst. and State Univ.); *Associate Professor of Applied Behavioral Studies*; 1981, 1975.
- ALFRED CARLOZZI, B.A. (Iona College), M.A. (Trinity Univ.), Ed.D. (Univ. of Houston); *Associate Professor of Applied Behavioral Studies*; 1983, 1979.
- GEORGE OLNEY CARNEY, B.A. (Central Missouri State College), M.A. (ibid), Ph.D. (O.S.U.); *Professor of Geography*; 1981, 1968.
- STANLEY B. CARPENTER, M.S. (Univ. of Idaho), M.F. (Univ. of Washington), Ph.D. (Michigan State Univ); *Professor and Head, Forestry*; 1981.
- KENNETH E. CASE, B.S.E.E. (O.S.U.), M.S.I.E. (ibid), Ph.D. (ibid); *Professor of Industrial Engineering and Management*; 1978, 1975.
- ANTHONY E. CASTRO, B.S. (New York Univ.), M.S. (New York Univ.), Ph.D. (Purdue), D.V.M. (Univ. of Minnesota); *Associate Professor of Veterinary Parasitology, Microbiology and Public Health*; 1978.
- 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 Univ.), M.S. (Indiana Univ.), (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.); *Professor of Mathematics*; 1983, 1970.
- MICHAEL D. CLADY, B.S. (Univ. of Michigan), M.S. (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.
- A. W. CONFER, B.S. (O.S.U.), M.S. (Ohio State Univ.), D.V.M. (O.S.U.), Ph.D. (Univ. of Missouri); *Associate Professor of Veterinary Pathology*; 1981.
- KENNETH E. CONWAY, B.A. (State Univ. of New York College at Potsdam), M.S. (State Univ. of New York College at Syracuse), Ph.D. (Univ. of Florida); *Associate Professor of Plant Pathology*; 1982, 1978.
- DONALD S. CORAM, B.A. (Univ. of Delaware), M.A. (Univ. of Wisconsin), Ph.D. (ibid); *Professor of Mathematics*; 1982, 1971.
- 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.
- R. JEWELL CRABTREE, B.S. (Univ. of Missouri), M.S. (Iowa State Univ.), Ph.D. (Michigan State Univ.); *Associate Professor of Agronomy*; 1981, 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 (1966-62).
- 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.

- CLARENCE MARION CUNNINGHAM, B.S. (Texas A.&M. Univ.), M.S. (Univ. of California), Ph.D. (Ohio State Univ.); *Associate Professor of Chemistry*; 1959, 1954.
- ROBERT EMMETT DARCY, B.A. (Univ. of Wisconsin), M.A. (Univ. of Kentucky), Ph.D. (ibid); *Associate Professor of Political Science*; 1980, 1977.
- ROBERT C. DAUFFENBACH, B.A. (Wichita State Univ.), M.A. (ibid), Ph.D. (Univ. of Illinois); *Associate Professor of Economics*; 1982, 1977.
- WILLIAM P. DAWKINS, B.A. (Rice Institute), B.S.C.E. (ibid), M.S. (ibid); Ph.D. (Univ. of Illinois); Registered Professional Engineer (Texas); *Professor of Civil Engineering*; 1973, 1969.
- FRED DeLACERDA, B.S. (Louisiana Tech Univ.), B.S. (Univ. of Tennessee), M.S. (Louisiana State Univ.), Ph.D. (ibid); *Associate Professor of Health, Physical Education and Leisure*; 1981, 1975.
- J. PAUL DEVLIN, B.S. (Regis College), Ph.D. (Kansas State Univ.); *Professor of Chemistry*; 1970, 1961.
- RICHARD N. DeVRIES, B.S. (Univ. of Nebraska), M.S. (ibid), Ph.D. (Utah State Univ.); Registered Professional Engineer (Nebraska, Oklahoma); *Professor of Civil Engineering*; 1975, 1969.
- GEORGE SUMTER DIXON, B.S. (Univ. of Georgia), M.S. (ibid), Ph.D. (ibid); *Associate Professor of Physics*; 1975, 1970.
- JUDITH SHELTON DOBSON, B.S. (Univ. of Wisconsin), M.S. (Univ. of Nebraska), Ph.D. (Univ. of Wyoming); *Professor of Applied Behavioral Studies*; 1977, 1971.
- RUSSELL LEE DOBSON, B.A., (Northeastern State College, Oklahoma), M.T. (ibid), Ed.D. (Univ. of Oklahoma); *Professor of Curriculum and Instruction*; 1973, 1967.
- RICHARD A. DODDER, A.B. (Univ. of Kansas), M.A. (ibid), Ph.D. (ibid); *Professor of Sociology*; 1980, 1969.
- GERALD ARTHUR DOEKSEN, B.S. (South Dakota State Univ.), M.S. (O.S.U.), Ph.D. (ibid); *Professor of Agricultural Economics*; 1979, 1978.
- WILLIAM A. DREW, A.B. (Marietta College), Ph.D. (Michigan State Univ.); *Professor of Entomology*; 1969, 1958.
- CECIL W. DUGGER, B.S. (Texas A.&M. Univ.), M.Ed. (ibid), Ed.D. (O.S.U.); *Associate Professor of Technical Education and Acting Director of the School of Occupational and Adult Education*; 1980, 1965.
- NORMAN NEVILL DURHAM, B.S. (North Texas State Univ.), M.S. (ibid), Ph.D. (Univ. of Texas); *Professor of Microbiology and Dean of the Graduate College*; 1967, 1954.
- PAUL FRAZIER DUVAL, JR., B.S. (Davidson College), M.S. (Univ. of Georgia), Ph.D. (ibid); *Professor of Mathematics*; 1977, 1971.
- LEA L. EBRO, B.S. (Univ. of the Philippines), B.S. (ibid), M.S. (Iowa State Univ.); *Associate Professor of Food, Nutrition and Institution Administration*; 1978.
- ANTHONY A. ECHELLE, B.S. (Southeastern Okla. State Univ), M.S. (Univ. of Oklahoma), Ph.D. (ibid); *Associate Professor of Zoology*; 1980.
- CHARLES K. EDGLEY, B.A. (Wayland College), M.A. (Texas Tech Univ.), Ph.D. (State Univ. of New York-Buffalo); *Professor and Acting Head of Sociology*; 1982, 1972.
- MICHAEL R. EDGMAND, B.A. (Washington State Univ.), M.S. (Michigan State Univ.), Ph.D. (ibid); *Professor of Economics*; 1983, 1966.
- LEWIS H. EDWARDS, B.S. (O.S.U.), Ph.D. (North Dakota State Univ.); *Professor of Agronomy*; 1976, 1967.
- STEVEN WILLIAM EDWARDS, B.P.E. (Purdue Univ.), M.S. (ibid), Ph.D. (ibid); *Associate Professor in Health, Physical Education and Leisure Services*; 1982.
- RICHARD W. EGGERMAN, B.A. (Baylor Univ.), M.A. (Univ. of Illinois), Ph.D. (ibid); *Associate Professor of Philosophy*; 1977, 1970.

- RAYMOND D. EIKENBARY, B.S. (O.S.U.), M.S. (Clemson Univ.), Ph.D. (ibid); *Professor of Entomology*; 1973, 1964.
- EDMUND JULIUS EISENBRAUN, B.S. (Univ. of Wisconsin), M.S. (ibid), Ph.D. (ibid); *Regents Professor of Chemistry*; 1975, 1962.
- BERNARD WILLIAM EISSENSTAT, B.S. (Univ. of Rochester), M.S. Univ. of Iowa), Ph.D. (Univ. of Kansas); *Professor of History*; 1971, 1969.
- HAMED K. ELDIN, B.S. (Cairo Univ.), M.S. (California Inst. of Technology), Ph.D. (Univ. of Iowa); *Professor of Industrial Engineering and Management*; 1967.
- GODFREY J. ELLIS, B.A. (Brigham Young Univ.), M.S. (ibid), Ph.D. (Washington State Univ.); *Associate Professor of Family Relations and Child Development*; 1982, 1978.
- BILL F. ELSOM, B.S. (North Texas State Univ.), M.Ed. (ibid), Ed.D. (ibid); *Professor and Head of the Department of Applied Behavioral Studies and Director of the Bureau of Tests and Measurements*; 1978, 1969.
- DAVID M. ENGLE, B.S. (Abilene Christian), M.S. (ibid), Ph.D. (Colorado State Univ.); *Associate Professor of Agronomy*; 1983.
- MARGARET K. **ESSENBERG**, A.B. (Oberlin College), Ph.D. (Brandeis Univ.); *Associate Professor of Biochemistry*; 1981, 1973.
- RICHARD ESSENBERG, B.S., (California Inst. of Technology), Ph.D. (Harvard Univ.); *Associate Professor of Biochemistry*; 1978, 1973.
- CARL B. ESTES, B.S. (Univ. of Oklahoma), M.S. (O.S.U.), Ph.D. (ibid); *Professor of Industrial Engineering and Management*; 1980, 1969.
- I. DWAIN EUBANKS, B.S. (Univ. of Texas, Ph.D. (ibid); **Professor of Chemistry 1982**, 1967, **Director, Center for Effective Instruction, 1982**.
- BENNY EVANS, B.S. (O.S.U.), M.A. (Univ. of Michigan), Ph.D. (ibid); *Professor of Mathematics*; 1979, 1972.
- SIDNEY A. EWING, B.S.A. (Univ. of Georgia), M.S. (Univ. of Wisconsin), D.V.M. (Univ. of Georgia), Ph.D. (O.S.U.); **Professor and Head of the Department of Veterinary Parasitology, Microbiology and Public Health**; 1979.
- LLOYD C. FAULKNER, D.V.M. (CO State), Ph.D. (Cornell Univ.); **Professor of Physiological Sciences and Acting Head of Veterinary Pathology**; 1984, 1981.
- EARL J. FERGUSON, B.S. (Texas A.&M. Univ.), M.S. (O.S.U.), Ph.D. (ibid); **Professor of Industrial Engineering and Management**; 1969, 1956.
- LE ROY HENRY FISCHER, B.A. (Univ. of Illinois), M.A. (ibid), Ph.D. (ibid); *Oppenheimer Professor of History*; 1960, 1946.
- DONALD D. FISHER, B.A. (Washington State Univ.), M.A. (ibid), Ph.D. (Stanford Univ.); **Professor and Acting Head of the Department of Computing and Information Sciences**; 1981, 1969.
- ERNEST CHESTER FITCH, JR. B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ of Oklahoma); *Professor of Mechanical and Aerospace Engineering*; 1970, 1953.
- JOHN LEROY FOLKS, B.A. (O.S.U.), M.S. (ibid), Ph.D. (Iowa State Univ.); *Professor and Acting Head of the Department of Statistics*; 1981, 1961.
- WARREN T. FORD, B.A. (Wabash College), Ph.D. (Univ. of California-Los Angeles); *Professor of Chemistry*; 1983, 1978.
- PATRICK BERNARD FORSYTH, B.A. (Marist College), M.A. (New York Univ.), Ed.D. (Rutgers Univ.); *Associate Professor of Educational Administration and Higher Education*; 1981, 1977.
- DAVID G. FOURNIER, B.A. (Missouri-Kansas City), M.A. (ibid), Ph.D. (Minnesota); *Associate Professor of Family Relations and Child Development*; 1983, 1978.
- STANLEY F. FOX, M.S. (Univ. of Illinois), M.Phil. (Yale Univ.), Ph.D. (ibid); *Associate Professor of Zoology*; 1982, 1977.

- RICHARD R. FRAHM, B.S. (Univ. of Nebraska), M.S. (North Carolina State Univ.), Ph.D. (ibid); *Professor of Animal Science*; 1976, 1967.
- JOHN RICHARD FRANZMANN, B.S. (Univ. of Connecticut), M.S. (ibid), Ph.D. (O.S.U.); *Professor of Agricultural Economics*; 1974, 1964.
- ROBERT DAVID FREEMAN, B.S. (North Georgia College), M.S. (Purdue Univ.), Ph.D. (ibid); *Professor of Chemistry*; 1982, 1955.
- DONALD KARL FROMME, **B.M. (Boston Univ.)**, Ph.D. (Univ. of Iowa); *Professor of Psychology*; 1976, 1967.
- ROBERT WESLEY FULTON, B.S. (O.S.U.), M.S. (Washington State Univ.), Ph.D. (Univ. of Missouri, Columbia), D.V.M. (O.S.U.); *Professor and Acting Head of Veterinary Parasitology, Microbiology & Public Health*; 1984, 1982.
- RONDAL ROSS GAMBLE, B.S. (Central State College, Oklahoma), M.Ed. (Adams State College), Ph.D. (Univ. of Oklahoma); *Professor of Applied Behavioral Studies*; 1971, 1966.
- JOHN J. GARDINER, B.A. (Univ. of Florida), Ph.D. (ibid); *Associate Professor of Educational Administration and Higher Education*; 1982, 1979.
- SANTIAGO GARCIA, B.A. (Instituto No. 1, Havana, Cuba), M.A. (Univ. of Oriente), Ph.D. (Univ. of Pittsburgh); *Associate Professor of Foreign Languages*; 1982, 1978.
- DUANE L. GARNER, B.S. (California State Univ., Fresno), M.S. (Washington State Univ.), Ph.D. (ibid); *Associate Professor of Physiological Sciences*; 1976, 1972.
- LLOYD LEE GARRISON, B.S. (State Teachers College, Missouri), M.Ed. (Univ. of Missouri), Ed.D. (ibid); *Regents Service Professor and Head of the Department of Administrative Services and Business Education*; 1966, 1951.
- JAMES ELMER GARTON, B.S. (O.S.U.), M.S. (Utah State Univ.), Ph.D. (Univ. of Missouri); *Professor of Agricultural Engineering*; 1964, 1949.
- JOHN I. GELDER, B.S. (Western Washington Univ.), M.S. (Univ. of Wisconsin), Ph.D. (Univ. of Arkansas); *Associate Professor of Chemistry*; 1982, 1977.
- JAMES W. GENTRY, B.S. Civil Engr. (Kansas State Univ.), M.B.A. (Indiana Univ.), D.B.A. (ibid); *Professor of Marketing*; 1982, 1978.
- ROBERT KARL GHOLSON, B.A. (Univ. of Chicago), B.S. (Univ. of Illinois), Ph.D. (ibid); *Professor of Biochemistry*; 1969, 1962.
- STANLEY E. GILLILAND, B.S. (O.S.U.), M.S. (ibid), Ph.D. (North Carolina State Univ.); *Professor of Animal Science*; 1980, 1976.
- BRYAN P. GLASS, A.B. (Baylor Univ.), M.S. (Texas A.&M. Univ.) Ph.D. (O.S.U.); *Professor of Zoology and Director of University Museum*; 1966, 1946.
- BERTIS LAMON GLENN, D.V.M. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Oklahoma); *Professor of Veterinary Pathology*; 1967, 1953.
- GEORGE GORIN, A.B. (Brooklyn College), M.A. (Princeton Univ.) Ph.D. (ibid); *Professor of Chemistry*; 1962, 1955.
- ANNA M. GORMAN, B.S. (Illinois State Northern Univ.), M.S. (Univ. of Wisconsin), Ed.D. (Univ. of Illinois); *Professor of Home Economics Education*; 1976.
- FRANCES J. GOUGH, B.S. (West Virginia Univ.), M.S. (ibid), Ph.D. (ibid); *Adjunct Research Plant Pathologist, USDA*; 1974.
- DONALD W. GRACE, B.S. (Carnegie Inst. of Technology), M.S. (ibid), M.S. (Stanford Univ.), Ph.D. (ibid); *Professor of Computing and Information Sciences*; 1977, 1970.
- VICKI GREEN, B.A. (Univ. of California-Berkeley), M.A. (ibid), Ph.D. (Colorado State Univ.); *Associate Professor of Psychology*; 1979, 1974.
- KATHRYN MOORE GREENWOOD, B.S. (O.S.U.), M.S. (New York Univ.), Ed.D. (O.S.U.); *Professor of Clothing, Textiles and Merchandising*; 1976, 1955.

- CHARLES R. GREER, B.A. (Emporia Kansas State College), M.S. (Wichita State Univ.), M.B.A. (Univ. of Kansas), Ph.D. (ibid); *Professor of Management; 1983, 1975.*
- MARY M. GRULA, B.A. (Univ. of Minnesota), Ph.D. (ibid); *Assistant Professor of Microbiology;; 1977, 1962.*
- JOHN JAMES GUENTHER, B.S. (Louisiana State Univ.), M.S. (ibid), Ph.D. (Texas A.&M. Univ.); *Professor of Animal Science; 1971, 1958.*
- CHARLES THOMAS HAAN, B.S. (Purdue Univ.), M.S. (ibid), Ph.D. (Iowa State Univ.); *Professor and Head of the Department of Agricultural Engineering; 1978.*
- RAYMOND N. HABIBY, B.A. (American Univ.), L.L.B. (Univ. of Jerusalem), M.A.P.A. (Univ. of Minnesota), Ph.D. (ibid); *Professor of Political Science; 1980, 1965.*
- JAKIE ALEXANDER HAIR, B.S. (Clemson Univ.), M.S. (ibid), Ph.D. (Virginia Polytechnic Inst.); *Regents Professor of Entomology; 1980, 1967.*
- E. CARL HALL, B.S. (Central State Univ., Oklahoma), M.S. (Kansas State Teachers College), Ed.D. (Univ. of Oklahoma); *Professor and Head of the Department of Housing, Design and Consumer Resources; 1976.*
- LARRY EUGENE HALLIBURTON, B.S. (Univ. of Missouri), M.S. (ibid), Ph.D. (ibid); *Professor of Physics; 1981, 1971.*
- B. CURTIS HAMM, B.S. (O.S.U.), M.B.A. (ibid), Ph.D. (Univ. of Texas); *Professor of Marketing; 1973, 1966.*
- DON R. HANSEN, B.S. (Brigham Young University), M.S. (ibid), Ph.D. (University of Arizona); *Associate Professor of Accounting; 1981.*
- BERTIL LENNART HANSON, B.S. (Northwestern Univ.), M.A. (Univ. of Chicago), Ph.D. (ibid); *Professor and Head of Political Science; 1982, 1959.*
- H. JAMES HARMON, B.S. (Purdue Univ.), M.S. (ibid), Ph.D. (ibid); *Associate Professor of Zoology; 1983.*
- KEITH D. HARRIES, B.S. (London School of Economics), M.A. (Univ. of California), Ph.D. (ibid); *Professor of Geography; 1976, 1970.*
- ARTHUR ERNEST HARRIMAN, A.B. (Bucknell Univ.), Ph.D. (Cornell Univ.); *Professor of Psychology; 1966.*
- AIX BARNARD HARRISON, B.S. (Univ. of Illinois), M.S. (ibid), (Michigan State Univ.); *Professor of Health, Physical Education and Leisure; 1968, 1950.*
- JOHN W. HARVEY, B.S. (O.S.U.), M.S. (ibid), Ph.D. (University of Notre Dame); *Associate Professor of Civil Engineering; 1975.*
- HARRY EUGENE HEATH, JR., B.A. (Univ. of Tulsa), M.S. (Northwestern Univ.), Ph.D. (Iowa State Univ.); *Regents Professor of Journalism and Head of the School of Journalism and Broadcasting; 1982, 1961 (1965-66).*
- RICHARD DOUGLAS HECOCK, A.B. (Albion College), A.M. (Wayne State Univ.), Ph.D. (Clark Univ.); *Professor and Head of the Department of Geography; 1981, 1969.*
- GEORGE E. HEDRICK, B.A. (Adams State College), M.S. (Iowa State Univ.), Ph.D. (ibid); *Professor and Acting Head of Computing and Information Sciences; 1983, 1970.*
- ROBERT H. HEIDERSBACH, JR., B.S. (Colorado School of Mines), M.S. (Univ. of Florida), Ph.D. (ibid); *Professor of Chemical Engineering; 1982, 1981.*
- BOB HELM, B.A. (Wichita State Univ.), M.A. (ibid), Ph.D. (State Univ. of New York-Albany); *Associate Professor of Psychology; 1976, 1972.*
- HERBERT JAMES HENDERSON, A.B. (Boston Univ.), M.A. (Columbia Univ.) Ph.D. (ibid); *Professor of History; 1970, 1966.*
- ROBERT L. HENRICKSON, B.S. (Kansas State Univ.), M.S. (ibid), Ph.D. (Univ. of Missouri); *Professor of Animal Science; 1958, 1956.*

- ANTHONY L. HINES, B.S. (Univ. of Oklahoma), M.S. (O.S.U.), Ph.D. (Univ. of Texas, Austin); *Professor and Associate Dean of Chemical Engineering*; 1983.
- BEULAH MARIE HIRSCHLEIN, B.S. (O.S.U.), M.S. (ibid), Ph.D. (ibid); *Professor of Home Economics Education and Director of Home Economics University Extension*; 1981, 1970.
- LARRY HOCHHAUS, B.S. (Iowa State Univ.), M.A. (ibid), Ph.D. (ibid); *Associate Professor of Psychology*; 1975, 1971.
- ELIZABETH M. HOLT, B.A. (Smith College), Ph.D. (Brown Univ.); *Associate Professor of Chemistry*; 1983, 1981.
- SMITH L. HOLT, B.S. (Northwestern Univ.), Ph.D. (Brown Univ.); *Professor of Chemistry and Dean of the College of Arts and Sciences*; 1980.
- GERALD W. HORN, B.S. (Texas Tech Univ.), M.S. (Purdue Univ.), Ph.D. (ibid); *Professor of Animal Science*; 1981, 1974.
- ARTHUR W. HOUNSLOW, B.Sc. (Univ. of Melbourne), M.Sc. (Carleton Univ.), Ph.D. (ibid); *Professor of Geology*; 1981.
- WILLIAM L. HUGHES, B.S. (South Dakota School of Mines and Technology), M.S. (Iowa State Univ.), Ph.D. (ibid); *Professor of Electrical and Computer Engineering and Director of Engineering Energy Laboratory*; 1976, 1960.
- PAUL DWIGHT HUMMER, B.S. (Pennsylvania State Univ.), Ph.D. (ibid); *Professor and Associate Dean of Agricultural Economics*; 1982, 1969.
- TERRY R. HUMMER, B.A. (Univ. of Southern Miss.), M.A. (ibid), Ph.D. (Univ. of Utah); *Assistant Professor of English*; 1980.
- LAWRENCE M. HYNSON, JR., B.A. (Texas Christian Univ.), M.A. (ibid), Ph.D. (Univ. of Tennessee); *Associate Professor of Sociology*; 1976, 1972.
- JOHN E. IKERD, B.S. (Univ. of Missouri), M.S. (ibid), Ph.D. (ibid); *Professor of Agricultural Economics and Extension Economist*; 1976.
- GEORGE C. JACKSON, B.S. (Michigan State Univ.), M.B.A. (ibid), Ph.D. (Ohio State Univ.); *Associate Professor of Marketing*; 1983.
- JAMES FORBES JACKSON, B.B.A. (Univ. of Texas), M.B.A. (ibid), Ph.D. (ibid); *Associate Professor of Finance*; 1967, 1964.
- JOSEPH M. JADLOW, JR., B.A. (Central Missouri State College), (ibid), Ph.D. (Univ. of Virginia); *Professor of Economics*; 1976, 1968.
- WAYNE B. JAMES, B. Eng. Ed. (Univ. of Washington), M.S. (Univ. of Tennessee), Ed.D. (ibid); *Associate Professor of Occupational and Adult Education*; 1981, 1978.
- WILLIAM ELBERT JAYNES, B.S. (Ohio State Univ.), M.A. (ibid), Ph.D. (ibid); *Professor of Psychology*; 1977, 1967.
- HERBERT MAHLON JELLEY, B.S. (Univ. of Minnesota), Ed.M. (Univ. of Cincinnati), Ed.D. (ibid); *Professor of Administrative Services and Business Education*; 1971, 1970.
- GEORGE FREDERICK JEWSBURY, B.A. (Mankato State College), M.A. (Univ. of Washington), Ph.D. (ibid); *Associate Professor of History*; 1976, 1967.
- JOHN JOBE, B.S. (Univ. of Tulsa), M.S. (O.S.U.), Ph.D. (ibid); *Professor of Mathematics*; 1979, 1964.
- BECKY B. JOHNSON, B.S. (O.S.U.), M.S. (Univ. of Illinois-Urbana), Ph.D. (ibid); *Associate Professor of Botany*; 1979, 1969.
- JERRY ALAN JOHNSON, B.S. (O.S.U.), M.S. (Univ. of Illinois), (ibid); *Professor of Mathematics*; 1979, 1969.
- WILBUR D. 'DEKE' JOHNSON, B.S. (Rocky Mountain College), M.Ed. (Univ. of Montana), Ed.D. (Western Michigan Univ.); *Associate Professor of Educational Administration and Higher Education*; 1979, 1974.

- THOMAS D. JOHNSTEN, B.S. (Kansas State Teachers College), M.S. (Fort Hays Kansas State College), Ed.D. (Univ. of Nebraska); *Professor of Curriculum and Instruction*; 1973, 1969.
- HELEN ELAINE JORDAN, B.A. (Bridgewater College), M.S. (Virginia Polytechnic Inst.), D.V.M. (Univ. of Georgia), Ph.D. (ibid); *Professor of Veterinary Parasitology, Microbiology, and Public Health*; 1969.
- D. ELAINE JORGENSON, B.A. (Colorado State College), M.A. (ibid), Ed.D. (O.S.U.); *Professor and Head of the Department of Home Economics Education*; 1976, 1968.
- ROBERT B. KAMM, B.A. (Univ. of Northern Iowa), M.A. (Univ. of Minnesota) Ph.D. (ibid); *Oklahoma State University President Emeritus and University Professor*; 1977, 1958.
- THOMAS ALLAN KARMAN, A.B. (Albion College), M.A. (Harvard Univ.), Ph.D. (Univ. of Toledo); *Professor and Head of the Department of Educational Administration and Higher Education*; 1978, 1972.
- MARVIN STANFORD KEENER, B.S. (Southern College), M.A. (Univ. of Missouri), Ph.D. (ibid); *Professor of Mathematics*; 1980, 1970.
- ALLEN EUGENE KELLY, B.S. (Texas A.&M. Univ.), M.E. (ibid), Ph.D. (Univ. of Texas); Registered Professional Engineer (Oklahoma); *Professor of Civil Engineering*; 1980, 1970.
- MARY ALICE KENNEY, B.S. (Texas Tech Univ.), M.S. (Iowa State Univ.), Ph.D. (ibid); *Professor of Food, Nutrition and Institution Administration*; 1978.
- DOUGLAS CHARLES KENT, B.S. (Univ. of Nebraska), M.S. (ibid), Ph.D. (Iowa State Univ.); *Professor of Geology*; 1980, 1969.
- DAROLD L. KETRING, B.S. (Univ. of California), Ph.D. (ibid); *Adjunct Associate Professor of Agronomy*; 1978.
- JAMES PERRY KEY, B.S. (Univ. of Tennessee), M.Ed. (Virginia Polytechnic Inst.), Ed.D. (North Carolina State Univ.); *Professor of Agricultural Education*; 1975, 1969.
- DON F. KINCANNON, B.A. (O.S.U.), M.S. (ibid), Ph.D. (ibid); Registered Professional Engineer (Oklahoma); *Professor of Civil Engineering*; 1973, 1966.
- KENNETH L. KING, B.A. (Southwestern State College, Oklahoma), M.Ed. (Univ. of Oklahoma), Ed.D. (ibid); *Professor of Curriculum and Instruction; Vice Chairman, Graduate Faculty Council*; 1976, 1972.
- JAMES STEVEN KIRBY, B.S. (O.S.U.) M.S. (ibid), Ph.D. (Iowa State Univ.); *Professor of Agronomy*; 1983, 1969.
- WILLIAM L. KLARMAN, B.S. (Eastern Illinois Univ.), M.S. (ibid), Ph.D. (ibid); *Professor and Head of the Department of Plant Pathology*; 1980.
- DARREL DEAN KLETKE, B.S. (O.S.U.) M.S. (ibid), Ph.D. (ibid); *Professor of Agricultural Economics*; 1979, 1966.
- CLYDE B. KNIGHT, B.S. (East Central State College, Oklahoma), M.S. (O.S.U.), Ed.D. (ibid); *Associate Professor of Trade and Industrial Education*; 1975, 1966.
- ANDREW ALAN KOCAN, B.A. (Hiram College), M.S.P.H. (Univ. of North Carolina), Ph.D. (ibid); *Associate Professor of Veterinary Parasitology, Microbiology and Public Health*; 1977, 1974.
- ROGER ERDMAN KOEPPE, A.B. (Hope College), M.S. (Univ. of Illinois) Ph.D. (ibid); *Professor and Head of the Department of Biochemistry*; 1963, 1959.
- ELTON EVERETT KOHNKE**, B.S. (South Dakota State College), M.S. (Northwestern Univ.), Ph.D. (ibid); *Professor of Physics*; 1964, 1955.
- IGNACY I. KOTLARSKI, Magister (M.S.), (Warsaw, Poland), Doctor in Mathematics (Ph.D.) Univ. of Croclaw, Poland), Docent in Mathematics (Technical Univ. of Warsaw); *Professor of Statistics*; 1970, 1969.
- GLENN A. KRANZLER, B.S.A.E. (North Dakota State Univ.), M.S.A.E. (ibid), Ph.D. (Iowa State Univ.); *Associate Professor of Agricultural Engineering*; 1982.

- RONALD DEAN KRENZ, B.S. (North Dakota State Univ.), Ph.D. (Iowa State Univ.); *Adjunct Professor of Agricultural Economics*; 1974.
- EARL EDWARD LAFON, B.S. (Univ. of Oklahoma), M.S. (ibid), Ph.D. (ibid); *Professor of Physics*; 1971, 1968.
- GERALD M. LAGE, B.S. (Iowa State Univ.), Ph.D. (Univ. of Minnesota); *Professor and Head of the Department of Economics and Finance*; 1977, 1966.
- JAMES N. LANGE, B.S., (Pennsylvania State Univ.), M.S. (ibid), Ph.D. (ibid); *Professor of Physics*; 1972, 1965.
- JOHN EDWARD LANGWIG, B.S. (Univ. of Michigan), M.S. (SUNY College of Forestry), Ph.D. (ibid); *Professor of Forestry*; 1975, 1971.
- GLENN EDWIN LAUGHLIN, A.B. (O.S.U.), L.L.B. (Univ. of Oklahoma), S.J.D. (Univ. of Wisconsin); *Professor of Administrative Services and Business Education*; 1966, 1947.
- JAMES J. LAWLER, B.A., (Univ. of Pittsburgh), M.A. (ibid), M.P.I.A. (ibid), J.D. (Harvard Univ.), Ph.D. (Univ. of Pittsburgh); *Professor of Political Science*; 1980, 1970.
- EDWARD G. LAWRY, B.A. (Fordham Univ.), M.A. (Univ. of Pittsburg), Ph.D. (Univ. of Texas); *Associate Professor of Philosophy*; 1978, 1971.
- FRANKLIN ROLLIN LEACH, B.A. (Hardin-Simmons Univ.), Ph.D. (Univ. of Texas); *Professor of Biochemistry*; 1968, 1959.
- LINDA K. LEE, B.A. (Kansas State Univ.), Ph.D. (Iowa State Univ.); *Associate Professor of Agricultural Economics*; 1983, 1979.
- LEONARD J. LEFF, B.B.A. (Univ. of Texas, Austin), M.A. (Univ. of Houston), Ph.D. (Northern Illinois Univ.); *Associate Professor of English*; 1983, 1979.
- RICHARD H. LEFTWICH, A.B. (Southwestern College, Kansas), M.A. (Univ. of Chicago), Ph.D. (ibid); *Regents Professor of Economics*; 1980, 1948.
- TA-HSIU LIAO, B.S. (National Taiwan Univ.), Ph.D. (Univ. of California at Los Angeles); *Professor of Biochemistry*; 1983, 1974.
- DAVID G. LILLEY, B.Sc. (Sheffield Univ.), M.Sc. (ibid), Ph.D. (ibid); *Professor of Mechanical and Aerospace Engineering*; 1982, 1978.
- DANIEL DEE LINGELBACH, B.S. (Kansas State Univ.), M.S. (ibid), Ph.D. (O.S.U.); *Professor of Electrical and Computer Engineering*; 1979, 1955.
- JOHN P. LLOYD, B.S. (Univ. of Illinois), M.S. (ibid), Ph.D. (ibid); Registered Professional Engineer (Oklahoma); *Professor of Civil Engineering*; 1981, 1970.
- MITCHELL O. LOCKS, A.B. (Central YMCA College, Chicago), A.M. of Chicago, Ph.D. (ibid); *Professor of Management*; 1972, 1970.
- RICHARD L. LOWERY, B.S.M.E. (Texas Tech. College), M.S. (O.S.U.), Ph.D. (Purdue Univ.); *Professor of Mechanical and Aerospace Engineering*; 1967, 1961.
- NEIL ROBERT LUEBKE, A.B. (Midland College), M.A. (Johns Hopkins Univ.), Ph.D. (ibid); *Professor and Head of the Department of Philosophy*; 1981, 1961.
- JANE MARIE LUECKE, B.A. (Benedictine Heights College), M.A. (Marquette Univ.), Ph.D. (Univ. of Notre Dame); *Professor of English*; 1973, 1966.
- KEITH S. LUSBY, B.S. (Kansas State Univ.), M.S. (ibid), Ph.D. (O.S.U.); *Associate Professor of Animal Science*; 1981, 1976.
- JULIAN QUENTIN LYND, B.S. (Univ. of Arkansas), M.S. (Michigan State Univ.), Ph.D. (ibid); *Professor of Agronomy*; 1957, 1951.
- ROBERT N. MADDOX, B.S. (Univ. of Arkansas), M.S. (Univ. of Oklahoma) Ph.D. (O.S.U.); Registered Professional Engineer (Oklahoma); *Professor of Chemical Engineering*; 1977, 1953.
- GILBERT J. MAINS, B.S. (Duquesne Univ.), Ph.D. (Univ. of California); *Professor of Chemistry*; 1971.

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- HARRY PARKS MAPP, JR., B.S. (Virginia Polytechnic Inst.), M.S. (ibid), Ph.D. (O.S.U.); *Professor of Agricultural Economics*; 1978, 1974.
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- JOEL JEROME MARTIN, B.S. (South Dakota School of Mines and Technology), M.S. (ibid), Ph.D. (Iowa State Univ.); *Professor of Physics*; 1979, 1969.
- O. EUGENE MAUGHAN, B.S. (Utah State Univ.), M.A. (Kansas State Univ.), Ph.D. (Washington State Univ.); *Adjunct Associate Professor of Zoology*; 1977.
- ELIZABETH MAX, B.S. (Texas Woman's Univ.), M.L.S. (North Texas State Univ.), Ed.D. (O.S.U.); *Associate Professor of Curriculum and Instruction*; 1978, 1970.
- CHARLES V. MAXWELL, B.S. (Univ. of Georgia), M.S. (ibid), Ph.D. (Univ. of Wisconsin); *Associate Professor of Animal Science*; 1974, 1968.
- JAMES WALTON MAXWELL, B.S. (Univ. of Georgia), M.A. (ibid), Ph.D. (ibid); *Associate Professor of Mathematics*; 1975, 1970.
- CHARLES SIDNEY McCAIN, M.S. (Univ. of Missouri), D.V.M. (Auburn Univ.); *Associate Professor of **Veterinary Parasitology, Microbiology and Public Health***; 1981.
- KENNETH ALLEN McCOLLOM, B.S. (O.S.U.), M.S. (Univ. of Illinois), Ph.D. (Iowa State Univ.); *Professor of Electrical and Computer Engineering and Dean of the Division of Engineering Technology and Architecture*; 1977, 1964.
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- FRANK EUGENE McFARLAND, B.A. (Baylor Univ.), M.A. (Columbia Univ.), Ed.D. (ibid); *Professor of Applied Behavioral Studies and Director of Student Services*; 1973, 1959.
- JULIA LOIS McHALE, A.B. (Syracuse Univ.), Ph.D. (Univ. of Minnesota); *Professor of Psychology*; 1963, 1960.
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- JAMES K. McPHERSON, B.S. (Univ. of Idaho), M.A. (Univ. of California), Ph.D. (ibid); *Professor of Botany*; 1982, 1968.
- FAYE C. McQUISTON, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Purdue Univ.); *Professor of Mechanical and Aerospace Engineering*; 1976, 1962.
- WAYNE ALAN MEINHART, B.S. (Univ. of Illinois), M.S. (ibid), Ph.D. (ibid); *Professor of Business Administration and Head of the Department of Management*; 1968, 1962.
- ULRICH K. MELCHER, B.S. (Univ. of Chicago), Ph.D. (Michigan State Univ.); *Professor of Biochemistry*; 1983, 1975.
- HASSAN A. MELOUK, B.Sc. (Alexandria (Egypt) Univ.), M.Sc. (Oregon State Univ.), Ph.D. (ibid); *Adjunct Associate Professor of Plant Pathology*; 1976.
- OWEN G. MERKLE, B.S. (O.S.U.), Ph.D., (Texas A.&M. Univ.); *Adjunct Research Agronomist and Professor **USDA-Agronomy***; 1974.
- PEGGY S. MESZAROS, B.S. (Austin Peay State Univ.), M.S. (Univ. of Kentucky), Ph.D. (Univ. of Maryland); *Professor and Director of Home Economics Education*; 1983, 1979.
- ROBERT DENNIS MIDDLEMIST, B.S. (Univ. of Co.), M.S. (ibid), Ph.D. (Univ. of Washington); *Professor and Head of Administrative Services*, 1982, 1975.

- MELVIN D. MILLER, B.S. (Oregon State Univ.), M.S. (ibid), Ph.D. (ibid); *Head of School of Occupational & Adult Education*; 1981.
- RUDOLPH JOHN MILLER, B.S. (Cornell Univ.), M.S. (Tulane Univ.), Ph.D. (Cornell Univ.); *Professor of Zoology*; 1969, 1962.
- STEPHEN J. MILLER, B.S. (O.S.U.), M.B.A. (ibid), Ph.D. (Univ. of California at Los Angeles); *Professor and Head of the Department of Marketing*; 1979, 1971.
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- TERENCE JOHN MILLS, B.S. (Western Illinois Univ.), M.S. (ibid), Ed.D. (Indiana Univ.); *Professor of Curriculum and Instruction*; 1978, 1970.
- JOHN MILSTEAD, B.A. (Univ. of New Mexico), M.A. (Univ. of Iowa), Ph.D. (Univ. of Wisconsin); *Professor of English*; 1974, 1965.
- EARL DOUGLASS MITCHELL, JR., B.S. (Xavier Univ.), M.S. (Michigan State Univ.), Ph.D. (ibid); *Professor of Biochemistry and Assistant Dean Emeritus of the Graduate College*; 1978, 1967.
- ANDREW W. MONLUX, D.V.M. (Iowa State Univ.), M.S. (ibid), Ph.D. (George Washington Univ.); *Professor of Veterinary Pathology*; 1976, 1956.
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- PETER M. MORETTI, B.S. (California Inst. of Technology), M.S. (ibid), Ph.D. (Stanford Univ.); *Professor of Mechanical and Aerospace Engineering*; 1976, 1970.
- CLAYTON A. MORGAN, B.A. (Millsaps College), M.Ed. (Univ. of Texas), Ed.D. (ibid); *Professor of Psychology*; 1967, 1958.
- PATRICK MONROE MORGAN, D.V.M. (Univ. of Georgia), M.P.H. (Tulane Univ.), Dr.P.H. (ibid); *Professor of Parasitology, Microbiology and Public Health and Dean of the College of Veterinary Medicine*; 1977.
- LAWRENCE G. MORRILL, B.S. (Utah State Univ.), M.S. (ibid), Ph.D. (Cornell Univ.); *Professor of Agronomy*; 1976, 1966.
- JAMES E. MOTES, B.S. (Kansas State Univ.), M.S. (ibid), Ph.D. (ibid); *Professor of Horticulture*; 1982, 1977.
- DENNIS L. MOTT, B.A.E. (Wayne State College), M.S. (Univ. of Nebraska-Omaha), Ed.D. (Univ. of Nebraska-Lincoln); *Professor and Head of the Department of Administrative Services and Business Education*; 1980, 1974.
- HORACIO A. MOTTOLA, Licentiate (Univ. of Buenos Aires), Doctorate (ibid); *Professor of Chemistry*; 1975, 1967.
- JOHN C. MOWEN, B.A. (William and Mary College), Ph.D. (Arizona State Univ.); *Associate Professor of Marketing*; 1982, 1978.
- SHARON MUIR, B.A. (Graceland College), M.A. (Univ. of Northern Iowa), Ph.D. (Univ. of Nebraska); *Associate Professor of Curriculum and Instruction*; 1981, 1978.
- NITIS MUKHOPADHYAY, B.S. (Univ. of Calcutta), M.S. (Indian Statistical Institute), Ph.D. (ibid); *Associate Professor of Statistics*; 1981, 1979.
- DONALD S. MURRAY, B.S. (O.S.U.), M.S. (ibid), Ph.D. (ibid); *Associate Professor of Agronomy*; 1980, 1978.
- JAY CLARENCE MURRAY, B.S. (Utah State Univ.), M.S. (Colorado State Univ.), Ph.D. (Cornell Univ.); *Professor of Agronomy and Associate Director of Agricultural Research*; 1974, 1959.
- AZIM NANJI, B.A. (Makerere Univ.), M.A. (McGill Univ.), Ph.D. (ibid); *Professor and Head of Department of Humanities*; 1983, 1973.
- ELDON CARL NELSON, B.S. (Ohio State Univ.), M.S. (ibid), Ph.D. (ibid); *Professor of Biochemistry*; 1975, 1963.

- JAMES RALPH NELSON, B.S. Ag.Ec. (Texas Tech Univ.), M.S. Ag.Ec. (ibid), Ph.D. (O.S.U.); *Professor of Agricultural Economics*; 1983, 1972.
- TED RICHARD NELSON, B.S. (Univ. of Nebraska), M.S. (ibid), Ph.D. (O.S.U.); *Professor of Agricultural Economics*; 1968, 1965.
- WILBUR STANLEY NEWCOMER, B.S. (Pennsylvania State Univ.), M.S. (Cornell Univ.), Ph.D. (ibid); *Professor of Physiological Sciences*; 1958, 1950.
- SHARON YVONNE NICKOLS, B.S. (Kansas State Univ.), M.A. (Columbia Univ.), Ph.D. (Univ. of Missouri); *Associate Professor of Housing, Design and Consumer Resources*; 1980, 1976.
- DAVID L. NOFZIGER, B.A. (Goshen College), M.S. (Purdue Univ.), Ph.D. (ibid); *Associate Professor of Agronomy*; 1980, 1974.
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- ROBERT E. NORRIS, B.S. (Arizona State Univ.), M.A. (ibid), Ph.D. (Univ. of Iowa); *Professor of Geography*; 1980, 1974.
- AUDREY ELEANOR OAKS, B.S. (State Univ. of New York-Buffalo), M.S. (Univ. of Wisconsin), Ed.D. (O.S.U.); *Associate Professor of Curriculum and Instruction*; 1972, **1964**.
- GEORGE VAN ODELL, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Texas A.&M. Univ.); *Professor of Biochemistry*; 1970, 1956.
- ROBERT LEE OEHRMAN, B.S. (Ohio State Univ.), M.S. (Oregon State Univ.), Ph.D. (Iowa State Univ.); *Associate Professor of Agricultural Economics*; 1979, 1970.
- KENT W. OLSON, B.S. (Arizona State Univ.), M.A. (Univ. of Oregon), Ph.D. (ibid); **Professor of Economics**; 1983, 1974.
- JAMES E. OSBORN, B.S. (O.S.U.), Ph.D. (ibid); *Professor and Head of the Department of Agricultural Economics*; 1977.
- DALE K. OSBORNE, B.A. (Univ. of Kentucky), M.A. (ibid), Ph.D. (ibid); **Professor of Economics and Finance and Director of the Center for Study of Financial Institutions**; 1979.
- ALEXANDER MEIR OSPOVAT, B.S. (Univ. of Oklahoma), M.A. (ibid), Ph.D. (ibid); *Professor of History*; 1973, 1962.
- FREDERIC N. OWENS, B.S. (Univ. of Minnesota), Ph.D. (ibid); *Professor of Animal Science*; 1979, 1974.
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- CHARLOTTE L. OWNBY, B.S. (Univ. of Tennessee), M.S. (ibid), Ph.D. (Colorado State Univ.); *Associate Professor of Physiological Sciences*; 1980, 1974.
- JAMES DONALD OWNBY, B.S. in Ed. (Univ. of Tennessee), M.S. (ibid), Ph.D. (Colorado State Univ.); **Associate Professor of Botany**; 1981, 1975.
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- JAMES VERNON PARCHER, B.S. (O.S.U.), M.S. (ibid), A.M. (Harva Ph.D. (Univ. of Arkansas); Registered Professional Engineer (Oklahoma, Kansas, **Colorado**); **Professor and Head of the School of Civil Engineering**; 1969, 1947.
- JERALD DWAIN PARKER, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Purdue Univ.); **Professor of Mechanical and Aerospace Engineering**; **1967, 1955**.
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- WAYNE A. PETTYJOHN, B.A. (Univ. of South Dakota), M.A. (ibid), Ph.D. (Boston Univ.), *Professor and Head of the Department of Geology*; 1981, 1980.
- JAMES L. PHILLIPS, B.A. (Univ. of Arizona), M.A. (Southern Illinois Univ.), Ph.D. (ibid); *Professor and Head of the Department of Psychology*; 1977.
- WILLIAM H. PIXTON, A.B. (George Washington Univ.), M.A. (ibid), Ph.D. (Univ. of North Carolina-Chapel Hill); *Associate Professor of English*; 1980, 1977.
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- RICHARD WILLIAM POOLE, B.S. (Univ. of Oklahoma), M.B.A. (ibid), Ph.D. (O.S.U.); *Professor of Economics and Finance and Vice-President for University Relations, Development and Extension*; 1972, 1960.
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- ROBERT THOMAS RADFORD, B.A. (Baylor Univ.), M.A. (ibid), Ph.D. (Univ. of Texas); *Associate Professor of Philosophy*; 1972, 1963.
- LIONEL MISCHA RAFF, B.S. (Univ. of Oklahoma), M.S. (ibid), Ph.D. (Univ. of Illinois); *Regents Professor of Chemistry*; 1978, 1964.
- RAMACHANDRA G. RAMAKUMAR, B.E. (Univ. of Madras), M. Tech. (Indian Inst. of Technology), Ph.D. (Cornell Univ.); *Professor of Electrical and Computer Engineering*; 1976, 1967.
- WILLIAM WALTER RAMBO, A.B. (Temple Univ.), M.A. (ibid), Ph.D. (Purdue Univ.); *Professor of Psychology*; 1966, 1956.
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- ROBERT LOUIS ROBINSON, JR., B.S. (O.S.U.), M.S. (ibid), Ph.D. (ibid); *Professor of Chemical Engineering*; 1972, 1965.
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- MARY HELEN ROHRBERGER, B.A. (Newcomb College), M.A. (Tulane Univ.), Ph.D. (ibid); *Professor and Director of English*; 1983, 1961.
- PETER CUSHING ROLLINS, B.A. (Harvard Univ.), Ph.D. (ibid); *Associate Professor of English*; 1977, 1972.
- JOHN F. ROONEY, JR., B.S. (Illinois State Univ.), M.S. (ibid), Ph.D. (Clark Univ.); *Professor of Geography*; 1976, 1969.
- JEFFIE FISHER ROSZEL, D.V.M. (Univ. of Pennsylvania); *Professor of Veterinary Pathology*; 1978, 1971.
- LAWRENCE O. ROTH, B.S. (Univ. of Wisconsin), M.S. (O.S.U.), Ph.D. (ibid); *Professor of Agricultural Engineering*; 1972, 1951.
- ROSCOE ROUSE, B.A. (Univ. of Oklahoma), M.A. (ibid); M.A. (Univ. of Michigan), Ph.D. (ibid); *Librarian with rank of Dean and Director of Library Science Institute*; 1967.
- JAMES R. ROWLAND, B.S. (O.S.U.), M.S. (Purdue Univ.), Ph.D. (ibid); *Professor of Electrical and Computer Engineering*; 1976, 1971.
- CHARLES CLAYTON RUSSELL, B.S.A. (Univ. of Florida), M.S.A. (ibid), Ph.D. (ibid); *Professor of Plant Pathology*; 1980, 1967.
- MARK AARON SAMUEL B.S. (McGill Univ.), M.S. (ibid), Ph.D. (Univ. of Rochester); *Professor of Physics*; 1981, 1969.
- HARJIT SANDHU, B.A. (Panjab Univ.), M.S. (ibid), M.S.W. (Ohio State Univ.), Ph.D. (Panjab Univ.); *Professor of Sociology*; 1973, 1971.
- ROBERT LEE SANDMEYER, B.A. (Ft. Hays Kansas State College), M.S. (O.S.U.), Ph.D. (ibid); *Professor of Economics and Dean of the College of Business Administration*; 1977, 1962.
- KENNETH DOUGLAS SANDVOLD, B.S. (Concordia College), M.S. (Univ. of North Dakota), Ph.D. (Univ. of Illinois); *Professor of Psychology and Director of Clinical Psychology*; 1973, 1965.
- PAUL WILLIAM SANTELMANN, B.S. (Univ. of Maryland), M.S. (Michigan State Univ.), Ph.D. (Ohio State Univ.); *Professor and Head of the Department of Agronomy*; 1977, 1962.

- JOHN R. SAUER, B.S. (St. John's Univ.), M.S. (New Mexico Highlands Univ.), Ph.D. (Tulane Univ.); *Professor of Entomology*; 1977, 1969.
- JOHN A. SCHILLINGER, B.A. (Monmouth), M.A. (Univ. of Illinois), M.A. (Univ. of Wisconsin), Ph.D. (Univ. of Wisconsin); *Professor of Foreign Languages*; 1982.
- FRANK SCHITOSKEY, JR., B.S. (Midwestern Univ.), M.S. (Texas Tech. Univ.), Ph.D. (Univ. of Calif., Davis); *Adjunct Associate Professor of Zoology*; 1980.
- ROBERT S. SCHLOTTMANN, B.A. (Louisiana State Univ.), M.S. (Tulane Univ.), Ph.D. (Louisiana State Univ.); *Professor of Psychology*; 1982, 1970.
- ANNE L. SCHNEIDER, B.A. (O.S.U.), B.S. (ibid), Ph.D. (Indiana Univ.); *Associate Professor of Political Science*; 1983.
- DEAN FREDERICK SCHREINER, B.S. (Colorado State Univ.), M.S. (Iowa State Univ.), Ph.D. (ibid); *Professor of Agricultural Economics*; 1974, 1968.
- LEON WILLIAM SCHROEDER, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Indiana Univ.); *Professor of Physics*; 1969, 1947.
- CHERYL MILLER SCOTT, B.S. (Purdue Univ.), M.A. (Northwestern Univ.), Ph.D. (Purdue Univ.); *Associate Professor of Speech Pathology*; 1977, 1972.
- HUGH LAWRENCE SCOTT, JR., B.S. (Purdue Univ.), Ph.D. (ibid); *Professor of Physics*; 1983, 1972.
- WILLIAM CHARLES SCOTT, B.A. (Bethany College), M.A. (Texas Christian Univ.), Ph.D. (ibid); *Professor of Psychology*; 1982, 1969.
- MARY MARGUERITE SCRUGGS, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Iowa State Univ.); *Professor of Home Economics Education and Associate Dean of the College of Home Economics*; 1973.
- JAMES M. SEALS, B.S. (Abilene Christian College), M.A. (Southwest Texas State Univ.), Ph.D. (East Texas State Univ.); *Professor of Applied Behavioral Studies*; 1975, 1968.
- WILLIAM E. SEGALL, B.A. (Yankton College), M.Ed. (Univ. of Texas at El Paso), Ed.D. (Univ. of Arkansas); *Professor of Curriculum and Instruction*; 1975, 1969.
- DANIEL SELAKOVICH, A.B. (Western State College of Colorado), M.A. (Washington State Univ.), Ed.D. (Univ. of Colorado); *Professor of Curriculum and Instruction*; 1968, 1963.
- JAMES EARLE SHAMBLIN, B.S. (Univ. of Texas), M.S. (ibid), Ph.D. (ibid); *Professor of Industrial Engineering and Management*; 1969, 1964.
- JOSEPH SHAANAN, A.B. (Temple Univ.), M.A. (Cornell Univ.), Ph.D. (ibid); *Associate Professor of Economics*; 1982, 1979.
- ANSEL MIREE SHARP, B.S. (Howard College), M.A. (Univ. of Virginia), Ph.D. (Louisiana State Univ.); *Professor of Economics*; 1964, 1957.
- JAMES H. SHAW, B.S. (Stephen F. Austin State College), M.F.S. (Yale Univ.), Ph.D. (ibid); *Associate Professor of Zoology*; 1979, 1974.
- JOHN C. SHEARER, B.S. (New York State School of Industrial and Labor Relations), A.M. (Princeton Univ.), Ph.D. (ibid); *Professor of Economics and Director of the Manpower Research and Training Center*; 1967.
- EVERETT C. SHORT, JR., B.S. (Kent State Univ.), Ph.D. (Univ. Minnesota); *Professor and Head of the Department of Physiological Sciences*; 1979.
- WILLIAM ARTHUR SIBLEY, B.S. (Univ. of Oklahoma), M.S. (ibid), Ph.D. (ibid); *Professor of Physics and Assistant Vice President for Academic Affairs and Research*; 1976, 1970.
- W. GARY SIMPSON, B.B.A. (Texas Tech Univ.), M.B.A. (Southern Methodist Univ.), Ph.D. (Texas A & M Univ.); *Associate Professor of Management*; 1980, 1979.
- GROVALYNN F. SISLER, B.S. (O.S.U.), M.S. (ibid), Ed.D. (ibid); *Professor and Head of the Department of Clothing, Textiles and Merchandising*; 1976, 1965.
- JAMES M. SMALLWOOD, B.D. (East Texas State Univ.), M.A. (ibid), Ph.D. (Texas Tech Univ.); *Associate Professor of History*; 1980, 1975.

- EDWARD L. SMITH, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Minnesota); *Professor of Agronomy*; 1971, 1966.
- MICHAEL WAYNE SMITH, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Michigan State Univ.); *Associate Professor of Horticulture and Landscape Architecture*; 1982, 1977.
- DONALD RAY SNETHEN, B.S. (O.S.U.), M.S. (ibid), Ph.D. (ibid); *Associate Professor of Civil Engineering*; 1979.
- DAVID L. SOLDAN, B.S.E.E. (Kansas State Univ.), M.S.E.E. (ibid), Ph.D. (ibid); *Associate Professor of Electrical and Computer Engineering*; 1983, 1980.
- ARTMARAM HARILAL SONI, B.S. (Univ. of Bombay), B.S. (Univ. of Michigan), M.S. (ibid), Ph.D. (O.S.U.); *Professor of Mechanical and Aerospace Engineering*; 1970, 1966.
- O. BRUCE SOUTHARD, III, B.A. (Texas Tech Univ.), M.A. (Purdue Univ.), Ph.D. (ibid); *Associate Professor of English*; 1981, 1978.
- ROBERT M. SPAULDING, A.B. (Univ. of Michigan), A.M. (ibid), Ph.D. (ibid); *Professor of History*; 1983, 1971.
- HOWARD OLIN SPIVEY, B.A. (Univ. of Kentucky), Ph.D. (Harvard Univ.) *Professor of Biochemistry*; 1975, 1967.
- ROBERT LEWIS SPURRIER, JR., A.B. (Univ. of Missouri), A.M. (ibid), Ph.D. (Univ. of California); *Professor and Assistant Director of Political Science*; 1982, 1972.
- ERNEST L. STAIR, JR., D.V.M. (O.S.U.), M.S. (Univ. of Nebraska), Ph.D. (Texas A.&M. Univ.); *Professor of Veterinary Pathology*; 1975.
- THEODORE E. STALEY, B.A. (Carroll College), D.V.M. (Michigan State Univ.), M.S. (ibid); *Professor of Physiological Sciences*; 1982, 1965.
- ROBERT FRANCIS STANNERS, B.S. (Univ. of Wisconsin), Ph.D. (Univ. of Iowa); *Professor of Psychology*; 1971, 1966.
- KENNETH J. STARKS, B.S. (Univ. of Oklahoma), M.S. (ibid), Ph.D. (Iowa State Univ.); *Adjunct Professor of Entomology*; 1975, 1969.
- JAMES KENNETH ST. CLAIR, B.A. (North Texas State Univ.), B.M. (ibid), M.M.E. (ibid), Ed.D. (Univ. of Texas); *Professor of Educational Administration and Higher Education*; 1968, 1964.
- FRANK GEORGE STEINDL, B.A. (DePaul Univ.), M.A. (Univ. of Illinois) Ph.D. (Univ. of Iowa); *Professor of Economics*; 1970, 1962.
- GARY F. STEWART, B.S. (O.S.U.), M.S. (Univ. of Oklahoma), Ph.D. (Univ. of Kansas); *Professor of Geology*; 1981, 1971.
- JOHN E. STONE, B.A. (Ohio Wesleyan Univ.), M.S. (Univ. of Illinois) Ph.D. (ibid), *Professor of Geology*; 1967.
- JOHN FLOYD STONE, B.S. (Univ. of Nebraska), M.S. (Iowa State Univ.) Ph.D. (ibid); *Professor of Agronomy*; 1969, 1957.
- JOSEPH A. STOUT, B.A. (Angelo State College), M.A. (Texas A.&M. Univ.), Ph.D. (O.S.U.); *Professor of History and Director of Will Rogers Research*; 1983, 1972.
- ENOS L. STOVER, B.S. (O.S.U.), M.S. (ibid), Ph.D. (ibid); *Associate Professor of Civil Engineering*; 1981, 1980.
- JIMMY FRANKLIN STRITZKE, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Missouri); *Professor of Agronomy*; 1981, 1970.
- GEOFFREY PHILIP SUMMERS, B.A. (Oxford Univ.), Ph.D. (ibid); *Associate Professor and Acting Head of the Department of Physics*; 1981, 1973.
- JOHN EARLE SUSKY, B.A. (Univ. of Florida), M.A. (ibid), Ed.D. (O.S.U.); *Professor of Philosophy*; 1979, 1961.
- ROBERT L. SWAIM, B.S. (Purdue Univ.), M.S. (ibid), Ph.D. (Ohio State Univ.); *Professor of Mechanical and Aerospace Engineering and Associate Dean of the College of Engineering*; 1978.

- NYAYAPATHI V.V.J. SWAMY, B.S. (Siddharth College), M.S. (Wilson College), Ph.D. (Florida State Univ.); *Professor of Physics*; 1973, 1968.
- CHARLES M. TALIAFERRO, B.S. (O.S.U.), M.S. (Texas A.&M. Univ.), Ph.D. (ibid); *Professor of Agronomy*; 1976, 1968.
- CHARLES G. TAUER, B.S. (Univ. of Minnesota), M.S. (ibid), Ph.D. (ibid); *Associate Professor of Forestry*; 1980, 1976.
- MARVIN PALMER TERRELL, B.S. (Univ. of Arkansas), M.S. (ibid), Ph.D. (Univ. of Texas); *Professor and Interim Head of Industrial Engineering and Management*; 1983, 1966.
- H. ROBERT TERRY, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Ohio State Univ.); *Professor and Head of the Department of Agricultural Education*; 1975, 1969.
- FRED TEWELL, B.A. (DePauw Univ.), M.A. (Louisiana State Univ.), Ph.D. (ibid); *Professor of Speech*; 1976, 1959.
- DONALD L. THOMPSON, B.S. (Northeastern Okla. State Univ.), Ph.D. (Univ. of Arkansas); *Associate Professor of Chemistry*; 1983.
- DANIEL S. TILLEY, B.S. (Iowa State Univ.), M.S. (ibid), Ph.D. (ibid); *Associate Professor of Agricultural Economics*; 1982.
- GLENN WILLIAM TODD, A.B. (Univ. of Missouri), M.A. (ibid), Ph.D. (ibid); *Professor and Head of the Department of Botany*; 1981, 1958.
- DALE W. TOETZ, B.S. (Univ. of Wisconsin), M.S. (ibid), Ph.D. (Indiana Univ.); *Professor of Zoology*; 1980, 1965.
- ROBERT TOTUSEK, B.S. (O.S.U.), M.S. (Purdue Univ.), Ph.D. (ibid); *Professor and Head of the Department of Animal Science*; 1977, 1952.
- JAMES N. TRAPP, B.S. (Kansas State Univ.), M.S. (ibid), Ph.D. (Michigan State Univ.); *Associate Professor of Agricultural Economics*; 1980, 1976.
- VERNON TROXEL, B.S. (Illinois State Normal Univ.), M.Ed. (Univ. of Illinois), Ed.D. (ibid); *Professor of Curriculum and Instruction and Director of Teacher Corps*; 1978, 1963.
- BILLY BOB TUCKER, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Illinois); *Regents Professor of Agronomy*; 1979, 1956.
- ELBERT JEROME TURMAN, B.S. (O.S.U.), M.S. (Purdue Univ.), Ph.D. (ibid); *Professor of Animal Science*; 1963, 1955.
- WAYNE C. TURNER, B.S.I.E. (Virginia Polytechnic Inst.), M.S.I.E. (ibid), Ph.D. (ibid); *Professor of Industrial Engineering and Management*; 1978, 1974.
- LUTHER GILBERT TWEETEN, B.S. (Iowa State Univ.), M.S. (O.S.U.), Ph.D. (Iowa State Univ.); *Regents Professor of Agricultural Economics*; 1971, 1962.
- AVDHESH K. TYAGI, B.S. (Univ. of Allahabad), M.S. (Univ. of Roorkee), Ph.D. (Univ. of California-Berkeley); *Associate Professor of Civil Engineering*; 1980.
- RONALD J. TYRL, B.A. (Park College), M.S. (Oregon State Univ.), Ph.D. (ibid); *Associate Professor of Botany*; 1977, 1972.
- HIROSHI UEHARA, Rigakushi (Univ. of Toyko), Sc.D. (Osaka Univ.); *Professor of Mathematics*; 1964.
- MILTON F. USRY, B.B.A. (Baylor Univ.), M.B.A. (Univ. of Houston), Ph.D. (Univ. of Texas); *Regents Professor of Accounting*; 1965, 1961.
- JAMES R. VAN DOREN, B.S. (Iowa State Univ.), M.S. (ibid), Ph.D. (ibid); Associate Professor of Computing and Information Science**; 1971.
- LOUIS P. VARGA, B.A. (Reed College), M.S. (Univ. of Chicago), Ph.D. (Oregon State College); *Associate Professor of Chemistry*; 1967, 1961.
- WILLIAM R. VENABLE, A.B. (Sacred Heart Seminary), M.Ed. (Wayne State Univ.), Ph.D. (Univ. of Michigan); *Associate Professor of Occupational and Adult Education*; 1982.

- AVAL M. VERHALEN, B.S. (Texas Tech Univ.), Ph.D. (O.S.U.); *Professor of Agronomy*; 1977, 1964.
- HELEN S. VISHNIAC, B.A. (Univ. of Michigan), M.A. (Radcliffe College), Ph.D. (Columbia Univ.); *Associate Professor of Microbiology*; 1983, 1978.
- JOHN D. VITEK, B.S. (Wisconsin State Univ.), M.A. (Univ. of Iowa), Ph.D. (ibid); *Associate Professor of Geography and Assistant Dean, Graduate College*; 1982, 1978.
- DALLAS FREMONT WADSWORTH, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of California); *Professor of Plant Pathology*; 1974, 1949.
- DONALD G. WAGNER, B.S. (Ohio State Univ.), M.S. (Cornell Univ.), Ph.D. (ibid); *Professor of Animal Science*; 1975, 1965.
- JEFFREY WALKER, B.S. (Shippensburg College), M.A. (Middlebury College), Ph.D. (Penn. State Univ.); *Associate Professor of English*; 1983, 1979.
- ODELL LARRY WALKER, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Iowa State Univ.); *Professor of Agricultural Economics*; 1964, 1956.
- GEORGE ROZIER WALLER, B.S.** (North Carolina State College), M.S. (Univ. of Delaware), Ph.D. (O.S.U.); *Professor of Biochemistry*; 1967, 1956.
- STEPHEN J. WALSH, B.S. (Fitchburg State College), M.S. (Oregon State Univ.), Ph.D. (ibid); *Associate Professor of Geography*; 1981, 1977.
- LOWELL EUGENE WALTERS, B.S. (O.S.U.)**, M.S. (Massachusetts State College), Ph.D. (O.S.U.); *Professor of Animal Science*; 1958, 1946.
- CLEMENT E. WARD, B.S. (Iowa State Univ.), M.S. (Kansas State Univ.), Ph.D. (ibid); *Associate Professor of Economics*; 1978
- WALTER JAMES WARD, B.S. (Ohio Univ.), M.S. (ibid), Ph.D. (Univ. of Iowa); *Professor of Journalism and Broadcasting*; 1970, 1967.
- WILLIAM D. WARDE, B.S. (Univ. of London), M.S. (Florida State Univ.), Ph.D. (Iowa State Univ.); *Associate Professor of Statistics*; 1977, 1972.
- PAUL GEORGE WARDEN, A.B. (Baldwin-Wallace College), M.A. (Kent State Univ.), Ph.D. (ibid); *Professor of Applied Behavioral Studies*; 1978, 1970.
- LARKIN B. WARNER, A.B. (Ohio Wesleyan Univ.), A.M. (Indiana Univ.), Ph.D. (ibid); *Professor and Director of Department of Economics*; 1982, 1979 (1976-79).
- THOMAS L. WARREN, A.B. (Univ. of Evansville), M.S. (Indiana Univ.), M. Phil. (Univ. of Kansas), Ph.D. (ibid); *Associate Professor of English*; 1980, 1977.
- GORDON A. WEAVER, B.A. (Univ. of Wisconsin-Milwaukee), M.A. (Univ. of Illinois), Ph.D. (Univ. of Denver); *Professor and Head of the Department of English*; 1981, 1975.
- MARGARET J. WEBER, B.S. (Eastern Illinois Univ.), M.S. (ibid), Ph.D. (Univ. of Missouri), *Associate Professor of Housing, Design and Consumer Resources*; 1981, 1977.
- ROBERT JOHN WEBER, B.S. (Arizona State Univ.), Ph.D. (Princeton Univ.); *Professor of Psychology*; 1973, 1967.
- JAMES WEBSTER, B.S. (Univ. of Kentucky), M.S. (ibid), Ph.D. (Kansas State Univ.), *Adjunct Associate Professor of Entomology*; 1982.
- DAVID LEE WEEKS, B.S. (O.S.U.), M.S. (ibid), Ph.D. (ibid); *Professor of Statistics*; 1966, 1957.
- DALE ELDON WEIBEL, B.S. (Univ. of Nebraska), M.S. (ibid), Ph.D. (Iowa State Univ.); *Professor of Agronomy*; 1961, 1958.
- ROBERT L. WESTERMAN, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Illinois); *Professor of Agronomy*; 1983, 1976.
- PAUL ANTHONY WESTHAUS, B.S. (St. Louis Univ.), Ph.D. (Washington Univ.); *Professor of Physics*; 1976, 1968.
- ROBERT PAUL WETTEMANN, B.S. (Univ. of Connecticut), M.S. (Michigan State Univ.), Ph.D. (ibid); *Professor of Animal Science*; 1980, 1972.

- CARL E. WHITCOMB, B.S. (Kansas State Univ.), M.S. (Iowa State Univ.), Ph.D. (ibid); *Professor of Horticulture*; 1978, 1972.
- DELBERT L. WHITENACK, B.S. (O.S.U.), D.V.M. (ibid), M.S. (Michigan State Univ.), Ph.D. (ibid); *Professor of Veterinary Pathology*; 1981, 1975.
- RICHARD W. WHITNEY, B.S.A.E. (Kansas State Univ.), M.S.A.E. (O.S.U.), Ph.D. (ibid); *Associate Professor of Agricultural Engineering*; 1979, 1975.
- JOHN ALBERT WIEBELT, B.S. (Texas Technological College), M.S. (Southern Methodist Univ.), Ph.D. (O.S.U.); **Professor of Mechanical and Aerospace Engineering**; 1965, 1958.
- KENNETH EDWARD WIGGINS, B.S. (Troy State College), M.S. (Auburn Univ.), Ed.D. (ibid); *Professor of Curriculum and Instruction*; 1969, 1962.
- LLOYD LEE WIGGINS, B.S. (O.S.U.), M.S. (ibid), Ed.D. (ibid); *Professor of Occupational and Adult Education*; 1976, 1956.
- DAVID NORVAL WIGTIL, B.A. (Concordia), M.A. (Univ. of Minn.), Ph.D. (ibid); *Assistant Professor of Foreign Languages and Literatures*; 1981.
- JERRY LEO WILHM, B.S. (Kansas State Teachers College), M.S. (ibid), Ph.D. (O.S.U.), **Professor and Head of the Department of Zoology**; 1982, 1966.
- JANET BARBARA WILKINSON, B.A. (Univ. of New Hampshire), M.S. (Purdue Univ.), Ph.D. (ibid); *Associate Professor of Applied Behavioral Studies*; 1980, 1972.
- JOSEPH E. WILLIAMS, B.S. (New Mexico State Univ.), M.S. (ibid), Ph.D. (Iowa State Univ.); **Associate Professor of Agricultural Economics**; 1980, 1975.
- TIMOTHY MICHAEL WILSON, B.S. (Univ. of Florida), Ph.D. (ibid); *Professor of Physics and Associate Director of Arts and Sciences Extension*; 1982, 1969.
- ESTHER ANN WINTERFELDT, B.S. (O.S.U.), M.S. (ibid); Ph.D. (Ohio State Univ.); **Professor and Head of the Department of Food, Nutrition and Institution Administration**; 1983, 1970.
- ROBERT F. WITWER, B.S. (SUNY), M.S. (ibid), Ph.D. (ibid); **Associate Professor of Forestry**; 1982.
- JOHN E. WOLFE, B.A. (Bucknell Univ.), M.A. (Univ. of California), Ph.D. (ibid); *Associate Professor of Mathematics*; 1978, 1974.
- PHILIP WOLFE, B.S.I.E. (Univ. of Missouri), B.S.B.A. (ibid), M.S.E. (Arizona State Univ.), Ph.D. (ibid); *Professor of Industrial Engineering and Management*; 1981, 1976.
- SAMUEL HUBERT WOODS, JR., A.B. (Harvard Univ.), M.A. (ibid), Ph.D. (Yale Univ.); **Professor of English**; 1965, 1956.
- RUSSELL E. WRIGHT, B.S. (Iowa State Univ.), M.S. (ibid), Ph.D. (Univ. of Wisconsin); **Professor of Entomology**; 1982, 1976.
- RADHA K. RAO YARLAGADDA, B.E. (B.M.S. College of Engineering), M.S. (South Dakota State Univ.), Ph.D. (Michigan State Univ.); *Professor of Electrical and Computer Engineering*; 1978, 1966.
- KYLE M. YATES, B.S. (Wake Forest College), B.D. (Southern Baptist Theological Seminary), Th.D. (ibid); *Professor and Head of Department of Religious Studies*; 1981, 1969.
- JERRY H. YOUNG, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of California); **Professor of Entomology**; 1965, 1959.
- LINDA YU, B.S. (National Taiwan Univ.), M.S. (Univ. of Illinois), Ph.D. (ibid); *Associate Researcher*; 1981.
- CHANG-AN YU, B.S. (National Taiwan Univ.), M.S. (ibid), Ph.D. (Univ. of Illinois); **Professor of Biochemistry**; 1982, 1981.
- WILLIAM G. ZIKMUND, B.A. (Univ. of Colorado), M.S. (Southern Illinois Univ.), D.B.A. (Univ. of Colorado); *Professor of Marketing*; 1980, 1972.

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E. BURL AUSTIN, B.S. (Univ. of Arkansas), C.P.A. (Iowa-Oklahoma), M.S. (Univ. of Iowa); *Associate Professor Emeritus of Accounting and Assistant Internal Auditor*; 1979, 1947.

HELEN FRANCIS BARBOUR, B.S. (Univ. of Oklahoma), M.H.Ec.Ed. (ibid), M.S. (Iowa State Univ.), Ph.D. (ibid); *Professor Emeritus of Food, Nutrition and Institution Administration*; 1974, 1960.

RUSSELL HUGH BAUGH, B.A. (Southwest Missouri State College), (Univ. of Wisconsin); *Professor Emeritus of Economics*; 1979, 1935.

MARY AGNES BERRIGAN, B.A. (Univ. of Oklahoma), M.A. (ibid), Ph.D. with Honors (Trinity College, Univ. of Dublin); *Professor Emeritus of English*; 1959, 1921.

LLOYD A. BRINKERHOFF, B.S. (Univ. of Arizona), M.S. (ibid), (Univ. of Minnesota); *Professor Emeritus of Plant Pathology*; 1978, 1948.

HARRY KERN BROBST, A.B. (Brown Univ.), M.A. (Univ. of Pennsylvania), Ph.D. (ibid); *Professor Emeritus of Psychology*; 1974, 1946.

CHARLES FRANKLIN CAMERON, B.S. (O.S.U.) Professional Degree in E.E. (ibid), M.S.E. (Purdue Univ.); Registered Professional Engineer (Oklahoma); Fellow (AIEE); *Professor Emeritus of Electrical Engineering*; 1963, 1941.

HARVEY L. CHADA, B.S. (Univ. of Wisconsin), M.S. (ibid), Ph.D. (ibid); *Professor Emeritus of Entomology*; 1970, 1961.

BERLIN BASIL CHAPMAN, B.A. (West Virginia Univ.), M.A. (Harvard Univ.), Ph.D. (Univ. of Wisconsin); *Professor Emeritus of History*; 1966, 1927.

HAROLD A. COONRAD, B.S. (O.S.U.), M.S. (ibid), Ed.D. (Indiana Univ.); *Professor Emeritus of Business Education and Administrative Services*; 1979, 1948.

JUNE E. COZINE, B.S. (Northwest Missouri State Teachers College), M.A. (Univ. of Missouri), Ph.D. (Univ. of Chicago); **Professor and Head Emeritus of the Department of Home Economics Education**; 1968, 1955.

FRANKLIN ROMIG CROW, B.S. (Pennsylvania State Univ.), M.S. (O.S.U.), *Professor Emeritus of Agriculture Engineering*; 1983, 1949.

OTIS CLIFFORD DERMER, B.S. (Bowling Green State College), Ph.D. (Ohio State Univ.) **Regents Service Professor Emeritus of Chemistry**; 1975, 1934.

GUY RENFRO DONNELL, A.B. (Univ. of Oklahoma), M.A. (Univ. of Ph.D. (ibid)); *Professor Emeritus of Political Science*; 1970, 1946.

TROY CLYDE DORRIS, B.Ed. (Southern Illinois Univ.), M.S. (ibid), Ph.D. (Univ. of Illinois); *Professor Emeritus of Zoology*; 1977, 1956.

CLARK ALLAN DUNN, B.S. (Univ. of Wisconsin), M.S. (O.S.U.), Professional Degree of C.E. (ibid), Ph.D. (Cornell Univ.); Registered Professional Engineer (Oklahoma); *Professor Emeritus of Civil Engineering and Associate Dean of the College of Engineering*; 1967, 1929.

FRANK MARSHALL DURBIN, B.S. (State Teachers College, Kirksville, Missouri), M.S. (Univ. of Chicago), Ph.D. (ibid); *Professor Emeritus of Physics*; 1960, 1929.

- WILLIAM HARRISON EASTON, B.S. (Univ. of Florida), M.S. (Univ. of Minnesota); Registered Professional Engineer (Oklahoma); *Professor Emeritus of Mechanical Engineering*; 1969, 1942.
- MARVIN TIPTON EDMISTON, B.A. (Univ. of Nebraska), M.S. (ibid), Ph.D (O.S.U.); *Professor Emeritus of Chemistry*; 1978, 1955.
- WILLIAM PRICE EWENS, B.S. (Univ. of Missouri), M.Ed. (ibid), Ed.D. (Stanford Univ.); *Professor Emeritus of Applied Behavioral Studies*; 1979, 1959.
- ERNEST CHESTER FITCH, JR., B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Oklahoma); *Professor Emeritus of Mechanical and Aerospace Engineering*; 1970, 1953.
- ROBERT CARL FITE, B.A. (Central State College), M.S. (O.S.U.), Ph.D. (Northwestern Univ.); *Professor Emeritus of Geography and Director of Programs for Professionals*; 1946.
- LYNN LAMARR GEE, A.B. (Brigham Young Univ.), M.S. (Colorado A.&M. College), Ph.D. (Univ. of Wisconsin); *Professor and Head Emeritus of the department of Microbiology*; 1977, 1954.
- ROY GLADSTONE, B.S. (Univ. of Illinois), M.S. (ibid), Ph.D. (ibid); *Professor Emeritus of Applied Behavioral Studies*; 1980, 1949.
- FENTON GRAY, B.S. (Univ. of Utah), Ph.D. (Ohio State Univ.), *Professor Emeritus of Agronomy*; 1959, 1951.
- GEORGE ALEXANDER GRIES**, A.B. (Miami Univ.), M.S. (Kansas State Univ.), Ph.D. (Univ. of Wisconsin); *Professor Emeritus of Botany*; 1968.
- MACK HALL GRIFFIN, A.B. (Univ. of Georgia), A.M. (Univ. of North Carolina), Ph.D. (ibid); *Professor Emeritus of Foreign Languages*; 1968, 1932.
- DONALD ALAN HAMILTON, B.Arch. (Carnegie Inst. of Technology), M.Arch. (ibid), Certificate (Beaux-Arts Inst. of Design), Licensed Architect (Oklahoma); *Professor and Head Emeritus of the School of Architecture and Applied Art*; 1958, 1930.
- JOHN DAVID HAMPTON, B.G.D. (Omaha Univ.), M.S. (Trinity Univ.), Ph.D. (Univ. of Texas); *Professor Emeritus of Applied Behavioral Studies*; 1983, 1967.
- JAMES C. HILLIER, B.S. (Iowa State Univ.), M.S. (ibid), Ph.D. (Purdue Univ.); *Professor Emeritus of Animal Science and Head Emeritus of the Department of Animal Sciences and Industry*; 1976, 1937.
- ORA ALMON HILTON, B.S. (Southwest Missouri State College), Ph.M. (Univ. of Wisconsin), Ph.D. (ibid); *Professor Emeritus of History*; 1966, 1929.
- ERNEST M. HODNETT, B.S. (Univ. of Florida), M.S. (ibid), Ph.D. (Purdue Univ.); *Professor Emeritus of Chemistry*; 1979, 1945.
- JOSEPHINE HOFFER, **B.S. (O.S.U.)**, M.S. (ibid), Ed.D. (ibid); *Associate Professor Emeritus of the Department of Family Relations and Child Development*; 1965, 1948.
- DARIEL ELZA HOWELL, B.S. (Univ. of California), M.S. (ibid), (ibid); *Professor Emeritus of Entomology*; 1976, 1939.
- WAYNE WINFIELD HUFFINE, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Purdue Univ.); *Professor Emeritus of Agronomy*; 1981, 1946.
- DEWITT TALMADGE HUNT, B.S. (Valparaiso Univ.), B.M.T. (ibid), B.S. (O.S.U.), M.A. (Ohio State Univ.), Ph.D. (ibid); *Professor and Head Emeritus of the Department of Industrial Arts Education*; 1955, 1915.
- GILFORD JOHN IKENBERRY, B.S. (Kansas State Univ.), M.S. (ibid), Ph.D. (Ohio State Univ.); *Professor Emeritus of Botany and Plant Pathology*; 1960, 1939.
- HAZEL INGERSOLL, B.S. (Univ. of Nebraska), M.A. (ibid), Ph.D. (Ohio State Univ.); *Professor Emeritus of Family Relations and Child Development*; 1973, 1950.
- ROBERT LEE JANES, B.S. (California Inst. of Technology), M.S. (ibid), Ph.D. (Illinois Inst. of Technology); Registered Professional Engineer (California, Oklahoma); *Professor Emeritus of Civil Engineering*; 1980, 1963.

- LLOYD WAYNE JOHNSON, A.B. (Central State College), M.A. (Univ. of Oklahoma), M.A. (Princeton Univ.), Ph.D. (ibid); *Professor Emeritus of Mathematics and Head Emeritus of the Department of Mathematics and Statistics*; 1951.
- ROY WINFIELD JONES, A.B. (Oklahoma City Univ.), M.S. (Kansas State Univ.), Ph.D. (Univ. of Oklahoma); *Professor and Head Emeritus of the Department of Zoology*; 1971, 1947.
- ERIC WYNN JONES, M.R.C.V.S. (Royal Veterinary College, London), Ph.D. (Cornell Univ.); *Professor Emeritus of Veterinary Medicine and Surgery and Director of Clinical Research*; 1981, 1954.
- RANDALL JEFFRIES JONES, B.S. (O.S.U.), M.S. (Univ. of Wisconsin), Ph.D. (ibid); *Professor Emeritus of Agronomy and Associate Dean Emeritus of Resident Instruction of Agriculture*; 1981, 1941.
- RICHARD PHILIP JUNGERS, B.E. (LaCrosse State College), Ph.M. (Univ. of Wisconsin), Ph.D. (ibid); *Professor Emeritus of Education*; 1957.
- WILLIAM RAYMOND KAYS, B.S. (O.S.U.), M.S. (Michigan State Univ.); *Professor Emeritus of Horticulture*; 1981, 1942.
- JOSEPH J. KLOS, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Wisconsin); *Professor Emeritus of Economics*; 1980, 1946.
- MONROE WERNER KRIEGEL, B.S. (Univ. of Texas), M.S. (ibid), Ph.D. (ibid); *Professor Emeritus of Chemical Engineering*; 1978, 1964.
- KATHERINE WALTER KUMLER, B.A. (West Virginia Univ.), M.A. (Teachers College, Columbia Univ.), Ph.D. (Ohio State Univ.); *Professor Emeritus of Home Economics Education*; 1956, 1941.
- WILLIAM JOHN LEIVO, B.S. (Carnegie Inst. of Technology), M.S. (ibid), D.Sc. (ibid); *Professor Emeritus of Physics*; 1981, 1955.
- IDELLA LOHMANN, B.A. (O.S.U.), M.A. (ibid), Ed.D. (Univ. of Tulsa) *Professor Emeritus of Curriculum and Instruction*; 1975, 1961.
- MELVIN RUDOLPH LOHMANN, B.S. in M.E. (Univ. of Minnesota), M.S. in I.E. (Univ. of Pittsburgh), Ph.D. (Univ. of Iowa); Registered Professional Engineer (Oklahoma); *Professor Emeritus of Industrial Engineering and Management and Dean Emeritus of the College of Engineering*; 1977, 1941.
- ROBERT ARNOLD LOWRY, B.S. (O.S.U.), M.S. (ibid), Ed.D. (Indiana Univ.); *Professor Emeritus of Business Education*; 1975, 1944.
- DAVID M. MACALPINE, B.S. (South Dakota School of Mines), M.S. (Case Institute of Technology), Ph.D. (Iowa State Univ.); Registered Professional Engineer (New York and Ohio); *Professor Emeritus of Civil Engineering*; 1970, 1947.
- NORBERT R. MAHNKEN, A.B. (Southwestern College, Kansas), M.A. (Univ. of Nebraska), Ph.D. (ibid); *Professor Emeritus of History*; 1983, 1947.
- CARL E. MARSHALL, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Iowa State Univ.); *Professor Emeritus of Mathematics and Statistics*; 1969, 1931.
- HARRISON SHEPLER MENDENHALL, A.B. (Miami Univ.), Ph.D. (Univ. of California); *Professor Emeritus of Mathematics*; 1968, 1937.
- DANIEL JUDSON MILBURN, B.S. (O.S.U.), M.A. (ibid), Ph.D. (Univ. of Oklahoma); *Professor Emeritus of English*; 1978, 1941.
- V. BROWN MONNETT, B.S. (Univ. of Oklahoma), Ph.D. (Univ. of Michigan), *Professor Emeritus of Geology and Associate Dean Emeritus of the College of Arts and Sciences*; 1980, 1947.
- GEORGE AZRO MOORE, B.S. (O.S.U.), M.S. (Univ. of Oklahoma), Ph.D. (Univ. of Michigan); *Professor Emeritus of Zoology*; 1965, 1931.
- THOMAS EDWIN MOORE, B.A. (Univ. of Texas), M.A. (ibid), Ph.D. (ibid); *Professor Emeritus of Chemistry*; 1957, 1947.

- ROBERT DEAN MORRISON, B.S. (O.S.U.), M.S. (ibid), Ph.D. (North Carolina State Univ.); *Professor Emeritus of Statistics*; 1981, 1946.
- JOSEPH RANDOLPH NORTON, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Texas); *Professor Emeritus of General Engineering*; 1978, 1946.
- HAROLD CECIL OLSON, B.S. (South Dakota College), M.S. (West Virginia Univ.), Ph.D. (Iowa State Univ.); *Professor Emeritus of Dairy Science*; 1971, 1940.
- LELA O'TOOLE, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Ohio State Univ.); *Dean Emeritus of the College of Home Economics*; 1975, (1949-1950).
- MILLIE VILET PEARSON, A.B. (Northeastern State College), B.S. (ibid), M.S. (O.S.U.), Ph.D. (Ohio State Univ.); *Professor Emeritus of Home Economics Education*; 1965, 1926.
- HERBERT A. POHL, B.S. (Duke Univ), Ph.D. (ibid); *Professor Emeritus of Physics*; 1981, 1964.
- JAY G. PORTERFIELD, B.S. (Iowa State Univ.), M.S. (ibid); Registered Professional Engineer (Oklahoma); *Professor Emeritus of Agricultural Engineering*; 1957, 1952.
- ROBERT RAYMOND PRICE, B.S. (O.S.U.), M.S. (ibid), Ed.D. (Pennsylvania State Univ.); *Professor and Head Emeritus of the Department of Agricultural Education*; 1965, 1948.
- LESTER WINFIELD REED, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Missouri); *Professor Emeritus of Agronomy*; 1983, 1947.
- CHRISTINE F. SALMON, B.Arch. (Univ. of Pennsylvania), M. Arch. (ibid); Registered Professional Architect (Pennsylvania, Illinois and Oklahoma; NCARB); *Professor Emeritus of Housing and Interior Design*; 1971, 1959.
- F. CUTHBERT SALMON, B.Arch. (Univ. of Pennsylvania), M.Arch. (ibid) Registered Professional Architect (Pennsylvania, Oklahoma and Illinois, NCARB); *Professor Emeritus of Architecture*; 1980, 1959.
- EUGENE THOMAS SCHAUER, B.A. (Northeastern State College, Oklahoma), M.S. (O.S.U.), C.P.A. (Oklahoma); *Professor Emeritus of Accounting*; 1970, 1942.
- ERVIN WILLIAM SCHROEDER, B.S. in Ag.E. (Univ. of Wisconsin), M.E. (ibid), M.S. (Pennsylvania State Univ.); Registered Professional Engineer (Oklahoma); *Professor and Head Emeritus of the Department of Agricultural Engineering*; 1974, 1947.
- LEONARD FRANCIS SHEERAR, B.S. (Alfred Univ.), M.S. (Ohio State Univ.), Professional Engineering Degree (Alfred Univ.); Registered Professional Engineer (Oklahoma); *Professor Emeritus of Chemical Engineering and Executive Director Emeritus of Engineering and Industrial Extension*; 1966, 1931.
- IDA TOWNSEND SMITH, B.A. (Central State College, Oklahoma), (Colorado State College), Ed.D. (ibid); *Professor Emeritus of Education*; 1964, 1948.
- HELMER ELLSWORTH SORENSON, B.E. (Eau Claire State Teachers College) Ph.M. (Univ. of Wisconsin), Ph.D. (ibid); *Professor Emeritus of Education and Dean Emeritus of the College of Education*; 1973, 1949.
- EDWARD EARL STURGEON, B.S.F. (Univ. of Michigan), M.F. (ibid), Ph.D. (ibid); *Professor Emeritus of Forestry*; 1981, 1966.
- ROLLIN HAROLD THAYER, B.S. (O.S.U.), M.S. (Univ. of Nebraska), Ph.D (Washington State Univ.); *Professor Emeritus of Poultry Science*; 1980, 1943.
- JOHN E. THOMAS, B.S. (Ohio State Univ.), Ph.D. (Univ. of Wisconsin) *Professor Emeritus and Head Emeritus of the Department of Plant Pathology*; 1981, 1950.
- RUDOLPH W. TRENTON, Dr. of Law (Univ. of Rome), Dr. of Political Science (Univ. of Turin, Italy); *Professor Emeritus of Economics*; 1979, 1948.
- NATHANIEL WALKER, B.S. (Colorado College), M.S. (Pennsylvania State Univ.), Ph.D. (North Carolina Univ.); *Professor Emeritus of Forestry*; 1974, 1947.
- ROBERT RALPH WALTON, B.S. (East Central State College, Oklahoma), M.S. (O.S.U.), Ph.D. (ibid); *Professor Emeritus of Entomology*; 1971, 1942.

- JAMES ELIAS WEBSTER, B.S. (Ohio State Univ.), Ph.D. (ibid); *Professor Emeritus of Biochemistry*; 1968, 1927.
- JAMES ARNOLD WHATLEY, JR. B.S. (Texas A.&M. Univ.), M.S. (Iowa State Univ.), Ph.D. (ibid); *Professor Emeritus of Animal Science*; 1981, 1939.
- JOE VERNON WHITEMAN, B.S. (New Mexico College of A.), M.A. (O.S.U.), Ph.D. (ibid); *Professor Emeritus of Animal Science*; 1983, 1952.
- HARRY C. YOUNG, JR., B.S. (Ohio State Univ.), M.S. (Univ. of Minnesota), Ph.D. (ibid); *Professor Emeritus of Plant Pathology*; 1956, 1950.
- JAMES HOWARD ZANT, A.B. (Southern Methodist Univ.), M.A. (Columbia Univ.), Ph.D. (ibid); *Professor Emeritus of Mathematics*; 1963, 1930.

Associate Members

- EARL PEIRCE AALSETH, JR., B.S. (Montana State Univ.), M.S. (Washington State Univ.), Ph.D. (Virginia Polytechnic); @Assistant Professor of Animal Science; 1981.
- BRUCE J. ACKERSON, B.S. (Univ. of Nebraska), M.S. (Univ. of Colorado), Ph.D. (ibid); *Associate Professor of Physics*; 1981, 1977.
- JEANNE L. AGNEW, B.A. (Queen's Univ.), M.A. (ibid), Ph.D. (Radcliff College); *Professor of Mathematics*; 1969, 1953.
- ROBERT MORRIS AHRING, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Nebraska); *Adjunct Associate Professor of Agronomy*; 1975, 1958.
- STUART W. AKERS, B.S. (Univ. of Oklahoma), M.S. (North Carolina State), Ph.D. (ibid); *Assistant Professor of Horticulture*; 1981.
- MAHIR ALI, Diploma (Leicester Polytechnic), Ph.M. (ibid), Ph.D. (Univ. of Nottingham); *Assistant Professor of Computing & Information Sciences*; 1982.
- DANIEL W. ALKOFER, B.A. (Oberlin College), M.A. (Univ. of Iowa), Ph.D. (Indiana Univ.); *Associate Professor and Head of the Department of Theatre*; 1981.
- JAMES JOE ALLEN, B.S. (Univ. of Arkansas), M.S. (ibid), Ph.D. (Purdue Univ.); *Assistant Professor of Mechanical & Aerospace Engineering*; 1981.
- MARSHALL E. ALLEN, B.A. (Miami Univ.), M.A. (ibid); *Associate Professor of Journalism and Broadcasting*; 1967.
- CRAIG KENNETH ANDERSON, B.S. ED. (Oregon College), M.Ed. (Colorado State Univ.), Ph.D. (ibid); *Assistant Professor of Occupational and Adult Education*; 1982.
- KIM B. ANDERSON, B.S. (O.S.U.), M.S. (ibid), Ph.D. (ibid); *Assistant Professor of Agricultural Economics*; 1982.
- MICHAEL J. APPLGATE, B.A. (Brigham Young Univ.), Ph.D. (Iowa State Univ.); *Associate Professor of Economics*; 1978, 1974.
- PETER AMSTUTZ, B.M. (Peabody Conservatory of Music), M.M. (ibid), D.M.A. (ibid); *Associate Professor of Music*; 1982.
- GEORGE EDWARD ARQUITT, B.A. (Union Univ.), M.S. (Univ. of Tennessee), Ph.D. (ibid); *Associate Professor of Sociology*; 1974, 1970.
- RICHARD ARTHUR AUKERMAN, B.S. (Univ. of North Dakota), M.S. (ibid), Ph.D. (ibid); *Associate Professor of Administrative Services and Business Education*; 1982, 1980.
- C. DOUGLAS AURAND, B.S.L.A., (Penn State Univ.), M.L.A. (Univ. of Virginia); *Assistant Professor of Horticulture and Landscape Design*; 1982.
- ANN E. AUSTIN, B.A. (Bates College), M.S. (Syracuse Univ.), M.A. (Univ. of Michigan), Ph.D. (ibid.); *Assistant Professor of Education Administration and Higher Education*; 1984.

- JOHN LAWRENCE BAIRD, B.S. (Washburn Univ.), M.S. (Kansas State Univ.), Ed.D. (O.S.U.); *Associate Professor of Technical Education*; 1980, 1977.
- ARMOND DUDLEY BAREFOOT, B.S. (O.S.U.), M.S. (ibid); *Associate Professor of Agricultural Engineering*; 1978, 1953.
- PAUL B. BARTO, V.M.D. (Univ. of Pennsylvania), M.S. (Oregon State Univ.), Ph.D. (Univ. of Illinois); *Professor of Veterinary Parasitology, Microbiology and Public Health*; 1964, 1955.
- LOUIS OTTO BASS, B.A. (O.S.U.), B.A.E. (ibid), M.A.E. (ibid); Registered Professional Engineer (Oklahoma and Texas); *Professor of Architecture*; 1976, 1963.
- GEORGE W. BAUMILLER, Diploma in Interior Architecture, State College of Building, Warsaw, Poland, M.S. (Warsaw Institute of Technology); *Associate Professor of Architecture*; 1978, 1973.
- D. JACK BAYLES, B.S.M.E. (Univ. of Oklahoma), M.E. (ibid), Ph.D. (O.S.U.); *Associate Professor School of Technology*; 1979, 1974.
- JOHN GILBERT BAYLESS, B.S. (Phillips Univ.), M.Ed. (ibid), Ed.D. (O.S.U.); *Professor and Chairman of the Department of Physical Education*; 1972, 1966.
- HAMILTON BECK, B.A. (Hamilton College), M.A. (Cornell Univ.), Ph.D. (ibid); *Assistant Professor of Foreign Languages*; 1983.
- GARY J. BEEBY, B.S. (Phillips Univ.), M.A. (Univ. of Illinois); *Assistant Professor of Speech*; 1974.
- RONALD S. BEER, B.S. (Illinois State Univ.), M.A. (Michigan State Univ.), Ph.D. (Kent State Univ.); *Professor of Educational Administration and Higher Education and Vice President of Student Services*; 1980.
- PATRICIA A. BELL, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Texas); *Assistant Professor of Sociology*; 1980.
- DENNIS EARL BERTHOLF, B.S. (Univ. of Kansas), M.A. (New Mexico State Univ.), Ph.D. (ibid); *Associate Professor of Mathematics*; 1973, 1968.
- JOHN PAUL BISCHOFF, B.A. (Univ. of Maryland), Ph.D. (Yale Univ.); *Assistant Professor of History*; 1976.
- DAVID G. BIVIN, B.S. (Ball State Univ.), M.S. (Purdue Univ.), Ph.D. (ibid); *Assistant Professor of Economics and Finance*; 1981.
- UNAB GUL BOKHARI, B.S. (Peshawar University, Pakistan), M.S. (Colorado State Univ.), Ph.D. (Univ. of California); *Adjunct Assistant Professor of Agronomy*; 1979.
- GEORGE BAKER BOKORNEY, B.S. (O.S.U.), M.S. (ibid), Ed.D. (Univ. of Oregon); *Associate Professor and Director of Food, Nutrition and Institution Administration*; 1983, 1971.
- JOHN RICHARD BOSWORTH, B.A. (Univ. of Illinois), M.A. (ibid); *Assistant Professor of Philosophy*; 1962.
- WENDELL BOWERS, B.S. (Univ. of Illinois), M.S. (ibid); *Professor of Agricultural Engineering*; 1967.
- A. DOUGLAS BREDE, B.S. (Penn State Univ.), M.S. (ibid), Ph.D. (ibid); *Assistant Professor of Horticulture and Landscape Architecture*; 1982.
- HOWARD L. BREWER, B.S. (Cal. State Univ.), M.B.A. (Univ. of Southern Calif.), Ph.D. (Univ. of Iowa); *Associate Professor of Economics and Finance*; 1981.
- ANTHONY E. BROWN, B.A. (Baylor Univ.), M.P.A. (Univ. of Tennessee), Ph.D. (ibid); *Assistant Professor of Political Science*; 1980.
- L. HERBERT BRUNEAU, B.S. (McGill Univ.), M.A. (Univ. of Texas), Ph.D. (ibid); *Professor of Zoology*; 1966, 1955.
- ALAN W. BRUNKEN, B.Arch. (O.S.U.), M.Arch. (Massachusetts Inst. of Technology); *Professor of Architecture*; 1982, 1973.

- JOHN H. BRYANT, B.Arch. (O.S.U.), M. Arch. (Univ. of Illinois); *Professor and Head of the School of Architecture*; 1977.
- DAVID S. BUCHANAN, B.S. (North Dakota State Univ.), M.S. (Univ. of Nebraska), Ph.D. (ibid); *Assistant Professor of Animal Science*; 1980.
- MICHAEL BUCHHOLZ, B.A. (North Texas State Univ.), M.A. (ibid), Ph.D. (O.S.U.); *Associate Professor of Journalism*; 1983, 1974.
- JOHN ROBERT BUMSTEAD, B.A. (Southern Methodist Univ.), M.Div. (Union Theology Seminary), S.T.M. (ibid), D.Phil. (Oxford Univ.); *Assistant Professor of Religious Studies*; 1977.
- RICHARD A. BUNCE, B.S. (Marietta College), Ph.D. (Univ. of Wisconsin-Madison); *Assistant Professor of Chemistry*; 1983.
- CHARLIE A. BURNS, B.S. (O.S.U.), M.S. (ibid), EdD. (ibid); *Professor of Agricultural Education*; 1980, 1953.
- MARILYN M. BURNS, B.S. (Colorado Univ.-Boulder), M.A. (Univ. of Northern Colorado-Greeley), Ph.D. (O.S.U.); **Associate Professor and Interim Associate Dean of Home Economics Cooperative Extension**; 1983.
- DAVID R. BUTLER, B.A. (Univ. of Nebraska-Omaha), M.A. (ibid), Ph.D. (Univ. of Kansas); *Assistant Professor of Geography*; 1982.
- DIANA M. BYRD, B.S. (Memphis State), M.S. (ibid), Ph.D. (ibid); *Assistant Professor of Psychology*; 1982.
- JOSEPH F. BYRNES, B.A., B.D. (Montfort Seminary), M.S. (University of Notre Dame at Chicago), Ph.D. (Univ. of Chicago); *Associate Professor of Religious Studies*; 1981, 1976.
- LORA BELLE CACY, B.S. (O.S.U.), M.S. (ibid), Ed.D. (ibid); **Associate Professor of Home Economics Education**; 1972, 1963.
- MARGARET S. CALLSEN, B.A. (Concordia College), M.S. (Univ. of Wisconsin), Ph.D. (Kansas State Univ.); **Associate Professor of Home Economics Education**; 1977, 1973.
- RAYMOND E. CAMPBELL, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Kansas State Univ.); *Associate Professor of Horticulture*; 1977, 1974.
- CHESTER E. CANADA, B.S. (Univ. of Louisville), M.S. (ibid), Ph.D. (Univ. of Arkansas); *Associate Professor of Civil Engineering*; 1981.
- LOWELL CANEDAY, B.A. (Le Tourneau College), M.A. (Univ. of Wyoming), Ph.D. (Univ. of Minnesota); *Assistant Professor of Health, Physical Education and Leisure Services*; 1981.
- BRIAN J. CARTER, B.S. (Rutgers Univ.), M.S. (Penn State Univ.), Ph.D. (ibid); *Assistant Professor of Agronomy*; 1982.
- TRACY S. CARTER, B.S. (Iowa State Univ.), M.S. (Michigan State Univ.), Ph.D. (ibid); *Adjunct Assistant Professor of Biological Sciences*; 1978.
- CHARLES W. CHEAPE, B.A. (Univ. of Virginia), M.A. (Brandeis Univ.), Ph.D. (ibid.); *Assistant Professor of History*; 1983.
- HELEN NEELY CHEEK, B.A. (Arizona State Univ.) M.A. (ibid), Ph.D. (ibid); *Assistant Professor of Curriculum and Instruction*; 1980.
- ARTHUR W. CLEAVES, A.B. (Brown Univ.), M.A. (Univ. of Texas at Austin), Ph.D. (ibid); *Assistant Professor of Geology*; 1981.
- KARL WARREN CLONINGER, B.S. (Univ. of Alabama), M.S. (Univ. of Oregon), Ph.D. (ibid); *Assistant Professor of Health, Physical Education, and Leisure Services*; 1982.
- SAMUEL W. COLEMAN, B.S. (Univ. of Tennessee), M.S. (ibid), Ph.D. (ibid); *Assistant Professor for USDA, SEA at El Reno, OK*; 1976.
- MARTHA W. COMBS, B.A. (Univ. of Florida), M.Ed. (ibid.), Ed.D. (ibid.); *Assistant Professor of Curriculum and Instruction*; 1983.

- BRIAN J. CONREY, B.S. (Univ. of Santa Clara), Ph.D. (Univ. of Michigan); Assistant Professor of Mathematics; 1983.
- HYLA S. CONVERSE, B.A. (Smith College), B.D. (Union Theological Seminary), Ph.D. (Columbia Univ.); Professor of Religious Studies; 1978, 1968.
- GEORGE EARL COOK, B.S. (O.S.U.), M.S. (ibid); Associate Professor of Agricultural Engineering; 1977, 1952.
- KENNETH COX, B.A. (Lindenwood College), M.A. (Univ. of Nebraska), Ph.D. (Univ. of Nebraska); Associate Professor of Theatre; 1977, 1970.
- R. JEWELL CRABTREE, B.S. (Univ. of Missouri), M.S. (Iowa State Univ.), Ph.D. (Michigan State Univ.); Associate Professor of Agronomy; 1981, 1975.
- JAMES E. CREED, B.S. (Univ. of Missouri, Columbia), M.S. (Colorado State Univ.), D.V.M. (Univ. of Missouri, Columbia); Professor of Dept of Veterinary Medicine and Surgery; 1982.
- JERRY D. CROFT, B.A. (O.S.U.), M.A. (Kansas State Univ.), Ed.D. (Univ. of Tulsa); Associate Professor of Geography; 1976, 1966.
- RICHARD LEE CUMMINS, B.S. (Univ. of Illinois), M.S. (ibid), Ph.D. (ibid); Associate Professor of Electrical and Computer Engineering; 1979, 1963.
- GERRIT CUPERUS, B.S. (Univ. of Minn.-Morris), M.S. (Univ. of Minn.-St. Paul), Ph.D. (ibid); Assistant Professor of Entomology; 1982.
- PAUL CZARNIECKI, B.S. (Univ. of Wisconsin-River Falls), M.S. (Univ. of Wisconsin), Ed.D. (O.S.U.); Assistant Professor of Agricultural Education; 1977, 1976.
- JAMES A. DAVIS, B.A. (Stephen F. Austin State Univ.), M.A. (Miami Univ.), Ph.D. (ibid); Assistant Professor of Political Science; 1980, 1978.
- JERRY G. DAVIS, B.A. (Central State Univ.), M.Ed. (ibid), Ph.D. (Ohio State Univ.); Assistant Professor of Occupational and Adult Education; 1981.
- JERRY L. DAVIS, B.S. (Kansas State College at Pittsburg), M.A. (Univ. of Kansas), Ph.D. (ibid); Professor and Technical Director of University Theatre; 1981, 1971.
- CHARLES EDWARD DENMAN, B.S. (O.S.U.), M.S. (Utah State Univ.); Associate Professor of Agronomy; 1971, 1949.
- JOHN J. DEVENY, B.A. (State Univ. of New York-Buffalo), Ph.D. (Univ. of Florida); Associate Professor of Foreign Languages; 1976, 1971.
- JOHN MILTON DILLARD, B.S. (Wilberforce Univ.), Ed.M. (State Univ. of New York), Ph.D. (ibid); Associate Professor of Applied Behavioral Studies; 1976.
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- HOWARD A. L. GREER, B.S. (Berea College), M.S. (Univ. of Kentucky), Ph.D. (Iowa State Univ.); *Professor of Agronomy*; 1974, 1965.
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- ELIZABETH M. HOLT, B.A. (Smith College), Ph.D. (Brown Univ.); *Associate Professor of Chemistry*; 1983, 1980.
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- ROBERT K. HUGHES, B.S. (The Citadel), M.S. (O.S.U.), Ph.D. (ibid); *Professor and Head of Civil Engineering*; 1983.
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- WILLIAM L. JOHNSTON, B.S. (Illinois State Univ.), M.S. (Univ. of Illinois), Ed.D. (ibid); *Professor of Housing, Design and Consumer Resources*; 1983, 1977.
- LAURA DUNN JOLLY, B.S. (Univ. of Mississippi), M.S. (O.S.U.), Ph.D. (ibid); *Assistant Professor of Clothing, Textiles and Merchandising*; 1983, 1980.
- EUGENE M. JONES, D.V.M. (Cornell Univ.); *Professor of Veterinary Medicine and Surgery*; 1969, 1965.
- THOMAS D. JORDAN, B.S.A.E. (Tri-State Univ.), M.S. (O.S.U.), (ibid); *Assistant Professor of Civil Engineering*; 1978.
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- PAUL EDWARD JUNIEWICZ, B.S. (Rutgers Univ.), M.S. (North Carolina State), Ph.D. (ibid); *Assistant Professor of Animal Science*; 1982.
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- MARILYN G. KLETKE, B.A. (The Colorado College), M.S. (Iowa State Univ.), Ph.D. (O.S.U.); *Assistant Professor of Management*; 1981.
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- DIANNA LEE NEWMAN, B.A., (Nebraska Wesleyan Univ.), M.A. (Univ. of Nebraska), Ph.D. (ibid); *Assistant Professor of Applied Behavioral Studies*; 1982.
- HUNG THIEN NGUYEN, B.S. (Pennsylvania State Univ.), M.S. (ibid), Ph.D. (Univ. of Missouri-Columbia); *Assistant Professor of Agronomy*; 1982.
- ROBERT LEE NOBLE, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Kansas State Univ.); *Professor of Animal Science*; 1966, **1949**.
- GEORGE H. OBERLE, B.S. (Earlham College), M.S. (Butler Univ.), Ed.D. (Indiana Univ.); *Professor and Director of the School of Health, Physical Education and Leisure Services*; 1976, 1974.
- GAROLD D. OBERLENDER, B.S. (O.S.U.), M.S. (O.S.U.), Ph.D. (Univ. of Texas); *Professor of Civil Engineering*; 1978, 1974.
- FAYNE H. OBERST, D.V.M. (Kansas State Univ.), M.S. (Cornell Univ.), Diplomate (The American College of **Theriogenologist-Specialty** Board in Veterinary Medicine); *Professor and Head of the Department of Veterinary Medicine*; 1974.
- MARSHALL C. OLDS, A.B. (Colgate Univ.), Ph.D. (Case Western Reserve Univ.); *Assistant Professor of Foreign Languages and Literatures*; 1983.
- JAMES W. OLTJEN, B.S. (Kansas State Univ.), M.S. (ibid.), Ph.D. (Univ. of California-Davis); *Assistant Professor of Animal Science*; 1983.
- ARLYN ORR, B.Arch. (O.S.U.), M.Arch.E. (ibid); *Professor Architecture*; 1973.
- RICHARD A. ORTEZ, B.S. (Creighton Univ.), M.S. (ibid), Ph.D. (ibid); *Assistant Professor of Botany and Microbiology*; **1982**.
- JERRY STEVE OWNBY, B.S. (O.S.U.), M.S. (Kansas State Univ.), (ibid); *Professor of Horticulture*; 1977, 1965.
- J. MACK OYLER, D.V.M. (O.S.U.), Ph.D. (ibid); *Professor of Veterinary Medicine and Surgery*; 1980.
- PHILIP E. PAULIN, B.A. (Univ. of Kentucky), M.A. (ibid), Ed.D. (O.S.U.); *Associate Professor of Journalism and Broadcasting*; 1980, 1971.
- CLAUDIA J. PECK, B.S. (Univ. of Oklahoma), M.S. (Univ. of Missouri), Ph.D. (Iowa State Univ.); *Assistant Professor of Housing, Design and Consumer Resources*; 1981.
- LARRY C. PENDLUM, B.S. (Morehead State Univ.), M.S. (Univ. of Kentucky), Ph.D. (ibid); *Adjunct Research Scientist for USDA, SEA at El Reno, OK11978*.
- ARTHUR PENTZ, B.S. (Bloomsburg State College), M.Ed. (ibid), Ph.D. (Penn State Univ.); *Assistant Professor of Speech Pathology*; 1982.
- DAVID W. PERRIN, B.A. (Davidson College), M.S. (Ft. Hays State College), Ph.D. (Univ. of Iowa); *Adjunct Assistant Professor of Applied Behavioral Studies and Assistant to the Vice-President for University Relations, Development and Extension*; 1982, 1975.
- KATY M. PERRY, B.S. (Bishop College), M.Ed. (Southeastern OSU), Ph.D. (O.S.U.); *Assistant Professor of Applied **Behavioral Studies***; 1983, 1979.
- DUANE RUSSELL PETERSON, D.V.M. (Kansas State Univ.), M.S. (ibid); *Professor of Physiological Sciences*; 1971, 1948.
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- JOAN K. PIERSON, B.S. (Emporia State Univ.), M.S. (ibid), Ed.D. (O.S.U.); *Assistant Professor of Administrative Services and Business Education;* 1982, 1981.
- GEOFFREY PILL, B.A. (Oxford Univ.), M.A. (ibid), D-es-L (Grenoble); *Professor of Foreign Languages and Director of Curricular Affairs and Honors Program in the College of Arts and Sciences;* 1976, 1964.
- KENNETH N. PINKSTON, B.S. (O.S.U.), Ph.D. (ibid); *Associate Professor of Entomology;* 1983, 1970.
- ARTHUR J. POLLARD, B.S. (Duke Univ.), Ph.D. (Cambridge Univ.); *Assistant Professor of Botany;* 1981.
- JOHN A. POLONCHEK, B.A. (Northwestern Univ.), M.S. (Georgia Institute of Technology), Ph.D. (ibid.); *Assistant Professor of Finance;* 1983.
- WAYNE B. POWELL, B.S. (Texas Luthern College), M.S. (Texas A. & M.) Ph.D. (Tulane Univ.); *Assistant Professor of Mathematics;* 1980.
- EDWARD OLLINGTON PRICE, III, B.A. (Texas A. & M. Univ.), Ph.D. (ibid); *Assistant Professor of Economics;* 1979.
- JAMES MANUEL PRICE, B.S. (Univ. of Oklahoma), M.A. (ibid), B.A. (ibid), Ph.D. (ibid); *Assistant Professor of Psychology;* 1979, 1977.
- JACK W. PRITCHARD, B.S. (O.S.U.), M.S. (ibid); *Professor of Agricultural Education;* 1976, 1968.
- ZANE K. QUIBLE, B. S. (Univ. of Nebraska-Lincoln), M.Ed. (ibid), Ph.D. (Michigan State Univ.); *Associate Professor of Administrative Services;* 1983, 1981.
- RANDALL C. REININGER, B.S. (Texas Tech. Univ.), M.Engr. (ibid), Ph.D. (ibid); *Assistant Professor of Electrical and Computer Engineering;* 1983.
- ROBERT FRED REISBECK, B.S. (Colorado State Univ.), M.S. (O.S.U.), Ed.D. (ibid); *Assistant Professor of Agricultural Education;* 1981, 1966.
- JEANINE N. RHEA, B.S. (Univ. of Nebraska), M.Ed. (Memphis State Univ.), Ed.D. (O.S.U.); *Associate Professor of Administrative Services and Business Education;* 1981, 1976.
- LAWRENCE RICE, B.S. (Colorado State Univ.), M.S. (ibid), D.V.M. (ibid); *Professor of Veterinary Medicine and Surgery;* 1981, 1976.
- DAVID W. ROBINSON, B.S. (O.S.U.), M.F. (North Carolina State Univ.), Ed.D. (O.S.U.); *Professor of Forestry;* 1976, 1962.
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- RICHARD CARLTON ROHRS, B.A. (Bucknell Univ.), M.A. (Univ. of Nebraska), Ph.D. (ibid); *Associate Professor of History;* 1982, 1976.
- LESTER L. ROLF, JR., B.A. (St. Mary's Univ.), M.S. (Texas A.&M. Univ.), Ph.D. (ibid); *Assistant Professor of Physiological Sciences;* 1974.
- LOREN ROMMANN, B.S. (South Dakota State Univ.), Ph.D. (ibid); *Professor and Extension Specialist of Agronomy;* 1979, 1970.
- WILLIAM JAMES RUGG, B.A. (Barrington College), M.S. (Utah State Univ.), Ph.D. (Univ. of Mississippi); *Associate Professor of Journalism and Broadcasting;* 1982.
- ANNE CHRISTINE RUSOFF, B.A. (Univ. of Montana), Ph.D. (Univ. of Colorado); *Assistant Professor of Physiological Sciences;* 1980.
- JAMES R. RUSSELL, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Virginia Polytechnic Institute and State Univ.) *Assistant Professor of Agricultural Economics;* 1981.
- DELBERT LEROY RUTLEDGE, B.S. (Univ. of New Mexico), M.S. (O.S.U.), Ed.D. (ibid); *Professor of Physics;* 1972, 1957.

- MARK R. SANBORN, B.A. (Univ. of Northern Iowa), M.A. (ibid), (Iowa State Univ.); *Associate Professor of Microbiology*; 1983, 1976.
- SUBBIAH SANGIAH, B.V.Sc. (Univ. of Madras), M.Sc. (ibid), Ph.D. (Purdue Univ.); *Assistant Professor of Physiological Sciences*; 1981.
- HAROLD VICTOR SARE, B.A. (O.S.U.), M.A. (ibid); *Regents Professor and Head of the Department of Political Science*; 1982, 1963.
- W. KEITH SCEARCE, B.S. (Virginia Polytechnic Inst. and State Univ.) M.S. (ibid), Ph.D. (ibid); *Associate Professor of Agricultural Economics*; 1982.
- RAYMOND JOE SCHATZER, B.S. (Univ. of Missouri-Columbia), M.S. (ibid), Ph.D. (Iowa State Univ.); *Assistant Professor of Agricultural Economics*; 1983.
- DOROTHY L. SCHRADER, B.A. (Agnes Scott College), M.A. (Middlebury College), Ph.D. (Florida State Univ.); *Licence-es-lettres (Univ. de Paris III)*; *Associate Professor of French*; 1982, 1977.
- JOHN LOUIS SCHWEITZER, B.F.A. (Univ. of Arizona), M.A. (ibid) M.A. (Univ. of Michigan); *Associate Professor of Foreign Languages*; 1965, 1959.
- MARJORIE M. SCHWEITZER, B.A. (Univ. of Colorado), M.A. (Univ. of Arizona) Ph.D. (Univ. of Oklahoma); *Assistant Professor of Anthropology*; 1982, 1972.
- WALTER GAYLORD SCOTT, B.A. (Baylor Univ.), B.D. (Southwestern Baptist Theological Seminary), Th.M. (ibid) M.A. (Baylor Univ.), Ph.D. (Johns Hopkins Univ.) *Associate Professor of Philosophy*; 1970, 1960.
- MAYIS SEAPAN, B.S. (Univ. of Tehran), M.S. (Univ. of Texas), (ibid); *Associate Professor of Chemical Engineering*; 1984, 1980.
- EMIL EDWARD SEBESTA, B.S. (South Dakota A.&M. College), M.S. (O.S.U.), Ph.D. (Cornell Univ.); *Professor of Agronomy*; 1961, 1951.
- RAMESH SHARDA, B.Ed. (Univ. of Udaipur), M.S. (Ohio State Univ.), M.B.A. (Univ. of Wisconsin-Madison), Ph.D. (O.S.U.); *Assistant Professor of Management*; 1980.
- RAVI SHEOREY, B.A. (Univ. of Nagpur, India), M.A. (Univ. of Texas a Austin), Ph.D. (ibid); *Assistant Professor of English*; 1981.
- JOHN L. SHERWOOD, B.S. (College of William and Mary), M.S. (Univ. of Maryland), Ph.D. (Univ. of Wisconsin); *Assistant Professor of Plant Pathology*; 1982, 1981.
- PHILLIP L. SIMS, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Utah State Univ.); *Adjunct Associate Professor of Agronomy*; 1977.
- LARRY L. SINGLETON, B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. Minnesota); *Associate Professor of Plant Pathology*; 1981, 1976.
- D. SCOTT SINK, B.S.I.E. (Ohio State Univ.), M.S.I.E. (ibid), (ibid); *Associate Professor of Industrial Engineering and Management*; 1982, 1978.
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- THOMAS J. SMITH, B.S. Ed. (East Central Oklahoma State Univ.); M.S. (O.S.U.), Ed. D. (ibid); *Professor of Educational Administration and Higher Education*; 1979.
- BRENT M. SNOW, B.S. (Brigham Young Univ.), M.S. (O.S.U.), Ph.D. (Univ. of Idaho); *Associate Professor of Psychology*; 1983, 1979.
- JOHN BRUCE SOLIE, B.S. (Univ. of Maryland), J.D. (Creighton Univ.), Ph.D. (Univ. of Nebraska); *Assistant Professor of Agricultural Engineering*; 1982.

- SHERRY G. SOUTHARD, B.S. (Purdue Univ.), M.A. (ibid), Ph.D. (ibid); *Assistant Professor of English*; 1981.
- STEPHEN JOHN STADLER, B.S.Ed. (Miami University), M.A. (ibid), Ph.D (Indiana State University); *Assistant Professor of Geography*; 1980.
- MICHAEL EDWARD STANO, B.A. (Univ. of Nevada-Reno), M.A. (Univ. of Colorado), Ph.D. (Univ. of Minnesota); *Associate Professor of Speech Communication*; 1982, 1977.
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- WILLIAM H. STEWART, B.A. (Univ. of Oklahoma), M.A. (ibid), Ph.D. (Oregon State Univ.); *Assistant Professor of Statistics*; 1978.
- JAMES H. STIEGLER, B.S. (Texas A. & I. Univ.), M.S. (O.S.U.), Ph.D. (Virginia Polytechnic Inst.); *Professor of Agronomy*; 1983, 1973.
- JAMES H. STINE, B.A. (O.S.U.), M.S. (ibid); *Associate Professor of Geography*; 1976, 1957.
- MARVIN L. STONE, B.S. (Colorado State Univ.) M.S. (ibid), Ph.D. (Washington State Univ.); *Assistant Professor of Agricultural Engineering*; 1982.
- LOUIE G. STRATTON, D.V.M. (O.S.U.), Ph.D. (O.S.U.); *Professor of Veterinary Medicine and Surgery and Director of the Boren Veterinary Medical Teaching Hospital*; 1979, 1973.
- FRANCES I. STROMBERG, B.A. (O.S.U.) M.S. (ibid), Ph.D. (Florida State Univ.); *Professor and Head of the Department of Family Relations and Child Development*; 1976, 1967.
- TANA WOOD STUFFLEBEAN, B.S. (O.S.U.), M.E. (Central State Univ.), Ph.D. (O.S.U.); *Assistant Professor of Clothing, Textiles and Merchandising*; 1980, 1979.
- ROY V. STURGEON, JR., B.S. (O.S.U.), M.S. (ibid), Ph.D. (Univ. of Minnesota); *Professor of Plant Pathology*; 1975, 1961 (1964-65).
- JAMES D. SUMMERS, B.S. (Univ. of Missouri), M.S. (ibid), Ph.D. (Univ. of Nebraska); *Assistant Professor of Agricultural Engineering*; 1982.
- GARRETT S. SYLVESTER, B.S.E.-E.E. (Princeton Univ.), Ph.D. (Massachusetts Inst. of Technology); *Assistant Professor of Mathematics*; 1979.
- JOHN ANDREW SYLVESTER, A.B. (Harvard Univ.), M.A. (Univ. of Wisconsin), Ph.D. (ibid); *Associate Professor of History*; 1970, 1966.
- LARRY GENE TALENT, B.A. (California State Univ.), M.A. (ibid), Ph.D. (Oregon State Univ.); *Assistant Professor of Zoology*; 1980.
- JOHN BRUCE TATE, B.S. (O.S.U.), M.S. (ibid), Ed.D. (Texas A.&M. Univ.); *Associate Professor of Industrial Arts Education*; 1971, 1947.
- CHARLES G. TAUER, B.S. (Univ. of Minnesota), M.S. (ibid), Ph.D. (ibid); *Associate Professor of Forestry*; 1980, 1976.
- ROBERT G. TEETER, B.S. (O.S.U.), M.S. (Univ. of Illinois), Ph.D. (O.S.U.); *Assistant Professor of Animal Science*; 1980, 1977.
- DONALD A. TENNANT, B.A. (Kansas State Univ.), Ph.D. (Washington State Univ.); *Assistant Professor of Sociology*; 1970.

- JAMES STEEL THAYER, B.A. (Indiana Univ.), M.A. (ibid), M.T.S. (Harvard Univ.), Ph.D. (Univ. of Michigan); *Assistant Professor of Religious Studies*; 1981.
- FLINT OWEN THOMAS, B.S. (Indiana State Univ.), M.S. (Purdue Univ.), Ph.D. (ibid); *Assistant Professor of Mechanical and Aerospace Engineering*; 1983.
- MARY ANN E. THOMPSON, B.S. (Texas Woman's Univ.), M.Ed. (Central State Univ., Oklahoma), Ed.D. (O.S.U.); *Assistant Professor of Health, Physical Education and Leisure Services*; 1979, 1976.
- JOHN W. THORNTON, B.S. (O.S.U.), Ph.D. (Univ. of Washington); *Professor of Zoology*; 1974, 1960.
- SHARILYN THORESON, B.S. (Luther College), M.S. (Iowa State Univ.), Ph.D. (ibid); *Assistant Professor of Computing and Information Science*; 1981.
- THOMAS F. TICE, B.A. (Bethany College), M.S. (Kansas State Univ.), Ph.D. (Purdue Univ.); *Assistant Professor of Agricultural Economics*; 1979.
- MARCIA TILLEY, B.S. (Iowa State Univ.), M.S. (Univ. of Florida), J.D. (ibid); *Assistant Professor of Agricultural Economics*; 1982.
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- DAVID C. ULLRICH, B.A. (Univ. of Wisconsin-Madison), M.A. (ibid.), Ph.D. (ibid.); *Assistant Professor of Mathematics*; 1983.
- EARL N. VAN EATON, B.S. (Univ. of Missouri), M.Ed. (ibid), Ph.D. (ibid); *Professor of Agricultural Education and Assistant Dean of the College of Agriculture*; 1977, 1970.
- JOHN H. VEENSTRA, B.S. (Iowa State Univ.), M.S. (Univ. of Iowa), Ph.D. (ibid); *Assistant Professor of Civil Engineering*; 1980.
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- FRANZ A. VON SAUER, A.B. (Univ. of Kansas), M.A. (ibid) Ph.D. (Georgetown Univ.); *Associate Professor of Political Science*; 1975, 1969.
- JAN WAGNER, B.Ch.E. (Cleveland State Univ.), M.S. (Univ. of Alaska) M.A. (Univ. of Kansas), Ph.D. (ibid); *Associate Professor of Chemical Engineering*; 1981, 1978.
- EDWARD P. WALKIEWICZ, B.A. (Yale Univ.), M.A. (Columbia Univ.), Ph.D. (Univ. of New Mexico); *Assistant Professor of English*; 1980.
- JERRY WALKUP, B.S. (O.S.U.), M.L.A. (Kansas State Univ.); *Assistant Professor of Horticulture*; 1979.
- MICHAEL M. WARNER, B.A. (Occidental College), M.A. (Univ. of Kansas), Ph.D. (ibid); *Assistant Professor of Applied Behavioral Studies*; 1982.
- DONNA R. WATSON, B.S. (O.S.U.), M.S. (ibid), Ph.D. (in progress-Emory Univ.); *Associate Professor of Food, Nutrition and Institution Administration*; 1982.
- JOSEPH A. WEBER, B.S. (Univ. of Missouri-Columbia), M.A. (ibid), Ph.D. (O.S.U.); *Assistant Professor of Family Relations and Child Development*; 1981.
- EDGAR L. WEBSTER, B.A. (Carson-Newman College), Ph.D. (Univ. Tennessee); *Assistant Professor of Sociology*; 1971, 1968.
- ROBERT F. WEIR, B.A. (McMurry College), B.D. (Emory Univ.), M.A. (Princeton), Ph.D. (ibid); *Associate Professor of Religious Studies*; 1977, 1973.
- DAN WESLEY, B.A. (Berea College), M.S. (Boston Univ.), M.A. (George Peabody College for Teachers), Ed.D. (O.S.U.); *Professor of Sociology and Director of Arts and Sciences Student Services*; 1969, 1960.

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- JAMES D. WHITE, B.S. (O.S.U.), M.S. (ibid), Ed.D. (ibid; *Assistant Professor of Agricultural Education*; 1979, 1976.
- JOSHUA LYLE WIENER, B.A. (Hiram), Ph.D. (Univ. North Carolina-Chapel Hill); *Assistant Professor of Marketing*; 1983.
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- ERIC IDWAY WILLIAMS, M.R.C.V.S. (Royal Veterinary College), F.R.C.V.S. (Royal College of Veterinary Surgeons), M.S.(O.S.U.); *Professor of Veterinary Medicine and Surgery and Director of Admissions and Student Affairs*; 1974, 1961.
- ERVIN WILLIAMS, JR., B.S. (Kansas State Univ.), M.S. (ibid), Ph.D. (O.S.U.); *Associate Professor of Plant Pathology*; 1979, 1969.
- ROBERT A. WILLS, B.S. (Univ. of Oklahoma), M.S. (ibid), Ph.D. (ibid); *Assistant Professor of Chemical Engineering*; 1981.
- LINDA J. WILLSON, B.S. (West Texas State Univ.), M.S. (ibid), Ph.D. (O.S.U.); *Assistant Professor of Statistics*; 1981.
- BRUCE N. WILSON, B.S.A.E. (Univ. of Minnesota), M.S.A.E. (ibid.), Ph.D. (Univ. of Kentucky); *Assistant Professor of Agricultural Engineering*; 1983.
- PAULINE WINTER, B.S. (Texas Women's Univ.), M.A. (ibid); *Associate Professor of Health, Physical Education and Leisure Services and Chairman of the Department of Leisure Services*; 1970, 1965.
- TIMOTHY A. WITTIG, B.S. (So. Dakota State Univ.), M.S. (Michigan State Univ.), Ph.D. (ibid.); *Assistant Professor of Statistics*; 1982.
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- BILL C. WRIGHT, B.S. (Mississippi State Univ.), M.S. (ibid), Ph.D. (Cornell Univ.); *Professor of Agronomy and Assistant Dean*; 1983.
- CHARLOTTE J. WRIGHT, B.B.A. (Univ. of Texas-Arlington), M.P.A. (ibid), Ph.D. (North Texas State Univ.); *Assistant Professor of Accounting*; 1982.
- JAMES C. WRIGHT, B.S. (Virginia Polytechnic Inst.), D.V.M. (Univ. of Georgia), M.S. (Univ. of Missouri), Ph.D. (ibid); *Assistant Professor of Veterinary Parasitology, Microbiology and Public Health*; 1981.
- DAVID YELLIN, B.A. (Gettysburg College), M.A. (New York Univ.), Ph.D. (Arizona State Univ.); *Associate Professor of Curriculum and Instruction*; 1982, 1978.
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- GARY E. YOUNG, B.S. (Univ. of California-Davis), M.S. (ibid), Ph.D. (Univ. of California-Berkeley); *Assistant Professor of Mechanical and Aerospace Engineering*; 1982.
- MICHAEL TERRANCE ZAVY, B.S. (Cornell Univ.), M.S. (Univ. of Florida), Ph.D. (ibid); *Assistant Professor of Animal Science*; 1983.
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- FREDERICK M. BLACK, B.S. (O.S.U.), M.S. (ibid); *Assistant Professor Emeritus of Business Administration*; 1979, 1953.
- JULIAN H. BRADSHAW, A.B. (Univ. of South Carolina), M.A. (Univ. of Colorado), Ph.D. (Univ. of California); *Professor Emeritus of Economics*; 1977, 1948.
- RALPH A. BRANN, B.S. (Bethel College), M.S. (O.S.U.), Ed.D. (ibid); *Professor Emeritus of Educational Administration and Higher Education*; 1979, 1964.
- RAYMOND E. CHAPEL, B.S. (O.S.U.), M.S. (ibid); *Professor Emeritus of Mechanical and Aerospace Engineering and Director of Engineering Research and Budget*; 1978, 1947.
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- 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.
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- 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.
- 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. (Teacher 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 CHARGES 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.
- MARY E. LEIDIGH, B.S. (Texas Technological College), M.S. (Univ. of Texas); *Professor Emeritus of Food, Nutrition and Institution Administration*; 1977, 1945.
- 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.
- MARK K. MACNEIL, B.A. (Univ of Oklahoma), M.A. (ibid), Ph.D. (ibid) *Associate Professor Emeritus of Psychology*; 1968, 1966.
- 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.
- J. BROWN MORTON, B.S. (O.S.U.), M.S. (ibid) Ed.D. (ibid); *Associate Professor Emeritus of Occupational and Adult Education*; 1978, 1971.
- LOU S. MORRISON, B.S. (O.S.U.), M.S. (ibid); *Assistant Professor Emeritus of Plant Pathology*; 1948, 1971.
- JOHN DAVIS NAFF, B.S. (Univ. of Alabama), M.S. (ibid), Ph.D. (Univ. of Kansas); *Professor Emeritus of Geology*; 1981, 1949.
- ALEX R. ROSS, B.A. (Colgate Univ.), M.A. (Univ. of Michigan), Ph.D. (ibid); *Professor Emeritus of Geology*; 1957, 1950.
- DAVID ADOLF SANDER, B.S. (Univ. of Nebraska), M.S. (ibid), Ph.D. (Purdue Univ.); *Professor Emeritus of Agronomy*; 1971, 1957.
- DOROTHY SAVILLE, B.S. (Univ. of Missouri), M.S. (Kansas State Univ.); *Professor Emeritus of Clothing, Textiles and Merchandising*; 1971, 1937.
- 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, North Carolina), 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.
- HOBART E. STOCKING, B.A. (Johns Hopkins Univ.), Ph.D. (Univ. of Chicago); *Professor Emeritus of Geology*; 1972, 1959.
- JAMES CURTIS STRATTON, B.A. (Univ. of Colorado), M.S.J. (Northwestern Univ.); *Associate Professor Emeritus of Journalism and **Broadcasting***; 1974, 1948.
- WARREN E. TAYLOR, B.S. (O.S.U.), M.S. (ibid); *Associate Professor Emeritus of Agricultural Engineering*; 1981, 1952.
- HOUSTON EVERETT WARD, **B.S. (O.S.U.)**, M.S. (ibid), Ph.D. (ibid); *Professor Emeritus of Agricultural Economics*; 1977, 1935.

CHRIS G. WHITE, B.S. (O.S.U.), M.S. (ibid); *Assistant Professor Emeritus of Agricultural Education*; 1968, 1938.

VICTOR WOLFRAM, B.S. (Julliard School of Music), M.S. (ibid); *Professor Emeritus of Music*; 1966, 1960.

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

William J. Nelson, Ph.D., Assistant Director for Instruction

Lester E. Hunter, M.Ed., Assistant Director for Student Affairs

Don E. Connel, M.N.S., Director for Special Services

Carla C. Splaingard, M.Ed., Director of Admissions and Registrar

Stanley Tipton, B.B.A., Director of Computer Services

Lyn Hester, B.S., Director of Industrial/Business Outreach and Coordinator of Public Relations

Merle R. Long, Ed.D., Director of Learning Resources

Jack Qualls, B.Arch.E., Director of Physical Plant Services

Dewey A. Yeager, Ed.D., Director of Telecommunications

Beverly J. Sloan, A.S., Coordinator of Admissions and Records

Ruthelma Crumley, Coordinator of Alumni and Placement Services

Judy Determan, Coordinator of Continuing Education

Patricia F. Reeves, M.Ed., Coordinator of Counseling Services

Gloria R. Derby, B.S., Coordinator of Financial Aid

Jo Ella Flinton, Coordinator of Student Activities (acting)

Uville W. Ogle, M.Ed., Manager, Bookstore

Department Heads

Accounting Technology, Ura Lee Denson, M.S.

Architectural/Construction Technology, Dale C. Delano, M.Arch.E.

Civil Technology, Dale C. Delano, M.Arch.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, Mary Ann Haliburton, M.S.

Industrial Technology, Russell L. Kline, M.Ed.

Instrumentation Technology, Phil Condrey, B.S.

Mathematics/Science, Larry Somers, M.S.

Nursing, Margaret Brock, M.S.N.

Oil and Gas Field Management, Herschel Deibel, M.S.(acting)

Police Science, Jim Swindall, M.A.(acting)

Surveying Technology, Dale C. Delano, M.Arch.E.

Technical Writing, Bea Sprouse, M.A.

Transportation and Traffic Management, Dale Fredericksen, Ed.D. (acting)

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 communication electronics, biomedical electronics or microcomputer electronics; fire protection technology with emphasis in either fire protection or municipal fire protection; general engineering technology; horticulture technology; industrial technology with emphasis in drafting; instrumentation technology with emphasis in air-conditioning and refrigeration; nurse science; oil and gas field management; police science; surveying technology and technical writing; and transportation and traffic management.

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 transferrable to bachelor's degree programs.

Methods of teaching are direct, with a strong emphasis on laboratory applications and somewhat less stress on 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 and 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 more information and/or a catalog about the Oklahoma State University Technical Institute in Oklahoma City, contact the Office of Admissions and Records, 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 3.4, *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*.

Prerequisites(s). Prerequisites from the same department as the course being described are listed first, with no departmental abbreviation and in increasing numerical order. If from another department, that departmental abbreviation must precede the number of the prerequisite course. Those courses having prerequisites from both within and from outside the department bear combination entries such as *3303 and STAT 2012*. Prerequisites are listed in the following manner:

Prerequisites: A, B or C *A or B or C is acceptable*

Prerequisites: A, B and C *A and B and C are required*

Prerequisites: A, and B or C *A and either B or C*

Prerequisites: A and B, or C *Both A and B, or C required*

Prerequisites: A, or B and C *Either A or both B and C required*

Prerequisites: A or equivalent, **and B** *Both A, or the equivalent of A, and B are required*

Prerequisites: A, and B or equivalent

Both A and B, or the equivalent of B, are required

Prerequisites: A and B, or equivalents

Equivalents of both A and B are acceptable

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

Description of Course Content. The content of the course and its major emphases are described. Courses which are taught under another name and number are indicated by the statement *Same course as 0000*. Credit may not be earned *in both courses so cross-referenced*.

ABBREVIATIONS USED

A&S	Arts and Sciences	CHEM	Chemistry
ABSED	Applied Behavioral Studies in Education	CHENG	Chemical Engineering
ACCTG	Accounting	CIVEN	Civil Engineering
AEROT	Aeronautical Technology	COMSC	Computing and Information Sciences
AEROS	Aerospace Studies	CONST	Construction Management Technology
AG	Agriculture (orientation)	CTM	Clothing, Textiles and Merchandising
AGEC	Agricultural Economics	DISED	Distributive Education
AGED	Agricultural Education	EAHED	Educational Administration and Higher Education
AGEN	Agricultural Engineering	ECON	Economics
AGRON	Agronomy	EDUC	Education
ANSI	Animal Sciences/Industry	EET	Electronics Engineering Technology
ANTH	Anthropology	ECEN	Electrical and Computer Engineering
APR	Advertising and Public Relations	ENGL	English
ARCH	Architecture	ENGR	Engineering
ART	Art	ENGSC	Engineering Science
ASTRO	Astronomy	ENTO	Entomology
ATHL	Athletics	ENVIR	Environmental Sciences
AVED	Aviation Education	EPT	Electrical Power Technology
BIOCH	Biochemistry	FIN	Finance
BISC	Biological Science	FIRET	Fire Protection Technology
BOT	Botany	FLL	Foreign Languages and Literature
BUSAD	Business Administration	FNIA	Food, Nutrition and Institution Administration
BUSED	Business Education		
BUSL	Business Law		
CHIN	Chinese		
CIED	Curriculum and Instruction Education		

FOR	Forestry	MGMT	Management
FRCD	Family Relations and Child Development	MICRO	Microbiology
FRNCH	French	MILSC	Military Science
GENAD	General Administration	MKTG	Marketing
GENE	Genetics	MPT	Mechanical Power Technology
GENEN	General Engineering	MUSIC	Music
GENT	General Technology	NATSC	Natural Sciences
GEOG	Geography	OAED	Occupational and Adult Education
GEOL	Geology	OFFMG	Office Management
GRAD	Graduate	PE	Physical Education
GREEK	Greek	PET	Petroleum Technology
GRMN	German	PHILO	Philosophy
HEC	Home Economics	PHSI	Physiological Sciences
HEECS	Home Economics Education and Community Services	PHYSC	Physics
HIDCS	Housing, Interior Design and Consumer Studies	PLP	Plant Pathology
HIST	History	POLSC	Political Science
HORT	Horticulture	PSYCH	Psychology
HPELS	Health, Physical Education and Leisure Sciences	REL	Religious Studies
HLTH	Health	RNT	Radiation and Nuclear Technology
HRAD	Hotel and Restaurant Administration	RTVF	Radio-Television-Film
HUMAN	Humanities	RUSS	Russian
IAED	Industrial Arts Education	SOC	Sociology
INDEN	Industrial Engineering and Management	SOCSC	Social Science
ITAL	Italian	SPAN	Spanish
JAPAN	Japanese	SPATH	Speech Pathology
JM	Journalism	SPCH	Speech
LA	Landscape Architecture	STAT	Statistics
LATIN	Latin	TECED	Technical Education
LEIS	Leisure Sciences	TH	Theatre
LIBSC	Library Science	TIED	Trade and Industrial Education
MAE	Mechanical and Aero- space Engineering	UNIV	University
MATH	Mathematics	VANAT	Veterinary Anatomy
MC	Mass Communications	VMED	Veterinary Medicine
MTCL	Medical Technology	VMS	Veterinary Medicine and Surgery
MECAG	Mechanized Agriculture	VPARA	Veterinary Parasitology, Microbiology and Public Health
MECDT	Mechanical Design Technology	VPATH	Veterinary Pathology
MFGT	Manufacturing Technology	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 percent. 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.
- 3013 Fundamentals of Federal Taxation I.** Prerequisite: 6 semester credit hours in accounting. Federal income tax and its relationship to other forms of taxation; primary emphasis on determination of federal income tax liability of an individual.
- 3103* Survey of Accounting Principles.** Elementary financial and cost accounting with special emphasis on statement interpretation and industrial problems. No credit for students with credit in 2103 or 2203.
- 3203 Budgetary Control and Cost Analysis.** Prerequisites: 2203 and STAT 202k 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.
- 4010 Accounting Projects.** 1-6 credits, maximum 6. Prerequisites: Consent of instructor and 3203 and 3403. Special topics, projects and independent study in accounting.
- 4013* Federal Taxation II.** Prerequisite: 3013. Federal income tax law applicable to corporations, partnerships, trusts and estates, and other specialized topics. Primary emphasis on determining tax liability of various entities.
- 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 Non-Business, Fiduciary and Institutional Accounting.** Prerequisite: 3403 with grade of C or better. Fund and governmental accounting, bankruptcies, receiverships, estates and trusts.
- 4403* Accounting for Consolidations.** Prerequisite: 3403 with grade of C or better. Accounting for domestic and foreign operations of partnerships, joint ventures, corporate fusions, and corporate affiliations (consolidated statements); emerging issues in financial 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. Present-day multinational accounting problems, including world-wide differences in financial reporting, efforts at harmonizing these differences, and planning and control in multinational enterprises.
- 5000* Thesis.** 1-6 credits, maximum 6. For students writing reports and theses in accounting.
- 5013 Seminar in Tax Research.** Prerequisite: 3013 or consent of instructor. Development and administration of federal tax law with emphasis on the development of tax research skills.
- 5023 Seminar in Estate and Gift Taxation.** Prerequisite: 5013 or consent of instructor. Federal tax law applicable to estate and gift taxation and income taxation of estates and trusts.
- 5033 Seminar in Oil and Gas Taxation.** Prerequisite: 5013 or consent of instructor. Federal income tax laws applicable to the petroleum and other extractive industries.
- 5043 Seminar in Partnership Taxation.** Prerequisite: 5013 or consent of instructor. Federal income tax laws applicable to partners and partnerships.
- 5053* Seminar in Corporate Taxation.** Prerequisites: graduate standing and 5013 or consent of instructor. Federal income tax law applicable to corporations and to other entities in their capacity as corporate shareholders.

- 5103 Managerial Accounting.** Prerequisites: 6 credit hours of accounting 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. Prerequisite: consent of instructor. Individual work on special topics, projects, or readings selected to acquaint students with significant accounting literature.
- 5133 Seminar in Oil and Gas Accounting.** Financial accounting and reporting rules and practices in the petroleum industry.
- 5203* Seminar in Contemporary Accounting Theory I.** Prerequisites: 3203 and 3403. Origin and development of accounting and a critical study of modern accounting theory.
- 5303* Seminar in Contemporary Accounting Theory II.** Prerequisites: 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.** Prerequisite: 4503. Emphasis on auditing aspects of EDP, use of statistical sampling techniques in connection with audits of financial data, filings with the SEC and other regulatory agencies and other public accounting related topics.
- 5603* Accounting Based Information Systems.** Prerequisite: 18 credit hours of accounting including 4203. Concepts underlying the design and use of an effective accounting information system.
- 5803* Seminar in Cost-Managerial Accounting.** 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.** Prerequisite: consent of supervising professor and coordinator of graduate programs in Accounting. Methods used in research and report writing in accounting. Independent investigation and writing of an acceptable report on a topic approved by the student's supervising professor. Restricted to candidates seeking the M.S. in Accounting degree and not available to students who have credit in 5000.
- 6000* Research and Thesis.** 1-18 credits, maximum 36. Prerequisite: approval of advisory committee. For students working on the doctoral degree.
- 6110 Graduate Reading in Accounting.** 1-3 credits, maximum 10. Prerequisite: 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 Accounting Research.** Prerequisites: Doctoral student status and consent of coordinator of graduate programs in accounting. The theoretical literature and research methodology in 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 Graphic Communication.** Lab 3. Creative and practical aspects of typography, layout and design, and production of printed communication.
- 3633 Principles of Public Relations.** Prerequisite: JM 2133. Practice and techniques of public relations as a management function in business, industry, government, education, agriculture, home economics and other fields.
- 3763 Advertising Copy and Layout.** Lab 3. Prerequisites: 2013, JM 2133. Advertising copy and layout; modern merchandising methods; 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. Prerequisites: 3763, 3893. Creative strategy and execution of advertising for mass media. Problems in idea creation for advertisers; emphasis on both the written and the visual components of advertising policies.
- 4623 Advertising Campaigns.** Lab 3. Prerequisite: 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: 4663. Public relations publications planning, problem solving, management techniques, policies and case study analysis.
- 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 Public Relations Programs.** Prerequisites: 3633, JM 3090. Research, preparation and presentation of public relations campaigns. Integration of public relations principles and methods; work in teams in organizational and agency situations.

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. 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. 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. 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. 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. The military profession; civil-military interaction, framework of defense policy and formulation of defense strategy. Review of the Military Justice System.
- 4203 (S)American Defense Policy II.** Lab 1. Strategy and management of conflict including limited war, insurgency, strategic arms limitation. Formulation and implementation of US defense policy.
- 4402 Applied Officership Practicum.** Prerequisite: Consent of PAS. Students spend from two to three weeks on an Air Force base working in their intended specialty under supervision of experienced officer. Leadership and management principles applied to day-to-day experiences.
- 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)Introduction to Agricultural Economics.** Economic theory of production, marketing and consumption of agricultural products. The role and structure of agriculture in the American economy. Policies to achieve efficiency and welfare goals in agriculture.
- 2103 (S)Principles of Economics Applied to Agriculture.** Prerequisite: 1114. Macroeconomic theories: national economic problems including inflation, unemployment, and monetary and fiscal policies and their impacts on agricultural industries and farms.
- 3010 Internship In Agricultural Economics.** 1-6 credits, maximum 6. Prerequisite: Approval of internship committee and adviser. Supervised work experience with approved public and private employers in agricultural economics including banks, production credit associations, federal land banks, soil conservation service, and other agricultural related firms. Credit will not substitute for required courses.
- 3203* Agricultural Price Analysis.** Prerequisite: 1114, and Math 1213 or Agec 3213. 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.** Lab 2. Prerequisite: 1114. Indices, graphics, budgeting, discounting, basic statistical measures, use of microcomputers, and price analysis. Basic background methods for some courses involving analysis.

- 3303* Agricultural Marketing.** Prerequisites: 1114, and MATH 1213 or AGECE 3213. The marketing system, its importance to the economy and the role of the individual firm. Futures markets, hedging, and the use of decision aids.
- 3313* Agricultural Business Management and Finance.** Prerequisites: 1114, and ACCTG 2103. Managerial functions and application to agricultural firms. The acquisition, organization and management of personnel, financial assets and physical assets. Procurement and merchandizing strategies under different economic conditions. Decision-making, problem-solving and operational strategies stressed.
- 3403 Agricultural Business Records and Analysis.** Lab 2. Financial accounts, production and statistical records and their practical application to the successful management of the farm or ranch and other agricultural businesses.
- 3413 Farm and Ranch Management.Lab 2.** Prerequisites: 1114, and Math 1213 or Agece 3213. Production planning with budgeting, market planning, financial records and income tax management for the individual farm-ranch business.
- 3503* Natural Resource ECONOMICSCS.Prerequisite:** 1114. Use of economic theory to analyze natural resource problems and alternative policy solutions.
- 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 and 3303. Agricultural marketing, with emphasis on system-wide approaches. Economic tools and techniques for making decisions.
- 4323* Cooperative Organization and Management.** Prerequisite: 3303. Principles, objectives, structure and management of cooperative organizations; cooperatives in the modern economy-history, legislation and evaluation.
- 4333* Commodity Futures Markets.** Prerequisite: 3203. The nature of commodity futures markets and the mechanics of trading. Fundamentals and technical aspects of commodity prices. Basis and basis trading. Hedging and hedging strategies. Regulating commodity trading. Tax aspects. Appreciation of principles via computer game.
- 4343* International Agricultural Markets, Trade and Development.** Prerequisites: 2103 and 3303. International trade of agricultural products with emphasis on theory of trade and monetary flows, national trade policies and world market structures for agricultural products. Impacts of trade on the domestic agricultural sector and the role of trade in agricultural economics.
- 4403* Farm and Ranch Management II.** Prerequisites: 3603 and MATH 1513. Production planning with linear programming and other tools and methods of planning under uncertainty; acquisition of resources and the use of information systems in managing the individual farm-ranch business.
- 4503* Environmental Economics and Resource Development.** Prerequisites: 1114 or ECON 2123. Economic, social and political factors relating to conservation, natural resource development and environmental quality. Legislation and role of governmental agencies in resource conservation and development. Recreational, esthetic and other qualitative considerations relating to natural resources and environment.
- 4513* Farm Appraisal.** Lab 2. Prerequisite: 3413. Estimation of the market value of agricultural real estate using the three approaches to value. Evaluation of land as an agricultural investment.
- 4703* American Agricultural Policy.** Prerequisites: 1114 and upper-division standing. Economic characteristics and problems of agriculture; evolution and significance of programs and policies.
- 4723* Rural Economic Development.** Prerequisite: 1114. Concepts and theories of regional and community economics, including input-output, economic base, simulation, budget location, and routing. Oklahoma applications.
- 4902* Agricultural Economics Seminar.** Prerequisite: senior standing in agricultural economics. Contemporary problems in agricultural economics; career exploration; agriculture in the economics of the nation and the world.

- 4911 Agricultural Economics Seminar.** Prerequisite: senior standing in agriculture economics. Contemporary problems in agricultural economics; career exploration; agriculture in the economics of the nation and the world.
- 4990* Problems of Agricultural Economics.** 1-6 credits, maximum 6. Open to students with consent of instructor only. Research on special problems in agricultural economics.
- 5000* Thesis or Report in Agricultural Economics.** 1-6 credits, maximum 6. For students working for a M.S. degree in agricultural economics. Independent research and thesis under the direction and supervision of a major professor.
- 5010 Professional Experience in Agricultural Economics.** 1-6 credits, maximum 6. Prerequisites: Approval of internship committee and adviser. Supervised professional experience with approved public and private employers in agricultural economics including banks, production credit associations, federal land banks, soil conservation service, and other agricultural related firms. Credit will not substitute for required courses. Designed for Master of Agriculture program.
- 5100* Research Methodology.** 1 credit, maximum 1. Prerequisite: 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* Mathematical Economics.** Prerequisites: differential calculus and ECON 3113. Mathematical tools necessary for formulation and application of economic theory and economic models.
- 5110 Applications of Mathematical Programming.** 1-3 credits, maximum 3. The application of concepts and principles of existing linear and nonlinear programming techniques to agricultural problems.
- 5203* Advanced Agricultural Prices.** Prerequisite: STAT 4043. Demand and price structures, price discovery, time series and agricultural price research methods.
- 5303* Agricultural Market Policy and Organization.** Marketing firm decisions; structure, conduct and performance of agricultural industries; interregional trade theory; and government policies that influence decisions.
- 5313* Food Distribution Systems.** Analysis of market structure; operational and pricing efficiency; organizational and operational decision making in food distribution firms.
- 5403* Production Economics.** Prerequisite: 5103. Analysis of micro static production economics problems; factor-product, factor-factor and product-product relationships; functional forms for technical unit and aggregate production functions; maximizing and minimizing choice rules; firm cost structure; scale relationships.
- 5503 Resource Administration and Environmental Policy.** Economic analysis, particularly benefit-cost analysis is emphasized. Development and administration of environmental policies related to the quality of our environment, including land, air, water and related resources are analyzed in an economic framework.
- 5603* Advanced Agricultural Finance.** Prerequisites: 3603. 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 criteria and economic analysis to agricultural, food and rural development problems and policies.
- 5713* Rural Regional Development.** Prerequisite: 5103. Concepts delineation of problem areas; theories of regional growth as applied to rural areas; policies and developmental programs for stimulating rural development.
- 5723* Development Planning and Project Appraisal.** Economics of development; methods of development planning with special emphasis on the analysis of agricultural projects and the economics of agricultural sector planning for developing countries.
- 5733 International Agricultural Policy and Development.** 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 2365. A mathematical approach to the theory of comparative statics, risk and uncertainty, equilibrium, and welfare economics applied to agriculture.
- 6113 *** **Systems Analysis for Agriculture.** Prerequisites: 5103 and STAT 4043, knowledge of FORTRAN. Methodology of systems modeling developed. Problem definition, design of abstract models and the simulation of dynamic agricultural systems with time delays, storage, feedback and stochastic variation. Theory and application of modeling with differential equations and optimal control procedures.
- 6203** **Econometric Methods.** Prerequisites: 5103, and STAT 4203. Application of econometric techniques to agricultural economic problems, theory and estimation of structural economic parameters.
- 6213 *** **Advanced Econometrics.** Prerequisite: 6203. 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. Prerequisite: consent of instructor. Current developments in theory, techniques for evaluating marketing behavior, market legislation and market development.
- 6303** **Advanced Agricultural Marketing.** Prerequisite: 5303. Marketing theory, market structure and performance, governmental regulation and policy, and bargaining in agricultural markets.
- 6400*** **Seminar in Farm Management and Production Economics.** 1-6 credits, maximum 6. Prerequisite: 5403 or consent of instructor. Scientific research methodology applied to problems of resource efficiency.
- 6403 *** **Advanced Production Economics.** Prerequisite: 5403. Micro dynamic production economic problems; recent developments in agricultural risk 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 Rural Resource Development.** 1-6 credits, maximum 6. Frontier issues in agricultural policy and rural resource development. Recent research reports in these areas.

AGRICULTURAL EDUCATION (AGED)

- 3103 Foundations and Philosophy of Teaching Vocational Agriculture.** Prerequisites: 21 semester credit hours of agriculture with a 2.5 GPA. Roles and responsibilities of the vocational agriculture teacher; types of program offerings; steps of the teaching-learning process; place of vocational agriculture in relation to other educational programs in school systems.
- 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 Programs and Personnel of the Cooperative Extension Service.** Enabling legislation, program areas, teaching methods used, staffing patterns, funding and program administration. Special emphasis on entry level positions and responsibilities of each.

- 3510 Laboratory/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 requirements 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.
- 4300 Agricultural Education Internship.** 3-10 credits, maximum 10. Prerequisites: Professional course sequence and consent of adviser/internship coordinator. Supervised fulltime internships in approved county extension offices, businesses of governmental agencies for students preparing for agricultural education. Not intended for teacher certification. Maximum credit requires a 12-week internship in addition to a report.
- 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. 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.** 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. Teaching methods applicable to extension work, their inter-relationships and relative effectiveness. Result demonstration, method demonstration, meetings, tours, field days, exhibits, etc.
- 5402* Young Farmer Organizations.** 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: 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.** Providing for guidance of youth into farming and agricultural occupations. Sponsoring and advising youth groups; developing leadership through the local FFA chapter, 4-H Club and other youth organizations and groups.
- 5820 History, Functions and Objectives of the Extension Service.** 1-3 credits, maximum 6. History, legal status, objectives, educational philosophy, aims and objectives and functional responsibilities.

- 5822* Advanced Methods of Teaching Agriculture.** 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.** 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. 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. Research tools as aids in decision making. Literature, logic, survey techniques, research design, statistics and the computer are emphasized. Studies in vocational and technical education are reviewed and proposals for graduate research papers prepared.
- 5990* Problems in Agricultural and Extension Education.** 1-3 credits, maximum 8. Securing and analyzing data related to special problems or investigation in designated areas of agricultural education.
- 6000* Research in Agricultural Education.** 1-16 credits, maximum 16. Prerequisite: approval of major adviser. Open to students pursuing graduate study beyond the requirements for a master's degree. Independent research and thesis under the direction and supervision of a major professor.
- 6100* Developments in Agriculture and Extension Education.** 1-3 credits, maximum 6. Developing trends in agricultural and extension education. Pending and anticipated organizational and structural changes and changing emphases in goals and objectives. Functional relationships with other agencies.
- 6120* Teaching Agriculture in Higher Education.** 1-3 credits, maximum 6. The teaching-learning matrix functioning in both undergraduate and advanced study in the field of agriculture. Discriminate review and assessment of recently developed instructional methods and trends.
- 6200* County Extension Program Development.** 1-3 credits, maximum 6. A systematic study and use of methods of developing county extension programs, giving attention to sources of essential basic information, determination of problems and needs of people, functions of lay people and the various groups of extension workers. Uses of committees, step-by-step procedures, coordinated county and state plans and characteristics of effective programs.
- 6220* Assessment and Evaluation of Educational Programs in Agriculture.** 1-3 credits, maximum 6. Application of the accountability concept to educational programs. Instructional, extension and other educational programs are assessed and the systems approach used to revise current programs and re-direct effort.

AGRICULTURAL ENGINEERING (AGEN)

- 1011 Introduction to Surveying.Lab** 3. Prerequisites: Trigonometry. Fundamentals of surveying including leveling, topographic surveying, boundary surveys and the layout of engineering facilities.
- 1302 Agricultural Engineering Principles.** Lab 4. Prerequisite: MATH 1613. Engineering measurements and design procedure. Analysis of test data. Orderly presentation of calculations and results. Design of a simple system. Introduction to engineering standards.
- 2012 Agricultural Energy Conversion.Prerequisite:** PHYSYC 2114. Energy use patterns in the U.S. food and fiber system, supply and demand for energy from various sources, thermodynamic constraints on energy sources, use and limitation of alternate energy sources.
- 3013* Intermediate Fluid Mechanics.** Prerequisite: ENGSC 3233. Closed conduit fluid flow, flow in open channels, non-Newtonian fluid flow and fluid power.
- 3023* Instruments and Controls.** Lab 2. Prerequisites: ENGR 1412, ENGSC 2613. Transducers, signal conditioning, read-out instruments, and electrical controllers. Assembly language programming, interfacing and applications of micro-computers in agriculture.
- 3113* Environmental Engineering.** Prerequisites: PHYSYC 2114, AGEN 3013. Physiologic mechanisms by which plants and animals adjust to their environment, environmental control

for animal and plant structures, equipment and facilities used for environmental control of animal and plant structures.

- 3212* Agricultural Machinery.** Prerequisites: 2012 and ENGSC 2122. Function and operation of agricultural machinery, soil dynamics and tillage machinery, selection and management of agricultural machinery.
- 3323 Hydraulic Applications in Soil and Water.** Prerequisite: 3013. Open channel flow, hydraulics of conservation structures, groundwater hydraulics, irrigation design.
- 3413* Agricultural Process Engineering.Lab 2.** Prerequisite: 3113. Physical properties of agricultural materials. Size reduction, mixing, separation, and conveying of biological materials. Grain storage, drying and handling.
- 4001* Seminar.** Prerequisite: senior standing. Technical and professional literature including preparation and presentation of papers.
- 4023* Agricultural Equipment Design.** Lab 3. Prerequisites: 3023, 4212. Senior design course. Project selection, patent search, market evaluation, and design of machine elements. Students will participate as design team members through prototype construction and evaluation.
- 4113* Design of Agricultural Structures.** Prerequisite: ENGSC 2114. Design of simple beams and indeterminate frames for agricultural structures. Determination of design loads. Design of functional agricultural structures using wood, steel and reinforced concrete.
- 4212* Agricultural Power.** Prerequisites: 3212, 3013, ENGSC 2213. Tractors and agricultural power units; fuels; accessories and their relationship to tractor performance; tractor stability and traction.
- 4222* Agricultural Power and Machinery Applications.** Lab 6. Prerequisites: 3023 and 4212. Planning, organizing and conducting experiments. Engineering report writing. Classroom knowledge applied to laboratory studies in power and machinery.
- 4313* Watershed Hydrology and Drainage.** Prerequisites: 3323. Role of soil and evapotranspiration in hydrologic budget. Rainfall, runoff and hydrograph analysis. Frequency analysis. Development of design hydrographs and flood routing for upstream reservoirs. Soil erosion and sedimentation. Surface and subsurface drainage design.
- 4400* Special Problems.** 1-4 credits, maximum 4. Investigations in specialized areas of agricultural engineering.
- 4423* Food Engineering.** Lab 2. Prerequisites: 3413, ENGSC 2213. 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.** Discussion of current literature with special emphasis on research and experimental techniques.
- 5513* Experimental Engineering Analysis.** Prerequisites: STAT 4023. Design and analysis of engineering experiments, error sources and prediction equations using statistical theory.
- 6000* Research and Thesis.** 1-10 credits, maximum 30. Prerequisite: approval by the student's advisory committee. Independent research and doctoral thesis preparation under the cognizance of a graduate faculty member in the student's field of specialization.
- 6503* Similitude in Research.** Prerequisite: MATH 2613. Theory of similitude and its use in planning, conducting and analyzing experiments in engineering and biological sciences.
- 6511* Research Methodology.** 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. Prerequisite: consent of instructor. Problems associated with erosion control, drainage, flood protection and irrigation.
- 6540* Problems in Farm Power and Machinery.** 2-6 credits, maximum 6. Prerequisite: consent of instructor. Literature review and analytical studies of selected farm power and machinery problems. Written report required.

- 6570*** **Light Structures Design.** 2-6 credits, maximum 6. Prerequisite: 4474. 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. Prerequisite: consent of instructor. Literature review and analysis of heat and mass transport and interval diffusion in biological materials. Transport phenomena at interfaces, thermal and cryogenic processing, drying, packed and fluidized bed systems. Thermal and moisture control processing affecting quality of food products. Written report required.
- 6610*** **Advanced Research and Study.** 1-10 credits, maximum 20. Prerequisite: approval by the student's advisory committee. Research and study at the doctoral level on the topic related to the student's doctoral program and field of interest.
- 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. Graded on pass-fail basis.
- 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)

- 1213 Crop Culture and Adaptation.** Soils and cropping practices necessary for future crop production systems. Production of modern crops and their management, as well as the adaptation of major agronomic crops to varying edaphic and climatic conditions. Importance of crop production to the producer and the consumer.
- 2014 (N)Crop Production Principles.** Lab 2. Characteristics of crop plants and their response to environment in relation to management practices. Crop evolution, selection, growth and development, flowering and maturation important principles.
- 2124 (N,L)Fundamentals of Soil 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.
- 2914 Introductory Range Management.** Lab 2. Prerequisites: 1213 or 2014 or BISC 1303. Range management; livestock and vegetation response to grazing pressure, seasonal effects, drought, and fire; range plant identification; range sites and condition.
- 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.
- 3111 Weed Control Laboratory.** Lab 2. Prerequisite: basic agronomy course. Identification of common weeds, principles and practices of herbicide application, and application equipment, handling and proper use of herbicides.
- 3112 Principles of Weed Control.** Prerequisite: 1213. Weed control principles and practices included in cultural and chemical weed control. Current weed control practices in crops, rangeland and crop situations.
- 3213* Pasture Management and Forage Production.** Prerequisites: 1213, 2124, and MATH 1213. Pasture systems, livestock management and forage crop production for maximum economical production of introduced forage species.
- 3433* Soil Genesis, Morphology, and Classification.** Lab 3. Prerequisite: 2124. Basic principles dealing with how and why soils differ, their descriptions, geographic distributions

and modern classification of soils. Soil genesis and classification a prerequisite to sound land use planning and land management.

- 3553 (N)Genetics.** Lab 2. Prerequisites: 1213 and BISC 1402. Basic principles of variation and heredity.
- 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.
- 3933* Range Ecology.** Prerequisite: 2914. Ecological principles pertaining to rangelands with emphasis on soil, plant and animal interrelationships.
- 4080 Agronomy Internship.** 1-6 credits, maximum 6. Prerequisite: consent of instructor. Internship must be at an approved agribusiness unit or other agency serving agronomic agriculture. Requires a final conference with on-campus adviser and a written report.
- 4112* Advanced Weed Science.** Prerequisites: 3112 and 3111. Integrated approach for weed management. Weed life cycles and biology, weed crop interferences, herbicide families and their characteristics, and finally a systematic and integrated weed management system. Methods of conducting and interpreting research results in appropriate topics.
- 4123* Crop Physiology.** Prerequisites: 1213 and BOT 3463. Application of basic physiological concepts of growth and cultural management and underlying crop production; environmental and genetic effects on growth of crop plants. Plant ecosystems at the community level relative to optimum yields and quality.
- 4234* Soil Fertility and Management.** Lab 3. Prerequisite: 2124 or equivalent. Soil fertility and use of fertilizer materials for conservation, maintenance, and improvement of soil productivity and to minimize environmental concerns.
- 4263* (I)International Agriculture and Food Production.Improving** the world food supply. Institutional structures needed to promote rural development, and to increase agricultural production in the developing countries.
- 4293* Plant Response to Climatic Stress.** Prerequisites: 1213 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* Soils 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.
- 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.

- 4683*** **(N)Physical Properties of Soil.** Prerequisites: Physics 1114; Agron 2124. Soil physical properties and processes, and their influence on plant growth.
- 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 3. Prerequisite: 3923. Range measurement and survey techniques with emphasis on vegetation inventory and application to management. 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.** 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.
- 4954*** **Range Improvement.** Lab 3. Prerequisite: 2914. Methods of improving or maintaining range condition and production. Grazing management; chemical, and pyric treatments; and physical developments. Field trips and reports in laboratory.
- 4994*** **Comparative Range Ecosystems.** Prerequisite: 3923. Characteristics of major range ecosystems of North America and the world. Structure, function, use and management of individual range ecosystems.
- 5000 Masters Thesis.** 1-6 credits, 6 maximum total credits under Plan I, and 2 maximum total credits under Plan II. Prerequisite: consent of adviser in agronomy. Research planned, conducted and reported in consultation with a major professor.
- 5020 Graduate Seminar.** 1 credit, maximum per semester 1 credit on M.S. program and 2 credits on a Ph.D. program required. Prerequisite: graduate standing. Philosophy of research, methods of research, or interpretation of research in agronomy.
- 5112*** **Herbicide Behavior in Soils.** Prerequisites: 4112, 4683. Biological, chemical and physical processes involved in the behavior and fate of herbicides in soils. Reactions, movement and degradation of herbicides in the soil.
- 5114*** **Advanced Crop Physiology.** Lab 4. Prerequisites: 4123, BIOCH 3653. Physiological concepts underlying culture and growth of crop plants. Plant competition and physiological processes.
- 5193 Data Acquisition and Analysis in Agronomic Systems.** Prerequisites: One course in statistics, computer programming experience, and consent of the Head of Agronomy Department. Use of microcomputers for data acquisition and control of field and laboratory instruments in agronomic applications. Management and analysis of data on microcomputer and main-frame systems. Practical experience in the use of graphics, data management, statistics, and inter-computer communication programs and simulation models with an analysis of the numerical methods involved.
- 5230*** **Research.** 1-6 credits, maximum 8 (not to exceed 4 credit hours of either crops or soils). Prerequisite: consent of a faculty member who will supervise the research.
- 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 or concurrent enrollment in BOT 5232. Behavior of chromosomes, cellular organelles and cytoplasm in relation to genetic behavior.
- 5353 Advanced Soil Genesis and Classification.** Lab 2. Prerequisite: 3433. Processes and factors of soil formation. Comparison of world soil morphology and classification systems.
- 5411*** **Plant Breeding Techniques I.** Lab 2. Prerequisites: 3553, 4353 and STAT 5013. 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 5013. 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 5013. Selfing and crossing summer crop plants, managing breeding and yield 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.** Prerequisite: 4234 or equivalent. Fundamental concepts, theories, approximations and techniques used in soil fertility investigations.
- 5513* Principles of Breeding Self-Pollinated Crops.** Prerequisites: 3553, 4353 and STAT 5013. 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 5013. 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, PHYS 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.** Prerequisite: 3893. 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: 3923 and consent of instructor. Oral and written discussion of selected current interest subjects concerning interrelationships among rangeland soils, plants, grazing animals and man.
- 5813 * Soil-Plant Relationships.Lab 2.** Prerequisite: 4234. Soil surface exchange reactions, soil solution chemistry, migration of ions to the plant root surface, soil-plant interactions. Reactions of soil nutrients and soil-plant status.
- 5863* Management of Agricultural Research Systems.** Organization, management and budgeting agricultural research systems with emphasis on developing countries. Analysis of research and training priorities, budgeting, staffing and management of projects.
- 5990 * Soil Physical Analyses.** Lab 1 or 2. 1-2 credits, maximum 2. Prerequisite: 4683. Principles and techniques.
- 6000 * Doctoral Thesis.** 1-6 credits, maximum 20. Independent research to be conducted and reported with the supervision of a major professor as partial requirement for the Ph.D. degree.
- 6010* Advanced Topics and Conference in Agronomy.** 1-6 credits, maximum 12. Prerequisite: M. S. degree. Supervised study of advanced topics in areas of agronomic interest. A reading and conference course designed to acquaint the advanced student with fields not covered in other courses in agronomy.
- 6222 * Physical Chemistry of Soil Colloids.** Prerequisite: 5615. 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 speciation; 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. 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. The relationship of quantitative genetics, cytogenetics, physiology and biochemistry to plant breeding. An examination of breeding philosophies and new trends in plant breeding.
- 6683* Advanced Soil Physics.** Prerequisites: 5583, MATH 4013. Movement of water in soils.

ANIMAL SCIENCE (ANSI)

- 1124 Introduction to the Animal Sciences.** Lab 2. Species adaptability, product standards and requirements, areas and types of production, processing and distribution of products, includes meat animals, dairy and poultry.
- 1133 Fundamentals of Food Science.** Food industry from producer to consumer and the current U.S. and World food situations.
- 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 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: 60 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* 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)Animal 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: PHSI 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 AGECE 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: PHSI 3034 or equivalent. Physiological factors affecting growth and performance of domestic animals.
- 3903 (I)Ecology of Agricultural Animals.** Prerequisites: 1124. Environmental and socioeconomic factors affecting the kinds, distribution and production of agricultural animals of the world and their utilization in different levels of social and economic development.
- 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. 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.
- 4712 Livestock Sales Management.Lab 2.** Prerequisite: 3433. Advertising of purebred livestock; performance data and breeding values in the merchandising of purebred livestock; photography and ad copy layout; conduct of an actual livestock auction, including animal selection, advertising, catalog and animal preparation, clerking, receipt of payments, sales budgets and transfer of registration papers.
- 4863* (L) Interpretation 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. Independent research planned, conducted and reported in consultation with a major professor.
- 5010* Special Problems.** 1-3 credits, maximum 6. Special problems in areas of animal science other than those covered by the individual graduate student as a part of his research and thesis program.
- 5110* Seminar.** 1 credit, maximum 3. A critical review and study of the literature; written and oral reports and discussion on select subjects.
- 5113* Advances in Meat Science.** Prerequisites: BIOCH 4113 and PHSI 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.
- 5120* Special Topics in Food Science.** 1-4 credits, maximum 4. Prerequisites: graduate standing and/or consent of instructor. Advanced topics and new developments in food science especially with reference to foods of animal origin.
- 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. 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 PHSI 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. An in-depth study of the digestion, absorption and metabolism of carbohydrates and lipids as related to energy requirements, productive function, health and disease.
- 5772* Protein Nutrition.** Prerequisite: BIOCH 5753. Nutritional, Biochemical and clinical aspects of protein metabolism as it relates to nutritional status.
- 5782* Vitamin and Mineral Nutrition.** Prerequisite: BIOCH 5753. Development of the concept of dietary essential minerals and vitamins. Individual minerals and vitamins discussed for animal species from the standpoint of chemical form, availability, requirements, biochemical systems, deficiencies and excesses, and estimation in foods and feed.
- 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. Population concept of genetics with emphasis on qualitatively inherited traits and statistical techniques utilized in population genetics. Gene and genotypic frequencies, estimation of genetic parameters within a population and the forces which can alter the magnitude of these genetic parameters and inbreeding.
- 6010* Special Topics in Animal Breeding.** 1-3 credits. Prerequisite: consent of instructor. Advanced topics and new developments in animal breeding and population genetics.
- 6110* Seminar.** 1 credit, maximum 3. A critical analysis of the objectives and methods of research in the area of animal science. Review of the literature, written and oral reports and discussion on select topics.

ANTHROPOLOGY (ANTH)

- 2353 (S)General Anthropology.** Anthropology, emphasizing the study of human physical evolution (physical anthropology) and cultural evolution (archaeology).
- 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.
- 4633* (S)Racial and Cultural Minorities.** Ethnic and racial groups in contemporary pluralistic society, including a cultural-historical perspective on their origins. social relations, value systems and goals.
- 4643* (I)Women: A Cross-Cultural Perspective.** Compares the roles of women in different types of societies (hunting and gathering, horticultural, peasant and agricultural). Social, familial, economic and legal status of women in American society. Same course as Soc 4643*.
- 4823* Contemporary Native Americans.** Cultural adaptations of North American Indians within both contemporary 'traditional' communities and urban settings. Federal programs and current problems as they relate to the adaptational processes.
- 4883* (S,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.
- 4993* Anthropology of Aging.** Study of aging using anthropological theory and method; includes aging in different societies, effect of culture change on aging and role culture plays in aging process.
- 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.
- 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.** 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 cognitive, affective and psychomotor domains.
- 3202 Education of Exceptional Learners.** Learning characteristics, needs and problems of educating the exceptional learner in the public schools. Implications of the learning, environmental and cultural characteristics; planning and program assistance available for 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. 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 Remediation.** Prerequisites: courses in mathematics and reading. 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.** Prerequisite:3202. Techniques for teaching the mentally retarded individual from birth to adolescence.

- 4723* Curriculum and Methods for Teaching Mentally Retarded Adolescents/Adults.** Prerequisite: 3202. Techniques for teaching the mentally retarded individual from adolescence through adulthood.
- 4743* Student Evaluation and Guidance Services.** For secondary school majors with emphasis on test design, use and grading practices and on the teacher role in testing, evaluation and guidance services.
- 4753* 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.** 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.
- 5042* Interviewing Techniques.** Prerequisites: graduate standing or consent of instructor. Basic principles underlying effective interviewing and interpersonal communication skills. Overview of various types of interviews. Application and analysis of interviews through video and audio-tapes.
- 5063* Introduction to Gifted and Talented Education.** Concepts, techniques and strategies for providing differentiated educational programs and experiences for the gifted and talented. State and Federal legislation; development of gifts and talents; program types; identification systems; program development; materials development; teaching techniques and methodologies.
- 5083* Principles of Counseling Psychology.** Development, theoretical foundations and applications of therapeutic models of counseling and psychology.
- 5103* Human Development in Psychology.** Introduction to basic research and theories of cognitive, emotional and social development. Applications to educational and family settings.
- 5123* Medical Information In Counseling. Prerequisites:** graduate standing or consent of instructor. Orientation to medical information and medical aspects of disability. Application to clinical problems in human service professions such as rehabilitation counseling, counseling psychology, and related disciplines.
- 5183* Introduction to Rehabilitation Counseling.** Background, legal aspects and philosophy of rehabilitation. Overview of current practices in rehabilitation and related areas.
- 5213* Advanced Educational Psychology.** Learning and its effect upon coping and adjustment. How learning, environmental and personality factors interact to change human behavior.
- 5223* Psychosocial Aspects of Rehabilitation Counseling.** Psychological and social implications of handicapping conditions. An examination of ways to facilitate the development of human potential, e.g., needs, communications and the helping relationship.
- 5320* Seminar in Applied Behavioral Studies.** 3-6 credits, maximum 6. Prerequisite: consent of instructor. In-depth exploration of contemporary problems of applied behavioral studies.
- 5363* Differentiated Curriculum Techniques and Materials for Gifted and Talented. Prerequisite:** 5063. Development of curriculum content for horizontal and vertical enrichment and acceleration. Commercial and teacher prepared materials in imagination; imagery; analogy; metaphor; inductive, deductive and abductive thinking; sciencing; philosophy;

psychology; logic systems; problem solving; concept learning; creativity; creative dramatics, etc. Conceptual approaches to the use of the preceding in various interest based and non-interest based formats.

- 5373* Educational Measurements.** Appropriate applications of tests in the schools. Development of teacher-made tests, selection of standardized tests, interpretation of test results, understanding of the statistics reported in testing literature, uses of test results and recent developments in educational measurement.
- 5382* Family-School Involvement Processes.** For teachers, administrators, counselors, school psychologists and other school personnel concerned with improving communication between the home and school in an attempt to better meet the needs of children and youth.
- 5443* Theories and Problems in Educational Psychology.** Theoretical foundations and nature of the problems studied in educational psychology; current issues and historical overview.
- 5452* Vocational and Career Information.** Prerequisites: 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: 5562. 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: 5562. Emphasis on effective communication skills in cross-cultural counseling or helping relationships and the integration of theoretical knowledge with experimental learning. Psycho-social factors, life styles, etc. of various cultural and ethnic groups and their influence on the helping relationship.
- 5510* Practicum in Educational Psychology.** 1-6 credits, maximum 6. Prerequisite: 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.
- 5512 Principles and Administration of Guidance Services.** Guidance in the secondary school program, principles and practices, organization and administration of guidance services.
- 5523 Individual Appraisal.** 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.** Counseling theories and specialized approaches applicable to school age children and youth. Focus on individual and group counseling and consulting.
- 5543* Career Development Theories.** Historical and contemporary viewpoints advanced by Ginsberg, Super, Holland, Roe, etc. Counselors are assisted in developing the theoretical and applied basis for developing school-based career education programs and for assisting individuals in career planning.
- 5553* Principles of Counseling.** Comprehensive foundation 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: 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.** 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.
- 5572* Guidance in the Elementary School.** 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 is stressed in organizing, developing, implementing and evaluating a school guidance program.

- 5583 Group Process.** Lab 2. Group dynamics, theory and techniques applicable to working with people of all ages in various school and non-school settings. Group member competencies are stressed during the laboratory period.
- 5590* Counseling Practicum.** 3-12 credits, maximum 12. Prerequisites: 5523, 5553, 5562 or 5572 or 5512 or equivalent and admission to the counseling or student personnel 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.
- 5612 Methods of Teaching Students with Learning Disabilities.** Prerequisites: 3202 or equivalent, 5623. 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.** 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.** Individual differences and problems that exceptional individuals experience. Educational programs and resources available to assist administrators, teachers and parents in dealing with unique individual needs.
- 5643 Counseling Parents of Exceptional Children.** Aiding the classroom teacher and other professional personnel in the understanding of unique activities and interpersonal relations involved in counseling with parents of exceptional children.
- 5653* Play Therapy in Special Education.** Theories and practices of the principles of play therapy. The application of play therapy for special education children. Supervised clinical experience with children with emotional, social and psychological problems.
- 5663* Creativity for Teachers.** Theoretical origins of creativity and their concomitant applications in the learning environment. Blocks to creative thinking, imagination, imagery, creativity testing, developing ideas and innovations, creative problem solving and teaching techniques and methods to maximize creative potential in all kinds and types of students.
- 5670* Rehabilitation Counseling Practicum.** 1-12 credits, maximum 12. Prerequisites: graduate standing and consent of instructor. Applied experience for graduate students in counseling.
- 5680* Internship in Rehabilitation Counseling.1-9** credits, maximum 9. Prerequisites: admission into the Rehabilitation Counseling Program and consent of instructor. Full time supervised experience working and studying in a rehabilitation agency or setting.
- 5713* Transpersonal Human Development.** Human development in terms of individual consciousness, focusing on the implications of such extraordinary states of consciousness as those associated with hallucinogenic drugs and mystical religious experience. Integration of psychological and religious interpretations of development. Applications to practical problems in education and psychology.
- 5720 Education Workshop.** 1-8 credits, maximum 15. Prerequisite: 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 CIED 5720 and OAED 5720.
- 5732 Seminar in Education.** Prerequisite: consent of instructor. Preparation of seminar study.
- 5733* Education of the Physically Handicapped.** Prerequisite: 3202. 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.
- 5763 Teaching Methods and Techniques for the Gifted and Talented.** Prerequisite: 5363. Subject and skill related learning facilitation which is process oriented and doing-centered. The role of the teacher as facilitator, counselor and non-directive change agent. Individualized educational plans, involving independent study, tutoring, correspondence, clustering, mentors, learning centers, resource centers.
- 5783* Psycho-educational Testing of Exceptional Individuals.** Prerequisite: 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.
- 5853 Advanced Methods for Teaching the Mentally Retarded.** Prerequisite: 4653. A review of research and methodological developments related to the instruction of mentally retarded children, adolescents, and adults.
- 5863 Developing Programs for the Gifted and Talented.** Prerequisites: 5063 and 5563. Programs based on various philosophies, structural concepts of gifted and talented education, e.g., mainstreaming, self-contained, pullouts, magnet schools, timeblocking, acceleration, enrichment, etc. Programs designed for general and specific academic ability; however, exposure will be provided to creative and productive thinking programs, leadership programs, and visual and performing arts programs. Specific models included.
- 5873 Instructional Strategies and Resources for the Emotionally Disturbed Learner.** Prerequisite: 5823. Instructional procedures and resources available for working with the emotionally disturbed/behavior-disordered learner. A wide range of theoretical approaches explored.
- 5883 Behavior Management of the Exceptional Learner.** Prerequisite: 4753. Various theoretical approaches to the management of individual and group behavior of exceptional learners.
- 5933 Altered States of Consciousness in Education.** Theory and research concerning altered states of consciousness. Practical techniques for increasing human potential for teachers, counselors, and other human services workers. An examination of and some participation in techniques of progressive relaxation, meditation, biofeedback, guided imagery, and autogenic training.
- 5952* Elementary Statistical Methods in Education.** Elementary statistical methods needed by consumers of educational research are presented. Descriptive and inferential statistics. No credit for students with credit in 5015.
- 5962 Developing Support Resources for Gifted and Talented Programs.** Prerequisite: 5863. Development, management, and evaluation of volunteer programs in intra- and extra-class settings. Program types include parent-aid, volunteer-aid, mentors, tutors, group sponsors. Developing community interest, finding external resources, external funding and resource information sources.
- 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.
- 5993 Identification and Behavior Characteristics of the Gifted and Talented.** Prerequisites: 5373 and 5863. Cognitive, affective, and behavioral characteristics of the gifted and talented. Selection of tests and interest inventories. Selection and/or developing of nomination/recommendation forms/models, inventories, checklists, rating scales, sociograms as well as data abstraction from cumulative and anecdotal records. Functions of gifted/talented identification committees.
- 6000* Doctoral Thesis.** 1-25 credits, maximum 25. Prerequisite: permission of advisory committee 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. Research design, data collection and analysis, and interpretation of results stressed. Appropriate utilization of complex analysis of variance, multiple regression analysis, and related multivariate analysis techniques.
- 6043*** **Post Adolescent and Adult Development.** The critical period in human development following adolescence. The impact of post-secondary education as it compares with direct employment and other critical development points of adulthood.
- 6053*** **Professionalism and Ethics in Counseling Psychology.** Principles and issues of professionalism and ethics. Legal and ethical implications derived from statutes and case law for the practice of counseling psychology in case studies.
- 6113*** **Seminar in School Psychology.** Assessment technology and indirect school psychological services.
- 6173 Higher Education Student Personnel Administration.** Develops an understanding of the history, philosophy, student life, critical issues and administration of student personnel work in higher education.
- 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.
- 6310*** **Advanced Practicum/Supervision.** 3-12 credits, maximum 12. Prerequisites: 5593 and master's degree. For prospective counseling psychologists, counselor educators and supervisors, and practicing counselors. Supervised assistance in development of counseling, consulting and supervising competencies.
- 6373*** **Educational Program Evaluation.** Prerequisite: 5013 or 5015. 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 nationwide 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.** A theoretically oriented approach to the concept of motivation; essential precursors to human behavior and applications to the solution of real and hypothetical problems.
- 6553*** **Advanced Practice-Marital and Family Treatment.** Prerequisites: 6523, concurrent enrollment in counseling or clinical practicum or consent of instructor. Advanced methods in assessment, diagnosis and treatment of marital and family problems. Skill development, professionalism, ethics and case management. Dynamics of co-therapy and conjoint treatment. Case consultation format. Same as PSYCH 6553.
- 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.
- 6603*** **Current Trends and Issues in Special Education.** Current research and literature regarding the education of exceptional children.
- 6663*** **Applied Behavioral Studies Research Seminar.** Prerequisites: admission to advanced graduate program. Critical analysis of current research.

6850 Directed Reading. 1-6 credits, maximum 6. Prerequisite: consent of instructor. Directed reading for students with advanced graduate standing.

6880* Internship in Education. 1-8 credits, maximum 8. Lab 3-24. Prerequisites: admission to advanced graduate program and consent of staff. Directed off-campus experiences designed to relate ideas and concepts to problems encountered in the management of the school program.

ARCHITECTURE (ARCH)

1216 Architectural Design Studio I. Lab 16. Architectural graphics and design fundamentals

2003 (H,I)Architecture and Society. Design, planning and building considered in their social and aesthetic contexts.

2100 Architectural Studies. 2-4 credits, maximum 4. Lab 6-12. Beginning studies in graphics and design in architecture.

2116 Architectural Design Studio II. Lab 16. Prerequisite: 1216. Problems in architectural design.

2216 Architectural Design Studio III. Lab 16. Prerequisite: 'C' in 2116. Problems in architectural design.

2263 Building Systems and Materials. Prerequisite: 2116. Architectural, structural, environmental control systems and materials in Architecture.

3117 Architectural Design Studio IV. Lab 20. Prerequisite: 2216. Problems in architectural design.

3123 Structures-Elementary Analysis. Lab 2. Prerequisite: ENGSC 2114. Structural theory for applications in architecture.

3133 Environmental Control-Basic I. Lab 2. Prerequisites: PHYS 1214 or 2114. A survey of acoustics, illumination and electrical systems in buildings.

3183 (H)History and Theory of Architecture I. The form and significance of architecture in western culture from pre-historic through the Gothic period.

3233* Environmental Control-Basic II. Lab 2. Prerequisite: 3133. Continuation of 3133; mechanical systems in buildings.

3246 Structures-Elementary Steel and Timbers. Prerequisite: 3123. Analysis and design of steel and timber structures used in architecture.

3253 Environmental Control-Alternative Energy. Prerequisite: 3133. Alternative energy systems for buildings; energy utilization, solar systems.

3283 (H)History and Theory of Architecture II. Architecture in western culture beginning with the Renaissance and continuing to the French Revolution.

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 History and Theory of Architecture II. Prerequisite: 3013. The evolution of contemporary architecture from the industrial revolution to the present time.

4113 Architectural Programming. Prerequisite: 3117. Data gathering, analysis and program formulation.

4117 Architectural Design Studio V. Lab 20. Prerequisite: 3117. Problems in architectural design.

4123* Structures-Elementary Concrete Lab 2. Prerequisite: 3123. Analysis and design applications in architectural problems using concrete structures.

4124 Structures-Advanced Analysis I. Prerequisite: 3226. Analysis of the interaction of frames and supports for structures used in Architecture.

- 4133* Environmental Control-Comfort.** Lab 2. Prerequisites: 3133 and 3233. Environmental comfort in buildings; human response rating scales, environmental design criteria.
- 4183* (H)History and Theory of Architecture III.** Architecture in western culture from the French Revolution to the present.
- 4217* Architectural Design Studio VI.** Lab 20. Prerequisite: 4117. Problems in architectural design.
- 4224* Structures-Advanced** ConCrete. Prerequisite: 4123. Design and analysis of multi-story reinforced concrete frames, prestressed and post stressed concrete structural components used in architecture applications.
- 4233* Environmental Control- Illumination.Lab 2.** Prerequisites: 3233 and 3253. Illumination and electrical distribution in buildings; visual comfort, illumination design, solar control, daylighting, energy utilization, environmental impact.
- 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.
- 5000* Special Problems.** 1-6 credits, maximum 6. Lab 3-18. Prerequisite: 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* Introduction to Urban DeSign.** Prerequisite: SOC 3423. Urban design concepts and their role in preconceiving the other environmental design disciplines. Identity, structure and meaning of an environmental image.
- 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. Subjects to be selected by the graduate faculty in architecture to cover advances in the state-of-the-art.
- 5119* Architectural Design and Development.Lab 24.** Prerequisites: Arch Engr Structures majors- 3117, 4224, and 4233; Arch Engr EC majors- 4117, 5124, or 4224 and 4233; Arch majors- 4217, 4123 and 3233 and 3253. Design and detailed development of a major architectural project integrating all aspects of architecture and related disciplines in a professional manner and milieu.
- 5124* Structures-Advanced** Steel. Prerequisite: 3226. Design and analysis of multi-story steel frames, trusses, arches and other architectural structure components.
- 5216* Advanced Architectural Design I.** Lab 15. The study of architectural problems of broader scope, familiarization with related fields of professional activity.
- 5227* Advanced Architectural Design I.** Lab 20. Prerequisite: 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 III.** 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.** 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. 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. Prerequisite: consent of instructor and head of School. Theory, research or design investigation in specific areas of study in the field of architecture and its related disciplines. Plan of study determined jointly by student and graduate faculty.
- 6100* Special Topics.** 3-6 credits, maximum 15. Subjects selected by the graduate faculty in Architecture to cover advances in the state-of-the-art.
- 6113* Survey of Non-Western Architecture.** 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* Structures-PlaStic.Prerequisite:** 5124. Plastic analysis and design of structural steel frames and components used in architecture.
- 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. Engineering problems in architecture involving structures, mechanical systems, acoustics, illumination, etc.
- 6513* Foundations of Architectural Engineering Research I.** Lab 3. Mathematical formulation of architectural structural behavior. Matrix applications, finite element, finite differences, stability considerations and three-dimensional structural modeling.
- 6523* Foundations of Architectural Engineering Research II.** Lab 3. 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. Prerequisite: Theory and design of architectural applications in steel framed building. Elastic and plastic, design, multi-story construction.
- 6624* Advanced Structures II.** Lab 3. Prerequisite: 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.** 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 noise.
- 6923* Professional Practice II.** 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 Art 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 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 or Art I.** Development of art from pre-history through the Gothic.
- 2613 (H,I)HiStOry or 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 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 non-majors.
- 3303 Sculpture II: Metal.** Lab 6. Prerequisite: 1333. Sculpture in fabricated metal and nonferrous metal casting.
- 3313 Sculpture III: 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 Metalsmithing.** Lab 6. Prerequisites: 2513 or consent of instructor. Production of three-dimensional metal forms by hammering, raising and stretching metal.
- 3603 History of Classical Art.** Prerequisite: 2603. Stylistic, philosophical and formal qualities of art in the Classical world. The creation of the Greek classical ideal and its dissemination in the Roman world through architecture, sculpture, and painting.
- 3643 History of Italian Renaissance Art.** Prerequisite: 2613. The art and architecture of Italy during the period 1250-1564, with emphasis on the interconnection of arts and ideas. Works of art analyzed and discussed against the background of 15th-century innovations in theory and technique.

- 3653 History of Nineteenth Century European Art.** Prerequisite: 2603. Art of the 19th century in Europe, with all its ideals, conflicts, escapes and triumphs. Period studied begins with the French Revolution and ends in 1900.
- 3663 (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.
- 3673 History of Northern Renaissance Art.** Prerequisite: 2613. Art of Northern Europe during the period 1400-1700, with emphasis on the development of painting. Social, religious and political phenomena that affected the development of Northern styles and attitudes.
- 3703 Printmaking.** Lab 6. Prerequisite: 1103 or 1203. Printmaking techniques in woodblock, etching, lithography and serigraphy, with emphasis on developing basic skills and techniques.
- 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.
- 4400 Graphic Design** 11.3-6 credits, maximum 6. Lab 6. Prerequisites: 1203, 2103, and 2403. Employment of skills gained in preparatory courses such as lettering, illustration and photography. 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.
- 4613 Art Since 1945.** Prerequisite: 2613. Art and art theory from 1945 to the present. Major trends of abstract expressionism, pop art, minimalism, photorealism and conceptual art. Theories and intellectual bases of each movement as well as major critical responses.
- 4633 (H,I) Survey of African Art.** Art products of traditional sub-Saharan African societies as they have evolved in relation to human needs, religion, philosophy, history, geography and anthropology. The contribution of African art to world art and approaches toward esthetic evaluation.
- 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 9. Lab 1-6. Prerequisites: junior standing and permission. For advanced students only. Self-designed special topics in studio art or art history with consent of a supervising instructor.

ARTS AND SCIENCES (AS)

- 1111 Freshman Orientation.** Study techniques, evaluation of one's abilities and exploration of educational and career opportunities. 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 5. Prerequisite: participation in the Honors program.
- 2110 Arts and Sciences Lower-division Honors Independent Study.** 1-3 credits, maximum 3. Prerequisites: participation in Arts and Sciences Honors program. Independent study, by individual contract only. Before enrolling student must have contract approved by the sponsoring professor and director of Arts and Sciences Honors Programs.

- 3000 Readings for Honors Students.** 1-3 credits, maximum 6. Prerequisites: Participation in the Arts and Sciences Honors program. Directed readings under the supervision of a readings committee.
- 3500 Colloquium 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.
- 3710 A&S Internship.** 1-6 credits, maximum 6. Prerequisites: Junior Standing. For students in the College of Arts & Sciences. Cooperative education experiences not included in departmental offerings. Before enrolling, students must have an individual contract approved by the sponsoring professor and the Dean of Arts & Sciences (or administrative officer).
- 3713 (H,SpD)The Arts Connection.** Formal relationships among painting, music and literature. An introduction to the several arts.
- 3723 (A,H,SpD)The Computer Connection: Arts, Sciences, Humanities.** Dialogue between arts and science students using the computer as a common base.
- 3733 (H,SpD)Life, Love, and Truth: Religious and Psychological Approaches.** Philosophical questions addressed from both religious and empirical (psychological) perspectives.
- 3743 (H,SpD)The Language of Appreciation.** Appreciation of art, music; use of specific art offerings available on campus.
- 3903 (H,I,S,SpD)Integrative Honors Studies: World Community.** Prerequisite: Participation in Arts and Sciences Honors Program. World history (cultural, political, and economic) since 1650; and seminar study of a selected global problem. Restricted to Honors students.
- 4000 Arts and Sciences Upper-division Honors Seminar.** 1-3 credits, maximum 5. Prerequisite: Participation in the Arts and Sciences Honors Program.
- 4110 Arts and Sciences Upper-division Honors Independent Study.** 1-3 credit, maximum 3. Prerequisites: participation in the Arts and Sciences Honors program. Independent study by individual contract only. Before enrolling, student must have contract approved by the sponsoring professor and the director of Arts and Sciences Honors Program.
- 4990 Honors Senior Thesis or Creative Activity.** 1-3 credits, maximum 6. Undergraduate honors thesis, research and report, or other creative activity undertaken to satisfy the requirements for Departmental Honors in the College of Arts and Sciences. Restricted to Arts and Sciences Honors Students.
- 5710* Developmental Workshop in Selected Academic Fields.** 1-3 credits, maximum 9. Arts and Sciences discipline-based material. Study groups, lectures and seminars.
- 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, class 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 interpretations 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.** Prerequisite: 1104 or 2023. 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 Golf.** 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 Private 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: 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: 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: 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 Multiengine 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.
- 4235 Theory of Instrument Flight.** Prerequisite: passage of FAA Private Pilot Written Examination or 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* Survey 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)Biochemical 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. 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 Physical principles underlying molecular phenomena 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 methods 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. 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 (L,N-SpD)Biological Sciences I.** Lab 2. Ecological principles, populations, man and environment; genetics, reproduction and development; concepts of evolution, selection, adaptation, speciation and taxonomy. For the non-major.
- 1214 (L,N-SpD)Biological Sciences II.** Lab 2. Cellular organization and function, energy relations, maintenance of living systems, coordination and behavior. For the non-major.
- 1220 Current Topics in Biology.** 2 credits, maximum 8. Topics of current interest especially designed for non-biology majors.
- 1222 (N,SpD)Man and Disease.Types** of diseases, such as infectious or genetic, and diseases of major organ systems. How diseases are diagnosed and treated; biological processes involved in disease. For the non-biology major.
- 1232 (N)Human Reproduction. Human** reproduction is dealt with in terms of anatomy, physiology, embryology, genetics and evolution. Birth control, and teratogenic substances as well as pregnancy and childbirth. For the non-biology major.
- 1252 (N)Man and Environment.The** impact of man's activities on the natural world and an analysis of the potential of technological and societal changes on the environment. For the non-biology major.
- 1262 (N,SpD)Plants and Man.** Types of plants, form and function, uses of plants by man, and impact of plants on society. For the non-biology major.
- 1272 (N-SpD)Human Origins.** The scientific evidence for the evolution of human morphology, technology, behavior and ecology. For the non-biology major.
- 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)Microbiology.** Lab 2. Emphasis on growth and identification. Techniques used in the isolation, cultivation and physiological characterization of microorganisms. Not designated for students majoring in microbiology, medical technology or pre-veterinary science; those students should enroll in MICRO 2124.
- 1603 (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: 1603. 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-SpD)Heredit y and Man.** Human heredity; the impact of genetics on human endeavor. For the non-major.
- 3014* Cell and Molecular Biology.** Lab 3. Prerequisites: 1402 1502 or 1603, or equivalent; and organic chemistry. The cell concept and cell morphology, cell macromolecules, organelles, enzymes, energetics, movement of water and materials across membranes, influence of external environment, cellular synthesis, growth and maintenance, control and integration of function, replication, differentiation, origin and evolution of cells.
- 3024* General GenetiCS.Prerequisite:** 1402, 1502 or 1603, or equivalent. Inheritance in plants, animals and microorganisms; on molecular and classical aspects.
- 3034* (L)Generai Ecology.** Lab 3. Prerequisite: 1402, 1603 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.
- 4313* Biophysics.** Prerequisites: 1402, 1502 or 1603; PHYSC 1214 or 2114; CHEM 3015. 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.
- 5143* Ecological Computer Modeling,Lab 3.** Prerequisites: 3034; 5133 strongly recommended. Use of BASIC to write programs that model simple concepts in ecology and behavioral biology. Use of interactive program packages that model more complex ecological and evolutionary phenomena at the computer console. No prior experience with computers or programming necessary.
- 5353* Membrane Biophysics and Bioenergetics.** 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

diffraction techniques. Application of these illustrated with current research problems. Same course as PHYS 5353.

5413* Developmental Biology. Prerequisites: 3013 or equivalent. The molecular basis of developmental events. Cell division, interaction, differentiation, migration and death as developmental mechanisms. Developmental aspects of carcinogenesis and teratology.

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. Field trips required.

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. Field trips required.

3114* Plant Taxonomy. Lab 8. Prerequisite: BISC 1402 or equivalent. Vocabulary and concepts of plant taxonomy: terminology, keys, nomenclature, documentation, classification and biosystematics. Emphasis on angiosperm flora of Oklahoma. Field trips required.

3233* Plant Anatomy. Lab 3. Prerequisite: 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. 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 taxonomy, ecology, and physiology of algae in lakes and streams with special reference to their role in overall aquatic productivity. Field trips required.

4053* Vegetation Sampling and Measurement. Lab 3. Prerequisites: 3005 and 4023. 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. Field trips required.

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. Prerequisite: BISC 1402. 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.
- 5213* Vascular Aquatic Plants.** Lab 3. Prerequisite: BISC 1402. Taxonomy, ecology, and physiology of vascular aquatic plants, with special reference to their role in aquatic ecosystem dynamics. Field trips required.
- 5232* Cytogenetics Laboratory.** Lab 4. Prerequisite: AGRON 5342 or concurrent enrollment. Cytogenetic research techniques, especially karyotyping; observation and interpretation of cytogenetic phenomena including mitosis, meiosis and chromosomal aberrations.
- 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. 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. 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. Field trips required.
- 5850 Botany Seminar.** 1 credit, maximum 6. Required of senior and graduate majors.
- 5923* Environmental Plant Physiology.** Prerequisite: 3463 or equivalent. Effects of light, temperature, water, soil and other environmental factors on physiological responses of plants; photosynthesis, water relations, water and temperature stress, flowering, dormancy and germination.
- 6000* Research.** 1-15 credits, maximum 36. Independent research for the doctoral dissertation.

BUSINESS ADMINISTRATION (BUSAD)

- 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* Organizational Policy.** Prerequisite: senior standing and completion of common body core of the CBA. A terminal integrating course in formulating and implementing basic policy for business. Planning models, policy models and strategy development. Strategic decisions applied to practical examples of problems firms now face and of problems that they will face given current trends in the external environment.

- 5013* Research Methods for Business.** Prerequisite: STAT 2023, admission to MBA program or approval from MBA director. Role of Bayesian & Inferential statistics in business research and management decision making. Measurement, scaling, survey methods, and forecasting. These tools will be presented and reviewed in their applications to marketing; managerial, human resource, financial and, production planning; and other related business topics. Use of computers in statistical analysis.
- 5110* Computer Applications in Business.** 3 credits, maximum 3. Prerequisite: admission to MBA program or approval from MBA director. Introduction to management information systems, statistical and optimization packages, financial modeling languages and micro-computers. Algorithmic programming in FORTRAN/ BASIC/COBOL.
- 5113* Entrepreneurship and Venture Management.** 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* The External Environment of Business.** Prerequisite: admission to MBA program or approval from MBA director. Social, ethical, regulatory and political forces as they impact on the organization. Attention to organizational response to these forces through management policies and strategies.
- 5713* Analysis of the Multinational Firm.** 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 30. 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 resource materials; evaluation procedures; analysis of various instructional strategies including individualized instruction; communication and interaction patterns with both school and outside publics.
- 4243* Principles and Philosophy of Vocational Business Education.** Prerequisite: senior standing. Principles and philosophy of the organization and development of business education; federally aided programs in business education; organization, objectives, and purpose of education in schools; cultural pluralism; development of education as a profession; characteristics of effective teachers; democratic principles; free public education and equal education opportunity.
- 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.** Prerequisites: CIED 2113, ACCTG 2203, ABSED 3213 and skill in secretarial business subjects. Teaching bookkeeping/accounting including development of objectives; organization, assessment and preparation of instructional resources and materials. Administration and interpretation of assessment techniques; design and use of diagnostic and achievement examinations; interaction patterns and instructional modifications.
- 4490 Student Teaching in Business Education.** 1-9 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. Fall semester offering is for 1 credit, including observation and procedures for student teaching, information on teacher licensure and certification. Spring semester offering is for 9 credits, which include the full-time teaching experience.
- 4653* Data Processing Instructional Methods and Procedures.** Prerequisites: GENAD 2103 or COMSC 2113. Instructional methods in the teaching of data processing courses including the development of an understanding of computer hardware and software concepts and terminology. Problems, methods, and techniques in using and teaching concepts about the computer and computer programming languages are included. 'Hands-on' programming experience is an integral part of the course. Lab required.
- 5000* Thesis.** 1-6 credits, maximum 6. Prerequisite: consent of Department head.
- 5110* Problems in Business Education.** 1-3 credits, maximum 6. Current problems in business education, based upon the interests and needs of the students.
- 5220* Seminar in Business Education.** 1-3 credits, maximum 6. Research in business education and intensive study of selected problems.
- 5330* Field Study.** 1-6 credits, maximum 6. Prerequisite: consent of Department head. Individual investigations conducted in absentia and internships; periodic conferences and reports during the progress of the study.
- 5433* Business Curriculum.** 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 Vocational Business and Office Education.** 1-3 credit hours, maximum 6. Prerequisite: consent of department. Problems, materials, methods, history and current theory and philosophy of vocational business and 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. 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. Prerequisite: 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 Vocational Business and Office Education.** 1-3 credits, maximum 6. Materials and teaching procedures in business and office education. Teaching techniques and knowledges necessary for preparing students for the automated office.
- 6470* Improvement of Instruction in Bookkeeping and Accounting.** 1-3 credits, maximum 4. Prerequisite: ACCTG 2203 or equivalent. Problems, materials and methods in teaching bookkeeping and accounting.
- 6580* Improvement of Instruction in Typewriting.** 1-3 credits, maximum 4. Prerequisite: 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 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* Law of Contracts and Agency. 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. 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 fiduciary management of property.

5163 Legal Environment of Business. Prerequisite: 3213 or equivalent. Legal environment within which business must operate. Nature and source of law, the operation of the judicial system, the operation of administrative agencies, selected Constitutional provisions frequently involved in litigation of business problems, and selected substantive legal areas having a direct relationship with business operation and decision making.

CHEMICAL ENGINEERING (CHENG)

2033 Introduction to Chemical Process Engineering. Lab 3. Prerequisite: CHEM 1515. Application of mathematics and scientific principles to solving chemical engineering problems. Simple material and energy balances applied to process design. The nature and application of unit operations and unit processes to the development of chemical processes.

3013* Rate Operations I. Lab 3. Prerequisites: 2033 and ENGSC 3233. Basic rate equations for heat, mass and momentum transport; the transport analogies, solutions and correlations for predicting transport rates for practical applications; utilization in design and analysis of process equipment.

3113 Rate Operations - II. Prerequisites: 3013, 3473. Continuation of CHENG 3013.

3243* Elements of Petroleum 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.
- 4223* Chemical Engineering Design II.** Prerequisite: 4123 A continuation of CHENG 4123. Economic analysis of process plants and equipment. Design of chemical processing equipment and chemical plants. Application of computer techniques to chemical engineering design.
- 4363* Chemical Processes.** Prerequisite: senior standing. Chemical process industries are studied from the standpoint of technology, raw materials, products and processing equipment. Thermodynamics and kinetics of industrial processes.
- 4473* Chemical Reaction Engineering.** Lab 3. Prerequisite: senior standing. Principles of chemical kinetics rate concepts and data treatment. Elements of reactor design principles for homogeneous systems; introduction to heterogeneous systems.
- 4581* Seminar.** Prerequisite: senior standing. Recent developments in chemical engineering and the process industries.
- 4613* Fundamentals of Reservoir Engineering.** Prerequisites: MATH 2613 and 3473 or MAE 3613. Properties of porous media, properties and phase behavior of reservoir fluids. Computational schemes, including numerical methods, for predicting and optimizing production rates and establishing reserves.
- 4683* Petroleum Processes.** Prerequisite: 3473. Analysis of the unit processes of petroleum refining.
- 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.
- 5110* Special Topics In Chemical Engineering.** Lab 2-6. 2-3 credits, maximum 6. Prerequisite: consent of instructor. Small group and individual projects in unit operations, unit processes, chemical kinetics, computer applications, process modeling or any of a wide range of chemical engineering topics. May be repeated for credit if subject matter varies.
- 5123* Advanced Chemical Reaction Engineering.** Prerequisite: 4473. Advanced principles and applications of chemical kinetics in catalysis, heterogeneous systems, non-ideal reactions, polymerization and biological reactions.
- 5213* Selected Diffusional Unit Operations.** Mass transfer in fluids. Diffusion in liquids and gases. Equilibrium stage and transfer unit concepts. Mass transfer concepts of diffusional unit operations such as absorption, adsorption, crystallization, drying, humidification and liquid extraction.

- 5320*** **Introduction to Nuclear Engineering.** 3-4 credits, maximum 4. Principles and application of nuclear energy. The fission reaction, the behavior of neutrons, nuclear reactor theory and nuclear reactors.
- 5423*** **Process Heat Transfer.** Application of fundamental principles of single- and two-phase fluid dynamics and heat transfer to the design and analysis of process heat transfer equipment.
- 5583*** **Corrosion Engineering.** Prerequisites: ENGSC 3313. Modern theory of corrosion and its applications in preventing or controlling corrosion damage economically and safely in service.
- 5633*** **Stagewise Operations.** Stagewise separation in binary and multicomponent systems. Development of theoretical techniques with application to typical situations in vapor-liquid, liquid-liquid and solid-liquid systems. Use of digital and analog techniques.
- 5743*** **Chemical Engineering Process Modeling.** 3 credits, maximum 6. Chemical engineering systems and process models. Analytical and numerical methods of solution of resulting equations or systems of equations, with computer methods in a chemical engineering context.
- 5793*** **Advance Process Design and Economics.** Prerequisites: 4123, 4233. Application of chemical engineering principles to the design and analysis of process equipment and plants; prediction and extrapolation of thermal and physical properties; methods for design and synthesis of process units and equipment.
- 5843*** **Principles of Chemical Engineering Thermodynamics** Principles of thermodynamics. Properties of fluids and prediction of thermodynamic properties. Phase and chemical equilibrium. Thermodynamics in unit operations.
- 5853*** **Advanced Chemical Process Control.** Prerequisite: 4843 or equivalent. Computer-based process control techniques. Discrete equivalent to the PID analog controller. Z-transform analysis of sampled-data control systems. Digital control algorithms for feed-back, feed forward, and multivariable control. Application of advanced concepts to distillation control and other chemical process units.
- 5873*** **Air Pollution Control Engineering.** Causes, effects and control of atmosphere pollution. Same course as CIVEN 5873.
- 5882*** **Inorganic Chemical Technology.** Processes, equipment and techniques important to the manufacture of inorganic chemicals. Economics of inorganic chemical production.
- 5902*** **Organic Chemical Technology.** Processes and technology of the organic chemical industry. The organic unit processes such as polymerization, chlorination, 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 operations.
- 5990*** **Special Problems.** 2-4 credits, maximum 9. Prerequisite: consent of instructor. Individual report topics in chemical engineering involving operations, processes, equipment, experimental, literature search, theory, computer use or combinations of these.
- 6000*** **Doctoral Thesis.** 2-15 credits, maximum 30. Prerequisite: approval of major professor. 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 dissertation.
- 6023*** **Chemical Engineering Science I.** Prerequisites: 5213 and 5423. Theoretical aspects of fluid dynamics, heat transfer and mass transfer. Boundary layer theory, multiphase flow theory of diffusion and interphase mass transfer. Analogies between heat, mass and momentum transfer.
- 6113*** **Chemical Engineering Science II.** Prerequisite: 6023. Continuation of 6023. Theoretical aspects of fluid dynamics, heat transfer and mass transfer. Boundary layer theory, multiphase flow. Theory of diffusion and interphase mass transfer. Analogies between heat, mass and momentum transfer.
- 6223*** **Advanced Chemical Engineering Thermodynamics.** Prerequisite: 5843. Phase equilibrium in multicomponent systems. Irreversible processes. Properties of fluids and the prediction of properties by statistical methods. Application of thermodynamics to unit operations.
- 6440*** **Advanced Topics in Chemical Engineering.** 3-6 credits, maximum 9. Topics in chemical engineering unit operations in design. Advanced mathematical techniques in chemical engineering problems. May be repeated for credit if subject matter varies.

6543 Chemical Engineering Kinetics. Prerequisite: 6223. Kinetics of chemical reaction. Reaction rates in homogeneous systems. Design of batch and fluid reactors. Catalysis and the design of gas-solid catalytic reactors.

CHEMISTRY (CHEM)

- 1014 (N,L)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 (N,L)General Chemistry.** Lab 2. Chemical principles and selected inorganic compounds. Beginning course of an integrated general-organic biochemistry sequence, recommended for students in the agricultural sciences. No credit for students with prior credit in 1014, 1215, 1314.
- 1215 (N,L)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 (N,L)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 (N,L)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 pre-veterinary science), physical sciences and engineering. No credit for students with credit in 1014, 1025, 1215.
- 1415 (N,L)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 (N,L)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. Terminal 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: 3153 or concurrent enrollment in 3153. Laboratory exercises related to theoretical principles covered in CHEM 3053 and 3153. No credit for students with credit in 3015.
- 3153* Organic Chemistry.** Prerequisite: 3053. A continuation of 3053.
- 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 II.** 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.
- 4320* Chemical and Spectrometric Identification of Organic Compounds.Lab** 1-2. 1-3 credits, maximum 3. Prerequisites 3112* and 3153*. Theory and practice in separating mixtures of organic compounds *and* some theory and practice in identifying organic compounds by spectroscopic methods.
- 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. Designed to help elementary and secondary science teachers improve their subject matter competence in chemistry. Content varies, depending on the needs of specific groups of teachers.
- 5223* Chemistry of High Polymers.** Prerequisites: 3153 and 3434 or equivalent. Preparation and polymerization of organic monomers; properties and uses of resulting high polymers; theories of polymerization; inorganic and natural organic polymers.
- 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.** Prerequisite: 3153. Products and mechanisms of reactions of importance in organic synthesis.
- 5362* Organic Reactions.** Prerequisite: 5323. A continuation of 5323, covering more advanced material.
- 5372* Spectrometric Identification of Organic Compounds.Lab** 3. Prerequisite: 4320. Obtaining and interpreting spectra of organic compounds. Ultra violet, infrared, nuclear magnetic resonance, circular dichroism, mass spectrometry.
- 5443* Mechanism and Structure in Organic Chemistry.** Prerequisites: 3153 and 3553. Relationship of properties of organic compounds to their structure; mechanisms of organic reactions.

- 5563* Chemical Thermodynamics I.** Prerequisite: 3553. Statistical and classical thermodynamics applied to chemical systems.
- 5623* Quantum Chemistry I.** Prerequisite: 3553. Fundamentals of quantum mechanics, including classical mechanics, wave representation of matter, the Schroedinger equation and atomic structure.
- 5723* Solutions of Electrolytes.** Prerequisite: 3553. Thermodynamics of solutions of electrolytes; cell potentials, transference conductance, diffusion, dielectric constants and their theoretical interpretation.
- 5963* Inorganic Chemistry II.** Prerequisite: 4330. 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. The theory, practice and instrumentation in various areas of modern electroanalytical chemistry.
- 6113* Analytical Spectroscopy.** Prerequisite: 4024. Survey of selected topics in analytical applications of spectroscopic techniques. Fundamental concepts as well as current trends in research, including instrumentation.
- 6153* Mechanism of Organic Reaction.** Prerequisite: 5443. Theories of organic reactions; prediction of their course.
- 6323 Heterocyclic Compounds and Medicinal Chemistry.** Prerequisite: 5362. Preparations and reactions of cyclic organic compounds containing atoms other than carbon in the ring. Modern synthetic techniques as well as industrial methods for the preparation of heterocycles, especially those with medicinal properties and uses as related to structural characteristics of the compounds.
- 6353 Chemistry of Natural Products.** Prerequisite: 5323. Complex naturally occurring organic compounds such as alkaloids, terpenes and steroids.
- 6420 Special Topics in Organic Chemistry.** 1-9 credits, maximum 9. Prerequisite: 3153. Deals with topics not covered in other courses.
- 6453* Chemical Kinetics.** Prerequisite: 3553. The kinetics of chemical reactions and their theoretical interpretation.
- 6523* Quantum Chemistry II.** Prerequisite: 5623 or PHYSC 5613. Molecular quantum mechanics and chemical bonding.
- 6553* Molecular Spectroscopy.** Prerequisite: 5623. Spectra and structure of molecules.
- 6623* Chemical Thermodynamics II.** Prerequisite: 5563. A continuation of 5563.
- 6650 Selected Topics in Advanced Physical and Inorganic Chemistry.** 1-6 credits, maximum 12. Prerequisite: consent of instructor. Supervised study of selected topics and fields not otherwise covered.

CHINESE (CHIN)

- 1115 (I)Elementary Chinese** Pronunciation, conversation, grammar and reading.
- 2115 (H,I)Intermediate Chinese** (.Prerequisite: 1 115 or equivalent proficiency. Reading, the writing system, culture, grammar, conversation.
- 2123 (H,I)Intermediate Chinese** 11.1115 and 2115 or equivalent proficiency.A continuation of 2115.
- 2223 (H,I)Intermediate Chinese** III.Prerequisites: 1115, 2115 and 2113 or equivalent proficiency. A continuation of 2115 and 2123.

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)Materials Testing Laboratory.** Lab 3. Prerequisites: 3413 or concurrent enrollment. Experimental investigation of the properties of structural materials and behavior of structural members subjected to load.
- 3413 Structural Analysis.** Lab 3. Prerequisite: ENGSC 2114. Minimum C grade. 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 Bioenvironmental 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.
- 3823 Water and Society.** How engineered water systems have influenced societies, from ancient civilization to present times. The effect of engineered water systems on developing countries will also be studied. The relationship between water development and the character of future societies.
- 3844 Hydraulics-Hydrology.** 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.
- 4910* Civil Engineering Research.** 1-4 credits, maximum 12. Prerequisite: senior standing or consent of instructor. Research and investigation of civil engineering problems.
- 4042 Seminar.** Lab 3. Prerequisites: senior standing. Professional aspects of civil engineering practice. Principles of management pertinent to the practice of civil engineering. Individual written and oral presentations of assigned topics.
- 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.
- 4713 Introduction to Geotechnical Engineering.** Prerequisite: ENGSCI 2114. Physical and mechanical properties of soils, including; specific gravity, grain size distribution, plasticity, permeability, consolidation, and shear strength. Use of physical and mechanical pro-

parties to calculate stresses in a soil mass, lateral earth pressures, bearing capacity, and slope stability.

- 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 Bioenvironmental Engineering.** Prerequisites: 3813 and 3844. Basic theory of water and wastewater treatment unit operation.
- 5000* Masters 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.
- 5003 Computer-aided Design and Analysis.** Prerequisites: senior or graduate standing. The simulation of the civil engineering design and analysis processes for the application of digital computing methods.
- 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.** 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. 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: 4713 and GEOL 1114 or GEOL 3024. 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.** 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 construction 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. 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.
- 5693*** **Pavement Design.** Prerequisite: 3633. Basic principles and current methods of pavement 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.
- 5703** **Laboratory Testing of Soils.** Lab 9. Prerequisites: 4713 or concurrent enrollment. Testing soils for engineering purposes. Laboratory exercises in physical and mechanical properties of soils including: specific gravity grain size distribution, permeability, plasticity, compaction, and stabilization. Consolidation and shear strength testing of soils.
- 5713*** **Soil Mechanics.** Prerequisite: 4713. Application of soil mechanics principles and concepts in geotechnical areas of permeability and seepage, settlement analysis, bearing capacity, lateral earth pressures and retaining walls, slope stability, and meta-stable soils.
- 5723** **Foundation Engineering.** Prerequisite: 4713. 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. A study of theory and applications in finite-difference and discrete-dement methods for analysis of soil-supported structural elements. Procedures for analysis of beams, beam-columns and grid systems considering linearly elastic and nonlinear flexural stiffness and soil support. Methods of predicting nonlinear soil response and organization of equations for computer analysis.
- 5753*** **Engineering Soil Stabilization.** Lab 2. Prerequisite: 4713. 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 construction methods and procedures.
- 5763*** **Construction Equipment Management.** Prerequisite: INDEN 3503. 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: 4763. 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: 4833. 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.** 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.** 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 bio-engineering, sanitary engineering analysis and design.
- 5863 Advanced Unit Operation in Bioenvironmental Engineering.** Prerequisites: 4833. Theory and design of advanced physical-chemical water and wastewater treatment processes.
- 5873* Air Pollution Control Engineering.** Causes, effects and control of atmosphere pollution.
- 5883* Solid Waste Management.** Theory, design and operation of solid waste collection, disposal and reclamation systems.
- 5913* Groundwater Hydrology.** Theory of groundwater movement, storage, exploration and pumping tests. Design of groundwater recovery and recharge systems.
- 5923* Water Resources Engineering.** Prerequisite: 5843. 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: 4833. Theory, design and operation of water treatment plants. Water treatment plant control procedures.
- 5943 Bioenvironmental Engineering Design.** Lab 3. Prerequisite: 4833. Design of water and wastewater treatment systems.
- 5953* Biological Waste Treatment Design.** Lab 3. Prerequisite: 4833 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.
- 5963* Bioenvironmental Process Kinetics.** Prerequisite: 4833. Use of bioenvironmental process kinetics. Principles of reaction order, rate constants, mass balances, and flow regimes will be developed.
- 6000* Ph.D. Research and Thesis.** 1-16 credits, maximum 30. Independent research under the direction of a member of the graduate faculty by students working beyond the level of Master of Science degree.
- 6010* Seminar.** 1-6 credits, maximum 12. Prerequisites: consent of instructor and approval of the student's advisory committee. Analytical studies with suitable reports on problems in one or more of the subfields in civil engineering by students working beyond the level of Master of Science degree.
- 6113 Theory of Elasticity.** 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. Analysis of bars, frames, towers, multistory building and truss structures subjected to dynamic disturbances; investigation of lumped and distributed mass systems; natural frequencies, response spectra, applications to blast loading and earthquake analysis.
- 6434* Theory of Structures III.** Prerequisites: 5113, 5424. 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.** Prerequisite: 6434. 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. Design of simple and continuous prestressed beams. Least weight design concepts.
- 6533* Behavior of Reinforced Concrete Structures.** 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.** 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.** Review of characteristics of earthquakes. Consideration of site and structural parameters on response of building. Building code specifications. Structural analysis and design procedures necessary to achieve earthquake-resistant structures.
- 6713* Seepage and Groundwater Flow.** Prerequisite: 4713. Seepage through dams and sub-soils. Construction and utilization of flow nets. Properties of line of seepage. Seepage pressures, piping and boiling. Groundwater lowering for construction purposes. Steady state and transient pumping problems. Sub-drainage analysis.
- 6723 Advanced Geotechnical Engineering.** Prerequisites: 4713 and GEOL 3024. 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.
- 6733* Selected Topics in Geotechnical Engineering.** Prerequisites: graduate standing in major area of geotechnical engineering, or consent of instructor. Recent developments in geotechnical engineering and selected geotechnical areas only briefly dealt with in prior courses.
- 6763* Construction Management.** Prerequisites: 4273 and 4763. 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.
- 6843* Stochastic Methods in Hydrology.** Prerequisites: 5843 and STAT 4053 or equivalent. Stochastic and statistical hydrologic analyses of surface water and ground water systems. Analyses of urban and rural drainage, and detention systems.
- 6853 Modeling of Water Resources Systems.** Prerequisites: 5843 and 5913. Application of finite-difference and finite-element methods to predict water flow and chemical and biological water quality in saturated-unsaturated ground waters, streams, lakes, urban areas, and watersheds.
- 6913* Advanced Sanitary Science.** Lab 3. Prerequisite: 5813. Effect and control of water pollutants.
- 6923* Industrial Wastes Engineering.** Theory and methods of treating and reducing industrial wastes.
- 6933* Operational Control of Wastewater Treatment Plants.** Prerequisites: 5853 and 5953 or consent of instructor. The use of scientific and engineering principles for the management of wastewater treatment facilities.

CLOTHING, TEXTILES AND MERCHANDISING (CTM)

- 1100 Clothing Construction: Processes and Products.** 1-3 credits, maximum 6. Lab 1-4. A modular class including units on basic construction techniques, pattern selection and garment construction, selecting quality ready-to-wear, pattern alteration and fitting, couture techniques and problem fabrics, construction of designer garment, and managing a sewing laboratory and mass production techniques.
- 2110 Fashion Showmanship.** 1 credit, maximum 8. Preparation, production and evaluation of special fashion related events. Professional learning experiences will include modeling techniques, organization and directing procedures.
- 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 dothing industry.
- 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 (L)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 (S)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 (H,I,S)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.
- 3433 Fashion Retailing.** Prerequisites: 2433 and junior standing. Marketing structures at retail level; job descriptions and responsibilities at management level; financial and control functions.
- 3533 Decorative Fabrics.** Lab 4. Prerequisite: 3 credit hours in art. Historic and contemporary textile designs. Creation of textile designs using personal inspirations, cultural expressions and a variety of techniques.
- 3643 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: 6 credit hours of 1100. Interpretation of dress design developed through the medium of flat pattern; introduction to pattern drafting.
- 4052* Dressmaker Tailoring.** Lab 4. Prerequisite: 6 credit hours of 1100. 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: 6 credit hours of 1100. 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: 3991 and completion of 90 credit hours. Successful merchandising of fashion goods. Retail management and supervision responsibilities. 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.
- 4522 Critical Issues in Clothing, Textiles and Merchandising.** Prerequisite: senior standing. Relationships among the clothing, textiles and merchandising industries and their external environments. Current issues and trends, forecasting and application of creative decision-making skills.
- 4553* Profitable Merchandising Analysis.** Prerequisites: 4303 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, mark-down, turn-over, stock-sales ratio.
- 4572* Analysis and Comparative Study of Fabrics.** Lab 2. Prerequisites: 2573 and 4 credit hours of chemistry. Fiber content, yarn construction, weave, color and finish; standard methods of textile testing.
- 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* Masters 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. The development and preservation of historic costumes including dating criteria, storage and display.
- 5110* Research Developments in CTM.** 1-3 credits, maximum 3. Prerequisites: concurrent enrollment in HEC 5102. Application of research methods and investigation of current research developments in clothing, textiles and merchandising.
- 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: 4572 and CHEM 2463. Testing equipment and methods applicable in the determination of certain physical and chemical characteristics of textile materials.
- 5333* Custom Tailoring.** Lab 4. Prerequisite: 4052. Techniques of custom tailoring. Construction of a coat or suit.
- 5383* Methods and Materials for Teaching Clothing and Textiles and Merchandising.** Prerequisite: 9 credit hours in clothing, textiles and merchandising. Discussion, demonstrations and projects for innovative teaching of clothing, textiles and merchandising.

- 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: 4572. Economic background of the textiles and apparel industry with emphasis on production and distribution and current national and international problems.
- 5653*** **Fashion Merchandising Workshop.** Prerequisite: consent of instructor. Current trends in merchandising policies and procedures. Management level problems approached through in-store observations 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.** Survey of recent developments in the marketing of fashion goods. Emphasis on current issues in fashion merchandising.
- 6000*** **Doctoral Thesis.** 1-12 credits, maximum 30. Prerequisite: consent of major professor. Research in home economics for the PH.D. degree under supervision of a graduate faculty member.
- 6103*** **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.
- 6203*** **Theories of Dress and Communication.** Appearance as a type of nonverbal communication related to appearance. Theoretical structures depicting the use of dress in communication.
- 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** **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 techniques, 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.
- 3103** **Computer Programming for Business.** Prerequisites: 2113 or GENAD 2103 or equivalent. 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 3103.
- 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. 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.
- 3334* Procedures and Algorithmic Processes.** Lab 2. Prerequisite: 2123. Description and programming of nonnumeric 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.
- 3444* 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.
- 4113 Techniques of Computer Science for Science and Engineering.** Prerequisites: one year of calculus and senior or graduate standing. 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, finite arithmetic, iterative processes, program structuring, numerical methods, program libraries are covered. No credit for students with credit in 2113 or 2123.
- 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* Numerical Mathematics: 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.
- 4323* Operating Systems I.** Lab 2. Prerequisites: 3443, STAT 2013. Dynamic procedure activation, system structure, system measurement and evaluation, memory management, process management, automatic and manual system recovery procedures.
- 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 predictor-corrector methods in digital computer solutions. Programming and scaling of analog computers for the solutions of differential equations.
- 4344 Data Structures and Information Processing.** Lab 2. Prerequisite: 3334. Storage, structures, data and information structures, list processing, trees and tree 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.
- 4424 File Structures.** Lab 2. Prerequisite: 3334. 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.

- 4444 Compiler Writing I.** Lab 2. Prerequisite: 3444. 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.** 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.** 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. Formal language theory applied to procedure-oriented languages. Recursive and nonrecursive parsing algorithms. Application of finite state algorithms to lexical analysis.
- 5323 * Operating Systems II.** Lab 2. Prerequisites: 4323. Continuation of 4323. I/O interrupt structure. Intersystem communication. Memory management. Concurrent processes, name management, resource allocation. Protection. Hardware-software interaction. Distributed systems.
- 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. Advanced data structures and their application in recursive and iterative algorithms. Static and dynamic data structure representations and processing algorithms. Dynamic and virtual storage management.
- 5423 * Information Organization and Retrieval.** Prerequisite: 4343, 4423. Storage, classification and retrieval of information, data bases, errors, multi-key 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. 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 recursivity, 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 Analysis of Algorithms.** 2-6 credits, maximum 12. Prerequisite: 5413. Analysis of various algorithms. Sorting, searching, computational complexity, lower bounds for algorithms; NP-hard and NP-complete problems; parallel algorithms; proof of correctness of algorithms. May be repeated with change of topics.
- 6623 Algebraic Structures of Formal Grammars.** Prerequisites: 5313, 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.
- 1333 Construction Practice.** Prerequisite: departmental approval. Supervised field experiences in construction between the freshman and senior years, emphasizing the wide variety of layout, concrete placement framing and finish techniques employed.
- 2252 Drawing Interpretation for Heavy Construction.** Prerequisites: 1213 and 2334. Interpretation of construction drawings for heavy construction projects including civil and structural together with fabrication drawing and submittal data review.
- 2253 Interpretation of Building Construction Drawings.** Lab 3. Prerequisites: 1213 and 2334. Interpretation of residential and commercial construction drawings including architectural, civil, structural, mechanical and electrical. Fabrication drawing and submittal data review.
- 2334 Materials and Methods of Construction.** Structural and finish materials used in architectural construction, their properties, manufacture and applications. Light, heavy and industrial construction. Foundation layout, framing and finish work, site investigations, excavation, precast concrete, tilt up, structural steel and metal building construction and project management.
- 2343 Concrete Technology.** Lab 3. Prerequisite: 2334. Fundamentals of concrete and concrete making materials including admixtures. Proportioning concrete mixtures. Batching, mixing, conveying, placing, finishing and curing concrete. Hot and cold weather concreting, jointing, volume change and crack control.
- 3263 Estimating I.** 3253. Prerequisite: 2013. Quantity take-off with emphasis on excavation, formwork and concrete, masonry, rough carpentry 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.
- 3363 Timber and Form Design.** Lab 3. Prerequisite: MECDT 3323. Basic timber structures with emphasis on concrete form applications.
- 3452 Mechanical Equipment of Buildings.** Prerequisite: PHYSC 1114. Plumbing, heating and air conditioning systems as applied to residences and commercial buildings.
- 3462 Electrical Equipment of Buildings.** Prerequisite: PHYSC 1214. Electrical and lighting systems as applied to residences and commercial buildings.
- 3553 Steel Design.** Lab 3. Prerequisite: MECDT 3323. Analysis and design of steel beams and columns. Bolted and welded connections.
- 3563 Construction Law and Insurance.** Legal and insurance problems as they pertain to the construction industry.
- 3663 Concrete Design.** Lab 3. Prerequisite: MECDT 3323. Analysis and design of reinforced and pre-stressed concrete in accordance with the ACI building code.
- 3714 Soil Mechanics Technology.** Lab 3. Prerequisites: GENT 2323 and MECDT 3323. Physical and mechanical properties of soils, and tests appropriate for construction management students.
- 4050 Advanced Construction Management Problems.** 1-4 credits, maximum 6. Prerequisites: junior standing and consent. Special problems in construction management. A maximum of 6 credit hours can be applied toward degree in construction management technology.
- 4263 Estimating II.** Lab 3. Prerequisite: 3263. Extensive use of actual contract documents for quantity take-off, pricing and assembling the bid for several projects. Use of computers in estimating.
- 4273 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 LIVEN 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)

- 1230 Reading and Study Skills for College Students.** 1-4 credits, maximum 4. Lab 1-4. Instruction and laboratory experience for the improvement of reading rate, vocabulary, comprehension and study skills. Graded on pass-fail basis.
- 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. Graded on a pass-fail basis.
- 3122* Utilization of Instructional Media.** Familiarizes students with a broad range of instructional media and with principles and techniques related to their selection, utilization and evaluation.

- 3132*** **Microcomputer Technologies for Education.** Lab 4. Literacy level interaction with microcomputers; principles and techniques related to selection, utilization, and evaluation of user-friendly computer software for instruction.
- 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. Prerequisite: 2450. Seminars, directed participation experiences in the elementary school. Develops an awareness of and gives experience in meeting the mental, social physical and cultural differences among children. Graded on a pass-fail basis.
- 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. Graded on a pass-fail basis.
- 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.** 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*** **Childrens 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.
- 4043*** **Microcomputer Applications in Education.** Lab 2. Prerequisite: 3132 or equivalent. Instructional computing course for educators including development and examination of instructional programs using the BASIC language, computing issues in schools, development of instructional computing plans, and hands-on experience with microcomputer applications for the classroom.
- 4053*** **Teaching Geometry in the Secondary School.** 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*** **Multi-Media Program Production.** Prerequisite: 3122. Design and production of synchronized automatic sound slide programs coordinated with subject matter content. Includes photographic techniques, audio recording and sound-mixing methods, graphics, and synchronizing techniques. Individual projects required.

- 4123 (S)History of Education.** The development of major educational ideas and programs with emphasis on the growth of public education in the United States from 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. Diagnostic procedures for reading instruction, including evaluation techniques, teaching strategies 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, selection 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. Mental, social, physical and cultural differences among children.
- 4452 Kindergarten Education: Methods.** Prerequisite: admission to teacher education. The purposes, 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 perspective 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) International Problems and the Role of the School.** Prerequisite: junior or senior standing. Extends the student's intercultural awareness by focusing on international problems and expanding their meaning to include the school and its relationship to existing international concerns in other types of societies. Consideration of such international problems as natural resources, environment, food supply, urbanization and conflict resolution.
- 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.
- 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.** 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.** Current trends in methods, materials and classroom procedures as they are related to the teaching of foreign languages in the secondary school.
- 5043* Fundamentals of Teaching.** Prerequisites: ABSED 5213 or 5463. Theory and research on teaching applied to classroom teaching behavior.
- 5053* Fundamentals of Curriculum Development.** A study of curriculum that includes philosophy, history, decision making, major concepts and terms.
- 5113* Videotape Television for Instruction.** Prerequisite: 4113. Educational design and production of videotape using single camera, small studio production and other technology. Individual and team projects.
- 5122* Curriculum in the Secondary School.** Curriculum in the middle and high schools.
- 5130* Advanced Studies In Children's Literature.** 1-3 credits, maximum 6. Prerequisite: 4023. The history of children's books against a world background of prevailing political, economic and social factors influencing cultural patterns and values. The tools of research in children's literature and to the nature and direction of contemporary children's book publishing in the United States and abroad.
- 5133* Photography for Instruction.** Prerequisite: 3122. Photography skills emphasizing 35mm and instamatic type cameras with application to instruction and other communication situations such as photo-copying, use of high contrast film for graphics, and simple photography projects for school age students.
- 5143* Language Arts in the Curriculum.** Content and current issues in the language arts. Materials and methods for teaching the communication skills.
- 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.
- 5270* Practicum in School Mathematics.1-3** credits, maximum 6. Lab 2-6. Prerequisite: 5263. Diagnostic and therapeutic procedures in mathematics with students of all ages. Laboratory classes provide for clinical experiences in evaluation and instruction with children experiencing difficulty in mathematics.

- 5280*** **Workshop In Science Education.** 1-4 credits, maximum 4. Develops and/or implements elementary and secondary science programs.
- 5323*** **Teaching Social Studies in the Schools.** Curriculum, materials, methods and procedures related to social studies.
- 5350*** **The Visual Arts in the Curriculum.** 1-3 credits, maximum 6. Lab 2. Prerequisite: 4213. Creative approaches to the use of two- and three-dimensional media as they relate to various aspects of education. Opportunities available for periodic group and individual evaluation in order to give direction and significance to future growth.
- 5423*** **Developmental Reading at the Primary Level.** Prerequisite: 3283, 4233 and 4190 or 4473. 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. 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. 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.** Prerequisite: consent of instructor. Seminar topics may differ depending upon the nature of current interests and topics in American education.
- 5740*** **Seminar in Teacher Education.** 3-9 credits, maximum 9. For cooperating teachers and university supervisors. Problems and issues in pre-service teacher education. Simulation and laboratory experiences in supervision of student teachers.
- 5753** **Audiovisual Communication Strategies.** Lab 2. Prerequisites: 3122 or 4113 and ABSED 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. 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.

- 5833*** **Methods In Physical Education.** Prerequisites: PE 4712 and 3773. Prior completion of CIED 5043 recommended. Differentiation between teaching methods in physical education; advantages of the application of the individual methods to particular situations in teaching physical education. Same course as HPELS 5833*.
- 5850*** **Directed Study.** Lab 1-3. 1-3 credits, maximum 3. Prerequisite: consent of instructor. Directed study for master's level students.
- 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, philosophies and points of view in elementary school education.
- 6133*** **Theory to Practice in Education.** Prerequisite: consent of instructor. A culminating seminar demonstrating the application of theory from several disciplines to the practical problems of education: curriculum development, organization, teaching strategies, 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. Developmental reading needs of various groups of exceptional individuals. Methods and materials of instruction.
- 6850*** **Directed Reading.** 1-6 credits, maximum 6. Prerequisite: consent of instructor. Directed reading for students with advanced graduate standing to enhance students' understanding in areas where they wish additional knowledge.
- 6853*** **Improvement of Instruction in Reading.** Problems and issues related to reading instruction. The roles of various school personnel in effecting change in curriculum and methods.
- 6880** **Internship in Education.** 1-8 credits, maximum 8. Lab 3-24. Prerequisite: consent of instructor. Directed off-campus experiences designed to relate ideas and concepts to problems encountered in the management of the school program.
- 6910*** **Practicum.** 1-6 credits, maximum 6. Prerequisite: consent of adviser. Helps the student carry out an acceptable research problem (practicum) in his/her local school situation. Credit given upon completion of the written report.

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.
- 3113*** **Foundations of Occupational Education.** 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 multi-cultural backgrounds and specific needs. Same course as OAED 3113.

- 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.
- 3333* Distributive Education/Marketing Promotion.** The promotional function in marketing in distributive education programs; competencies and skills in teaching advertising, display, publicity, public relations, and visual merchandising in all types of businesses.
- 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.
- 3543 Techniques of Teaching Salesmanship Skills.** Development of the knowledge and skills to plan, develop and implement a competency based distributive education salesmanship course.
- 3901 Seminar in Teacher Education.** Procedures for gaining admission to teacher education and student teaching. Requirements for certification and graduation and course planning to meet those requirements. Career opportunities and procedures for securing employment. Same course as OAED 3901.
- 4103 Methods of Teaching Occupational and Adult Education.** Lab 2. 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. Same course as OAED 4103.
- 4333* Principles of Teaching Business Management and Ownership.** Principles of management and ownership techniques appropriate for teaching these skills at the secondary school level.
- 4470 Teaching Practicum in Occupational Education.** 1-12 credits, maximum 12. Prerequisites: admission to Teacher Education, 3253*, 4103, and/or concurrent enrollment in 3453*. Organized teaching experiences under the guidance and direction of a local school cooperating teacher and a university teacher educator. Participant is assigned to a cooperating teacher with responsibility for planning, implementing and evaluating the classroom, laboratory or shop. Same course as OAED 4470.
- 5000* Thesis.** 1-6 credits, maximum 6. Prerequisite: consent of head of department.
- 5220* Seminar.** 1-3 credits, maximum 6. Prerequisite: 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.** 1-6 credits, maximum 6. Prerequisite: graduate standing and consent of department. Problems related to distributive education; work conducted off campus; conferences and reports required.
- 5350 Problems and Methods in Distributive Education.** 1-6 credits, maximum 6. Prerequisite: consent of department. Problems related to the cooperative and simulated project method of instruction.
- 5660* Distributive Education Workshop.** 1-2 credits, maximum 6. Prerequisite: 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.** Prerequisite: 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.** Issues-oriented approach. Basic economic principles introduced and developed through study of important social issues; for example,

inflation, unemployment, poverty, discrimination, crime, population growth and environmental quality. Develops the economist's **approach** to social problems, and evaluates the **contribution** of economics to their solution. No credit for students with prior credit in 2013 or 2023.

- 2013 (S)Introduction to Macroeconomics.** Prerequisite: 15 semester credit hours. The functioning and current problems of the aggregate economy: determination and analysis of national income, employment, inflation and stabilization; monetary and fiscal policy; and aspects of international interdependence.
- 2023 (S)Introduction to Microeconomics.** Prerequisite: 2013. Goals, incentives and outcomes of economic behavior with applications and illustrations from current social issues: operation of markets for goods, services and factors of production; the behavior of firms and industries in different types of competition; income distribution; and international exchange.
- 2123 Introduction to Economic Analysis.** Prerequisite: 1113. A theory-oriented approach to 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: 2023 or 2123, prior approval of instructor. Analysis of a contemporary topic in economics. Course content will vary to reflect changing social issues and trends in applied economics.
- 3023 Managerial Economics.** Prerequisite: 2023 or 2123. 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.** Prerequisites: 2023 or 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.** Prerequisites: 2023 or 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.** Prerequisites: 2023 or 2123. The economics of money and banking. Operations of commercial banks and structure and competition of the banking industry. Organization and operation of the Federal Reserve System *and* its effects on interest rates, employment and prices. An introduction to monetary economics and international banking concludes the course.
- 3423 (S)Public Finance.** Prerequisite: 3 credit hours in economics. The economics of the government sector. Scope of government activity, efficiency in government expenditures, federal budget, fiscal and debt management policy. Principles of taxation. Major tax sources, tax distribution, tax issues. Current public finance problems such as revenue sharing, negative income tax, urban transport systems and national health insurance.
- 3513* Labor Economics and Labor Problems.** Prerequisite: 3 credit hours in economics. Economic analysis of contemporary labor market problems and survey of U.S. unionism. The labor force, education and training, discrimination, inflation and unemployment theories of the labor movement, economic impact of unions and public policy toward labor.
- 3523* (S)Poverty and Economic Insecurity.** Prerequisite: 3 credit hours in economics. Problems, programs and proposals for dealing with poverty and economic insecurity.
- 3613* (I)International Economic Relations.** Prerequisite: 3 credit hours in economics. International trade and finance; international economic organizations; the foreign economic policy of the U.S.
- 3713* Government and Business.** Prerequisite: 3 credit hours in economics. Methods of measuring the extent of monopoly power in American industries and ways of evaluating the effects of this power on consumer welfare. U.S. antitrust laws, their enforcement and landmark court decisions under these laws.
- 3813* Development of Economic Thought.** Prerequisite: 3 credit hours in economics. The ideas of great economists with emphasis upon economic concepts and systems of thought in relation to social, ethical and political ideas under evolving historical conditions.
- 3823* Economic History of the United States.** Economic development since about 1763; particular emphasis on the period since 1860. Same course as HIST 4513.

- 3903* Economics of Energy and the Environment****Prerequisite:** 2123. Issues related to the development and use of energy resources, and the management of the natural environment.
- 4010* Basic Studies in Economics.** 1-6 credits, maximum 6. Prerequisite: 3 credit hours in economics. Economic concepts, theory, issues and problems. Designed for elementary and secondary teachers. Economics education teaching methods included.
- 4213* Econometric Methods.** Prerequisites: 2023 or 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.
- 4223* Business and Economic Forecasting.** Prerequisites: 2023 or 2123; STAT 3013 or 4013. Forecasting business and economic variables. Regression models and time series models such as exponential smoothing models, seasonal models, and Box Jenkins models. Evaluation of methods and forecasting accuracy. Application of methods using computer programs.
- 4313* Advanced Banking.** Prerequisite: 3313. Central and commercial banking, including Federal Reserve policymaking, banking structure, capital adequacy and taxation of banks. Friedman's proposals for monetary and banking reform.
- 4413* State and Local Government Finance.** Prerequisite: 3 credit hours in economics. State and local government revenue and expenditure patterns in a federal fiscal system; intergovernmental fiscal problems; taxation in a federal system; adjustment to economic growth and change.
- 4513* Labor and Public Policy.** 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, Employment and Public Policy.** Introduction to the manpower field, dealing with the problems, issues and experience of public programs for combating unemployment, and of public and private programs for improving employment and earnings prospects of people, including the disadvantaged. (Same course as GEOG 4523).
- 4643* (I)International 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: 2023 or 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* Economic Systems.** Prerequisite: 2023 or 2123. Comparative analysis of the economic theory and institutions of capitalism, socialism, communism and facism.
- 4913* Urban and Regional Economics.** Prerequisites: 2023 or 2123. Urban and regional economics; the spatial aspects of poverty, land use, the urban environment and rural industrial development.
- 4923* United States Economic Development.** Prerequisite: 2023 or 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. 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.
- 5020* General Studies in Economics.** 1-6 credits, maximum 6. Economic principles and problems from the general education point of view rather than that of teaching economics. Credits applied only toward Master of Science in Education or Doctor of Education.
- 5113* Managerial Economics.** Economic theory applied to business decision making. Concepts of microeconomics and macro-economics related to understanding the economic system, analysis of policy, forecasting, and international economics.
- 5123* Microeconomic Theory I.** Contemporary price and allocation theory with emphasis on comparative statics.

- 5133* Macroeconomic Theory I.** Prerequisite: 3123, Math 2265 or Math 2:13. National income, employment and the price level from the point of view of comparative statics.
- 5143* Macroeconomic Theory II.** Prerequisite: 5133. National income, employment and the price level from the point of view of dynamics. Growth models.
- 5163* Microeconomic Theory II.** Prerequisite: 5123. Contemporary price and allocation theory with emphasis on general equilibrium analysis. Welfare economics.
- 5213* Mathematical Economics.** Mathematical concepts especially useful to an understanding of economic theory.
- 5223* Introduction to Mathematical Economics.** Prerequisites: 3113, Math 2265 or equivalent. Mathematical concepts of calculus, difference or differential equations, linear algebra, and linear and non-linear programming with applications from economic theory.
- 5233* Advanced Mathematical Economics.** Prerequisites: 5223 or MATH 2265. A mathematical approach to the theory of economic equilibrium growth, cycles and imperfect competition.
- 5243* Econometrics I.** Prerequisite: 4213 or Stat 4043. Application of econometric techniques to economic problems: theory and estimation of structural economic parameters.
- 5253* Econometrics II.** Prerequisite: 5243. Theory, principles of estimation and quantitative applications involving complex systems of structural relationships of economic phenomenon.
- 5313* Monetary Economics I.** Contemporary issues in monetary theory and policy. Demand for money and supply of money theory, interest rate theory and issues in monetary policy.
- 5323* Monetary Economics II.** Intensive analysis of classical monetary theory and individual research on selected problems in monetary economics. The ideas of Patinkin, Wicksell, Fisher and Keynes.
- 5413* Economics of the Public Sector I.** Allocation and distribution effects as well as incidence of governmental budget policies.
- 5422* General Studies in Economics.** Financing government-federal, 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.** Fiscal policy as a means of promoting economic stabilization and growth.
- 5533* Manpower Analysis.** 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 Analysis.** A critical evaluation of the theoretical and empirical literature dealing with labor market processes; wage determination and the impact of unions on relative wages; estimation of aggregate labor supply; resource allocation and labor mobility; the inflation-employment tradeoff and the economics of labor market discrimination.
- 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 GEOG 5553.
- 5613* International Finance.** Foreign exchange, open-economy macroeconomics and world monetary relations; the framework of international credit and foreign investments.
- 5623* Economic Development I.** Characteristics and problems of less developed countries. Criteria of growth and development with emphasis on strategies for development. The role of capital, labor, technological progress and entrepreneurship. Growth models.
- 5633* International Trade.** International trade and commercial policy. Comparative advantage, general equilibrium and modern trade theories; welfare implications of international resource allocation models; the theory of protection and international interdependence.
- 5643* Economic Development II.** Major problems of development policy. Inflation and mobilization of capital, investment criteria, agriculture, foreign trade, population and manpower, planning and programming methods.

- 5713*** **Industrial Organization I.** Organization and operation of the enterprise sector of a free enterprise economy; interrelations of market structure, conduct and performance; public policies affecting these elements.
- 5723*** **Industrial Organization II.** Alternative market structures and their relationships to market performance; the empirical evidence concerning these. Public policies toward business, including emphasis on U.S. antitrust laws and economic analysis of their enforcement; theories of public utility regulation.
- 5813*** **History of Economic Thought.** 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.** Selected topics in location theory, regional economic growth and policies toward regional development in the U.S.
- 5913*** **Urban Economics.** The urban area as an economic system. Problems of economic policy in urban environment.
- 6000** **Research and Thesis.** 1-12 credits, maximum 30. Prerequisite: approval of advisory committee. Workshop for the exploration and development of research topics. Research leading to the Ph.D. dissertation.
- 6010** **Seminar in Economic Policy.** 1-3 credits, maximum 6. Intensive analysis of selected problems in economic policy. Individual research, seminar reports and group discussion of reports.
- 6113** **Seminar in Economic Theory. Microeconomics.**
- 6123** **Seminar in Economic Theory. Macroeconomics.**
- 6520*** **Seminar in Manpower Analysis.** 1-4 credits, maximum 4. 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.** 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. Selected problems in regional economics for advanced students. Individual research and seminar reports.

EDUCATION (EDUC)

- 1111** **Orientation to Education.** Required of all rust-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 instruction 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 institutions 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 combat 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. Prerequisite: consent of instructor. Limited to graduate students who have experience in the field and knowledge of elementary techniques in research. Students pursue individual research problems under the direct supervision of members of the staff.

6023* Doctoral Seminar. Prerequisite: approval of adviser. Open to all doctoral aspirants dealing with preparation of a proposal for the doctoral study. Mechanics and techniques of proposal and dissertation preparation and design of the proposed research.

EDUCATIONAL ADMINISTRATION AND HIGHER EDUCATION (EAHED)

- 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.** Purpose, organization and administration of community education and its various components.
- 5813* Public School Administration.** The scope and function of public school administration.
- 5833* Public School Finance.** 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: 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.
- 6003* Educational Ideas.** Seminar for majors in EAHED. Decision-making processes utilized in educational systems today.
- 6230* Critical Issues in Higher Education.** 1-3 credits, maximum 9. Prerequisite: 6753. Issues that have shaped and are shaping higher education in American society.
- 6243* Organization and Administration in Education.** Research and best practice in the organization and administration of educational organizations.
- 6253* The Principalship.** Prerequisites: 5813, 6243 and 6263. Strategies, techniques and solutions the principal can utilize in the operation of a public school. Developing policy statements, handbooks, budgets, schedules, etc.
- 6263* Supervision.** The place of supervision in the improvement of instruction; a study of fundamental principles and procedures.
- 6333* Public School Business Management.** Prerequisite: 5833. School business management as a function of educational administration.
- 6363* Educational Finance: A National Perspective.** Prerequisite: 5833. Theory and practice of financing American public education.
- 6393* School Personnel Administration.** Relationships between administration and other school personnel; recruitment, selection, promotion, morale, salary, staff relations and evaluation of teaching.
- 6420* The Politics of Education.** 2-3 credits, maximum 3. Activities of schools as they relate to the political environment; e.g., voter behavior, change strategies and community power structures.
- 6453* Legal Aspects of Education.** Legal aspects of education with special reference to Oklahoma. Separate sections for common schools and 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.

- 6463* Higher Education Law.** National and state constitutional provisions, laws, and court cases concerning higher education. Considerable legal research required.
- 6473* Practicum in Instructional Supervision.** Prerequisite: 6263 or consent of instructor. Application of modern approaches to instructional supervision through practice in recording and analyzing teacher behavior in actual classroom settings. Clinical and group methods for improving instruction are considered.
- 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.** Prerequisite: 6243. Selected organizational typologies, conceptualizations and theoretical frameworks as they relate to organizational behavior and behavior of personnel in organizations.
- 6613* Organizing, Developing and Administering Community Education. Relationship** between education and the community, with special emphasis on community needs/resources and the development of a total community education program. Skills and competencies for planning, implementing and evaluating community education programs are explored.
- 6622* The School Community Survey.** Basic principles and survey techniques, which are then applied in the field.
- 6650* Problems in Educational Administration.** 1-4 credits, maximum 8. Prerequisite: consent of instructor. Special administrative problem in common schools or higher education, e.g., school plant, school/community relations, administration and the instructional programs, attrition and finance.
- 6683* The Community Junior College.** The American two-year college including historical and philosophical development, curricula, students and the learning process, faculty and instruction, administration and governance, support and control. Principles, practices and problems of community junior colleges in America.
- 6703* Finance in Higher Education.** Prerequisite: 6753. Problems and prospects of financing American education, with in-depth discussion of selected topics, e.g., social capital, federal aid, faculty salaries and state support.
- 6710* Special Problems.** 1-4 credits, maximum 8. Prerequisite: teaching or administrative experience. Assists administrators with either recurrent or unique problems arising in common schools or in higher education. Emphasizes evaluation and planning related especially to staff, programs and faculty needs.
- 6713* Effective Teaching in Colleges and Universities.** Research findings on teaching-learning relationships at the college and university level. Study of methods employed to encourage, guide and evaluate student learning. Investigation and appraisal of newer instructional methods and trends.
- 6720* Education Workshop.** 1-4 credits, maximum 8. Enables public school and higher education personnel to analyze instructional and/or administrative problems.
- 6730* Planning and Educational Change.** 1-4 credits, maximum 4. Includes organizational and environmental parameters, sources of change, barriers to change, and strategies for planning and implementing organizational change.
- 6753* Development and Organization of Higher Education.** 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.** Curriculum for colleges and universities, including basic definitions and concepts, theoretical views, historical perspectives, internal and external influences, processes for planning, evaluating, and revising, examples of distinctive curricula and future projections.
- 6823* Educational Leadership.** Prerequisite: 6803. Marshalling scarce resources to achieve institutional goals and objectives congruent with the needs and abilities of persons associated with the institution. Research on leadership models and styles, with consideration given to application in higher education today. May also be of value to those in business and industry, politics, and government.

- 6833* College and University PreSidenCy.**Prerequisite: 6803. For those who anticipate a career in college and university administration in a related management position. The role and function of the presidency.
- 6843* The Academic Department.**Prerequisite: 6753. An analysis of the academic department and its leader, the department head.
- 6850* Directed Reading.** 1-4 credits, maximum 6. Prerequisite: consent of instructor. Directed reading for students with graduate standing.
- 6870* Seminar.** 1-4 credits, maximum 10. Prerequisite: consent of instructor. Topical issues related to administration and/or higher education, including research techniques available to analyze such topics.
- 6880* Internship in Education.** 1-4 credits, maximum 8. Prerequisite: consent of 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 and COMPUTER ENGINEERING (ECEN)

- 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; concurrent enrollment in 3713, 3723. 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, MATH 2613, 3713, 3012, concurrent enrollment in 3022. 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; concurrent enrollment in 3012 and 3723. 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, concurrent enrollment in 3012 and 3713. 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.

- 4001 *** **Electrical Engineering Seminar.** Prerequisite: senior standing. Topics on professionalism technical and professional societies, and current industrial developments. Individual or group reports prepared and presented.
- 4010 *** **Technical Problems and Engineering Design.** 1-12 credits, maximum 12. Prerequisite: consent of instructor. Individual independent study projects selected in consultation with the instructor; analysis or design problems, literature searches and computer simulations may be involved.
- 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.
- 4254 *** **Digital Systems Design and Analysis.** Lab 2. Prerequisites: 3213 and 3313. Boolean algebra, optimization of logic networks. Design using SSI, MSI AND LSI components, ROM and PLA applications. Analysis and design of clocked sequential logic networks. Flip-flops, counters, registers, RAM. Large signal models for transistors. Digital logic families DTL, RTL, STTL, IIL, ECL, NMOS, CMOS. Laboratory experience in implementing combinational and sequential logic devices.
- 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 formatting, 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 wave-shaping 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 system.
- 4503 *** **Random Signals and Noise.** Prerequisites: 3713 and 3723. Analysis of electrical systems using elementary concepts of probability, random variables and random processes. Frequency and time domain response of linear systems driven by random inputs. Statistical properties of electrical noise.
- 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; electromagnetics 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 realizability, driving-point synthesis, passive and active network synthesis.
- 4813* Optical Electronics.** Prerequisite: 3313, 3613. Extension of electronics principles into the optical domain. Ray matrices of passive devices. Properties and propagation of gaussian beams. Optical resonators and oscillations. Lasers. Propagation through fiber optics. Detection problems. Integrated optical circuits.
- 5000* Thesis or Report.** 1-6 credits, maximum 6. Prerequisite: approval of major professor. A student studying for 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.** Quasi-static control of power systems and analysis of power systems under abnormal operating conditions. Transient stability studies. Models formulated and solutions outlined for implementation on the computer.
- 5123* Engineering Systems Reliability Evaluation.** Techniques and concepts needed for evaluating the long term and short term reliability of a system. Topics include static and spinning generation capacity; transmission, composite, interconnected, and dc system reliability evaluations; and power system security. Applications to systems other than power systems included. For students with little or no background in probability or statistics.
- 5153* Direct Energy Conversion II.** 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 data 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.** An advanced study of electronic systems. 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. Continuation of 5313. Devices and integrated circuits as applied in pulse circuits, modulation, demodulation and digital networks.
- 5413 Control Systems I.** Prerequisite: 5713. 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.** Prerequisites: 4513 and 4503 or STAT 4033. Theory and applications involving probability, random variables, functions of random variables, and stochastic processes, including Gaussian and Markov processes. Correlation, power spectral density, and nonstationary random processes. Response of linear systems to stochastic processes. State-space formulation and covariance analysis.
- 5523* Estimation Theory.** Prerequisite: 4513. Optimal estimation theory including linear and nonlinear estimation of discrete and continuous random functions. Wiener and Kalman filter theory included.
- 5533 Modern 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 Electromagnetic Theory I.** 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* Introduction to System Theory.** 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. 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.** Review of digital signal processing, digital models for the speech signal. Short-time Fourier analysis, linear predictive coding of speech and an introduction to man-machine communication by voice.
- 5763* Digital Signal Processing.** Introduction to discrete linear systems; frequency-domain design of digital filters; quantization effects in digital filters; digital filter hardware, discrete Fourier transforms; high-speed convolution and correlation with application to digital filtering; introduction to Walsh-Fourier theory.
- 5783* Random Systems Modeling and Analysis.** Random dynamical systems; development of discrete modeling techniques, analysis procedures for continuous and discrete random systems. Digital implementations of algorithms for random systems featuring engineering tradeoffs between accuracy, response time, equipment requirements and complexity.
- 5793* Digital Image Processing.** Prerequisite: 5763. Digital image processing including acquisition and characterization of images, coding, enhancement, restoration and segmentation. Use of transforms. Use of ECEN VAX/COMTAL image processing system to develop skills in using and writing image processing software.
- 5813* Solid-State Engineering.** 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, recom-

binations). Boltzmann transport equation. Irreversible thermodynamics as applied to the thermo-electric effect and magnetic fields. Engineering superconductivity.

- 5853 Modern Solid-State Devices.** Prerequisite: 5813. 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. 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. Study of the computer as a control element in complex processes. Basic sampling theory. Analog-to-digital and digital-to-analog conversion of data. Analysis of analog-digital systems via Z-transform methods and difference equations in state-variable form. Stability criteria and design approaches for digital compensation. Simulation of digital control systems on the hybrid computer.
- 6450* Control Systems II.** 1-3 credits, maximum 6. Prerequisites: 5413 and 5523. Advanced topics in optimal control systems. Dynamic programming and the maximum principle applied to stochastic systems. Optimum state estimation and the separation theorem. Selected topics from recent developments in adaptive and stochastic control.
- 6523* Introduction to Information Theory.** Prerequisite: 5513. 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. 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 acoustical electrodynamic phenomena.
- 6653* Applications of Electromagnetic Theory II.** 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. Chosen from recent developments. R-network synthesis, state model approach to network synthesis. N-port network synthesis, multivariable synthesis, sensitivity.
- 6723* Nonlinear Systems Analysis 11.** 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. Device fabrication; wafer preparation, etching and masking techniques, alloying, bonding, testing, Epitaxial techniques, special topics.

ELECTRICAL POWER TECHNOLOGY (EPT)

- 3003 Principles Of Electrical Power.** Lab 2. Prerequisite: EET 1213. Polyphase power distribution systems transformer connections and industrial electrical motors. Selection and methods of control of polyphase induction motors.

- 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.
- 3213 Power Systems I.** Prerequisites: MATH 2373 and basic electricity. Voltage, current and power relationships in single-phase and polyphase electric circuits and systems. Power transformers theory, operation, testing, and connections to power systems. Methods of starting and controlling electrical machines.
- 3224 Power Circuits and Machinery.** Lab 3. Prerequisite: 3102. Balanced operation of poly-phase 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-11 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.
- 4050 Advanced Electrical Power Problems.** 1-4 credits, maximum 4. Prerequisite: junior standing and consent of Department. Special problems in the electrical power area.
- 4113 Power Systems II.** Prerequisites: 3213, 3224, MATH 2383. Transmission and distribution line parameters, system modeling load flow analysis. Mathematical techniques in the analysis of large networks. Problem procedures are computer assisted.
- 4124 Switchgear 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.
- 4223 Advanced Topics in Electrical Power.** Prerequisites: 4113, 4124. Electric energy systems planning, operation control, and protection. System problem solutions are computer assisted.
- 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) Electronic Devices and Amplifiers.** Lab 3. Co-requisite: 1104. Solid-state components as used in elementary amplifier circuits; brief description of power supplies.
- 1224 (L) Electronic Amplifiers I.** Lab 3. Prerequisites: 1112; co-requisite: 1244. Amplifiers using bipolar and FET transistors. RC coupled, direct coupled and transformer coupled circuits. Bias stabilizing and feedback techniques.

- 1244 (L) Circuit Analysis I.** Lab 3. Prerequisites: 1104 and Math 1715; Co-requisite: 1224. Transient analysis of electric circuits. The use of network theorems. Resonant circuits and filters and AC power including three-phase.
- 2213 Essentials of Electricity.** Lab 2. Prerequisites: MATH 1513, 1613. Electric circuits and machines, including Ohm's law, magnetism, direct-current motors, generators and controls, alternating current, single-phase circuits, polyphase circuits and alternating current machinery. For non-electronics majors only.
- 2303 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 Fabrication Techniques.** Lab 3. Prerequisites: 2303 and 2634. Laboratory projects for modern electronics engineering technicians. Circuit test, development and fabrication in wired and printed form.
- 3103 Fundamental of Electronics.** Lab 2. Prerequisite: 1213, Co-requisite: MATH 2373. 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.
- 3234 Nondestructive Testing.** Lab 2. Commonly used nondestructive testing in industry; radiography. Magneflux, liquid penetrant, ultrasonic and eddy current testing.
- 3263 Electronic Digital Systems.** Lab 3. Prerequisite: 2633. 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 assembly language.
- 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.
- 4050 Advanced Electronic Problems.** 1-4 credits, maximum 4. Prerequisites: junior standing and consent of Department. Special problems in the electronic area.
- 4153 Data Communications.** Lab 3. Prerequisites: 2633, 2634, and 3263. Data communications including multiplexing concepts, sampling techniques, encoding techniques. Telemetry, digitized voice, TTY, and bulk Transmission systems.
- 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 lines, 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: 1111. Continuation of 1111.
- 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.
- 2030 Co-op Industrial Practice I.** 1-6 credits, maximum 12. Prerequisite: sophomore standing and permission of Co-op coordinator. Pre-engineering industrial practice. Written reports as specified by advisor. Application of credit to meet degree requirements varies with level and department.
- 2100 Orientation Projects.** Lab 2-6. 1-3 credits, maximum 3. Prerequisite: pre-engineering 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.
- 3030 Co-op Industrial Practice II.** 1-6 credits, maximum 12. Prerequisites: junior standing and permission of Co-op coordinator. Pre-engineering industrial practice. Written reports as specified by advisor. Application of credit to meet degree requirements varies with level and department.
- 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.
- 4030 Co-op Industrial Practice III.** 1-6 credits, maximum 12. Prerequisites: senior standing and permission of Co-op coordinator. Pre-engineering industrial practice. Written reports as specified by advisor. Application of credit to meet degree requirements varies with level and department.
- 4060 * Topics in Technology and Society.** 1-3 credits, maximum 6. Problems of society relating to technology and added problems stemming from their solution. Minimal reliance on mathematics; for engineering and nonengineering students.
- 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. Introductor 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.
- 1213 Directed Writings: Freshman Composition.** Prerequisite: English ACT score 24-27. Review of fundamentals as necessary. Individualized instruction in writing on topics based on discussion of student's interests. Class size limited. This course may be substituted for Engl 1113.
- 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.
- 2003 Vocabulary Development for International Students.** Lab 2. Basic vocabulary building methods and vocabulary development through discussion of readings and audio lab listening comprehension exercises.
- 2023 (H) Thought and expression of Biological Scientists.** Reading and study skills, systematic thinking processes and abilities in organization and expression as applied to the life sciences.
- 2333 Introduction to Technical Writing 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 6. Prerequisite: 6 hours of English. Specialized readings and independent studies.
- 2413 (H) Introduction to Literature.** Prerequisite: 6 credit hours of English Fiction, drama/film and poetry. Written critical exercises and discussion.
- 2443 (H,SpD) Introduction to Language.** Structural and historical organization of languages. The process of language as a basic human function. A comprehensive survey of world languages. Same course as FLL 2443.
- 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.

- 2543 (H)British Literary Tradition I.** Prerequisite: 6 hours of English. The beginnings through the Neo-Classic Period.
- 2653 (H)British Literary Tradition II.** Prerequisite: 6 hours of English. The Romantic Period to the present.
- 2773 (H) American Literary Tradition I.** Prerequisite: 6 hours of English. The Puritans through the Romantic Period.
- 2883 (H)American Literary Tradition II.** Prerequisite: 6 hours of English. From the Romantic Period to the present.
- 3003 Internship: English Majors.** Prerequisites: 9 hours of English. A practicum to allow the student to experience various vocational situations and demands.
- 3010 Review of English Fundamentals.** Prerequisites: 6 hours of English. Taken by audit only. Restricted to those failing the STEP grammar test or the University English Essay Proficiency Examination.
- 3033 Intermediate Creative Writing: Fiction.** Prerequisite: 2513. Directed readings and fiction with special attention to techniques.
- 3043 Intermediate Creative Writing: Poetry.** Prerequisite: 2513. Directed readings and practice in writing poetry with special attention to techniques.
- 3053 Intermediate Creative Writing: Scriptwriting.** Prerequisite: 2513. Directed readings and practice in writing scripts with special attention to techniques.
- 3123 (H)Classical Mythology.** Prerequisite: 9 hours of English. The heritage of classical Greek and Roman myths as revealed in selected examples of British and American literature.
- 3133 (H)Science Fiction.** Major special issues, scientific theory and myths as expressed in science fiction and fantasy.
- 3143 (H,SpD)American Folklore.** Historical perspective, traditions, common cultural experiences and varied ethnic contributions to American life before the twentieth century as expressed in American folklore.
- 3200 Special Problems in Language and Literature.** 1-3 credits, maximum 6. Prerequisite: 9 credit hours of English. Specialized readings and independent study.
- 3243 (H)Criticism: Literary Theory.** Prerequisites: 9 hours of English. The principal critical theories in use today with emphasis on critical vocabulary.
- 3253 Criticism: Applied Literary.** Prerequisites: 9 hours of English. Practice in applying the principal critical theories in use today. Emphasis on using research writing techniques: summary, abstract, precis, bibliography, primary and secondary source papers.
- 3263 (H) Criticism: Film.** Prerequisites: 9 hours of English. Contemporary critical perspectives: historic, formal, auteur, thematic. Emphasis on practical film criticism.
- 3273 Criticism: Technical Writing.** Prerequisites: 9 hours of English. Contemporary scientific and technical style, sources of information and rhetoric. Critical analysis.
- 3323 Intermediate Technical Writing and Professional Report Writing.** Prerequisites: 1113 and 1323. Applied writing in areas of specialization. Intensive practice in professional writing modes, styles, research techniques and editing for specialized audiences and/or publications. This course may be substituted for 1323 with an A or B in 1113 and recommendation of student's college.
- 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 English. Origins, development, theory and craft of poetry.
- 3353 (H)Film as Literature.** Film and literature as narrative forms.
- 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.
- 3891 Shakespeare Laboratory.** Lab 2. Prerequisite: 3883. Review of ten Shakespearean plays by either audio or video tape.
- 3903 (H)Literature of Minority or Ethnic Groups: Major Black Writers.** Prerequisite: 9 hours of English. The literary expressions and ethnic contributions to American literature of major black black writers.

- 3913 Literature of Minority or Ethnic Groups: Southwest American Indians.** Prerequisite: 9 hours of English. The literary expressions and ethnic contributions to American literature of Southwest American Indians.
- 3923 Literature of Minority or Ethnic Groups: Plains American Indians.** Prerequisite: 9 hours of English. The literary expressions and ethnic contributions to American literature of Plains American Indians.
- 3933 Literature of Minority or Ethnic Groups: Five Civilized Tribes.** Prerequisite: 9 hours of English. The literary expressions and ethnic contributions to American literature of Five Civilized Tribes.
- 4003 * History of the English Language.** Prerequisite: 9 hours of English. The growth of the English language.
- 4013 * English Grammar.** Prerequisite: 9 hours of English. The traditional terminology and concepts of English grammar leading or evolving into the several current systems of description.
- 4053* Transformational Generative Grammar.** Prerequisite: 9 hours of English. The grammatical theory of transformational analysis of the English language.
- 4063 * Descriptive Linguistics.** Prerequisite: 9 hours of English. The methodology of linguistic analysis.
- 4073 * Historical and Comparative Linguistics.** Prerequisite: 9 hours of English. The major developments of the 19th Century historical and comparative grammarians. The techniques of comparative reconstruction.
- 4083 * Applied Linguistics.** Prerequisite: 9 hours of English. The application of linguistic theory to literary analysis.
- 4090* Workshop in Teaching English as a Second Language.** 1-3 credits, maximum 6. Prerequisite: 9 hours of English. Theories and techniques of teaching English to non-native speakers.
- 4093 * Language in America.** Historical development of American English. Regional, social and cultural language differences.
- 4133* (H)Literature in Cultural Context: The American South.** Prerequisite: 9 hours of English. Selected major writers of the American South with special emphasis on intellectual and cultural interrelationships.
- 4263 * Aesthetics of Film.** Prerequisite: 9 credit hours of English. Major theoretical approaches to the art of cinema: auteurism, semiotics, structuralism, historicism.
- 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.
- 4543 * Scientific and Technical Editing.** Prerequisites: 9 hours of English. Scientific and technical editing skills; emphasis on editing project.
- 4550 * Research Problems in Technical Writing.I-3** hours credit, maximum 6. Prerequisite: 9 hours of English. Research methods, emphasis on research project.
- 4563* Scientific and Technical Literature** Prerequisites: 6 hours of English. Scientific and technical style.
- 4623* Prosody.** Prerequisite: 12 hours of English. The concepts of rhythm and meter, the linguistic terminology and theory of prosodic elements in English and the analysis of poetic metrical structure.
- 4633* Advanced Creative Writing: Fiction.** Prerequisite: 3033. Student practice and composition.
- 4643 * Advanced Creative Writing: Poetry.** Prerequisite: 3043. Student practice and composition.
- 4653 * Advanced Creative Writing: Scriptwriting.** Prerequisite: 3053. Student practice and composition.

- 4703 (H)Chaucer.** Prerequisite: 4003. 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 poems-Paradise Lost, Paradise Regained and Samson Agonistes-studied critically in context of the 17th Century.
- 4730 * Single Author/Work.** 3 hours credit, maximum 9. Prerequisite: 9 hours of English. The works of a single author such Hawthorne, Coleridge, Faulkner or a single work and selected criticism such as The Bible, The Prelude, Moby Dick, Ulysses.
- 4743 (H,I)Transnational Literature: Continental Novel.** Prerequisite: 9 hours of English. Literary influence and expressions of selected continental authors in translation.
- 4763 * (H,I)Transnational Literature: India.** 20th Century Novel in India. Literary influence and expressions of selected 20th Century authors in India writing in English.
- 4800 Readings in American Poetry.** 3 hours credit, maximum 6. Prerequisite: 9 hours of English. Genre development. Major writers and their works: for example Bradstreet, Taylor, Dickinson, Whitman, Frost, Stevens.
- 4803 * (H)Readings in British Romantic Poetry.** Prerequisite: 9 hours of English. Genre development. Major writers and their works.
- 4813 (H)Readings in British Victorian Poetry.** 9 hours of English. Genre development. Major writers and their works.
- 4823 (H)Readings in the 18th Century British Novel.** Prerequisite: 9 hours of English. Genre development. Major writers and their works.
- 4833 * (H)Readings in the 19th Century British Novel.** Prerequisite: 9 hours of English. Genre development. Major writers and their works.
- 4843 * (H)Readings in the 20th Century British Novel.** Prerequisite: 9 hours of English. Genre development. Major writers and their works.
- 4853 (H) Readings in the 19th Century American Novel.** Prerequisite: 9 hours of English. Genre development. Major writers and their works.
- 4863 (H)Readings in the 20th Century American Novel.** Prerequisite: 9 hours of English. Genre development. Major writers and their works.
- 4873 * (H)Readings in British Drama.** Prerequisite: 9 hours of English. Genre development. Major writers and their works.
- 4883 * (H)Readings in American Drama.** Prerequisite: 9 hours of English. Genre development. Major writers and their works.
- 4903 * (H)Period Studies: 17th Century British.** Prerequisites: 12 hours of English. Historical development. Major writers and their works.
- 4913 * (H) Period Studies: 18th Century British.** Prerequisite: 12 hours of English. Historical development. Major writers and their works.
- 4943 * (H)Period Studies: American Colonial.** Prerequisite: 12 hours of English. Historical development. Major writers and their works.
- 4953 * (H)Period Studies: American Romance.** Prerequisite: 12 hours of English. Historical development. Major writers and their works.
- 4963 * (H)Period Studies: American Realism.** Prerequisite: 12 hours of English. Historical development. Major writers and their works.
- 4973 * (H)19th Century American Short Fiction.** Prerequisite: 9 hours of English. Genre development. Major writers and their works.
- 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.
- 5060 Single Author/Work.** 3 credit hours, maximum 9. 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.
- 5213*** **Teaching Freshman Composition.** Materials and methods of instruction in freshman composition.
- 5223*** **Teaching Technical and Business Writing.** Materials and methods of instruction in teaching technical and business writing.
- 5233*** **Teaching the Inquiry Method as Classroom Strategy.** Materials and methods of instruction in the inquiry method as classroom strategy.
- 5243*** **Teaching English as a Second Language.** Theories of second language acquisition. Materials and methods of instruction.
- 5290*** **Interdisciplinary Uses of English.** 3 credits, maximum 6. Interdisciplinary study with emphasis on multiple uses of literature and writing: for example film, new media, popular culture, American studies.
- 5313*** **Internship, Teaching English as a Second Language.** Supervised teaching of beginning through advanced English as a second language courses.
- 5333*** **Seminar in TESL: Tests and Materials.** Standardized testing and materials for teaching English as a second language.
- 5403*** **Seminar in British Literature of the 16th Century.** Selected writers and their works, themes and literary developments of the 16th Century.
- 5423*** **Seminar in British Literature of the 17th Century.** Selected writers and their works, themes and literary developments of the 17th Century.
- 5443*** **Seminar in British Literature of the 18th Century.** Selected writers and their works, themes and literary developments of the 18th Century.
- 5463*** **Seminar in British Literature of the 19th Century.** Selected writers and their works, themes and literary developments of the 19th Century.
- 5483*** **Seminar in British Literature of the 20th Century.** Selected writers and their works, themes and literary developments of the 20th Century.
- 5613*** **Seminar in American Literature of the 17th Century.** Selected writers and their works, themes and literary developments of the 17th Century.
- 5633*** **Seminar in American Literature of the 18th Century.** Selected writers and their works, themes and literary developments of the 18th Century.
- 5663*** **Seminar in American Literature of the 19th Century.** Selected writers and their works, themes and literary developments of the 19th Century.
- 5673*** **Seminar in American Literature of the 20th Century.** Selected writers and their works, themes and literary developments of the 20th Century.
- 5733*** **Seminar in Creative Writing: Fiction.** Writing fiction at the professional level.
- 5743*** **Seminar in Creative Writing: Poetry.** Writing poetry at the professional level.
- 5753*** **Seminar in Creative Writing: Scriptwriting.** Scriptwriting at the professional level.
- 6000*** **Dissertation.** 1-6 credits, maximum 20. Ph.D. dissertation.
- 6133*** **Studies in Creative Writing: Fiction.** Prerequisite: 5733. Individual projects in fiction.
- 6143**
Studies in Creative Writing: Poetry. Prerequisite: 5743. Individual projects in poetry.
- 6153*** **Studies in Creative Writing: Scriptwriting.** Prerequisite: 5753. Individual projects in scriptwriting.
- 6210*** **Seminar/Directed Study.** 1-6 credits maximum 9. Specialized readings/independent studies.
- 6220*** **Studies in Fiction.** 3 credits, maximum 9. Selected work in fiction: for example development of short fiction, contemporary short fiction, contemporary novel.
- 6230*** **Studies in Poetry.** 3 credits, maximum 9. Selected work in poetry: for example modern poetry, contemporary poetry.
- 6240*** **Studies in Drama.** 3 credits, maximum 9. Selected work in drama: for example American, British, Tudor-Stuart, pre-Shakespearean.

6250* Studies In New Media. 3 credits, maximum 9. Selected work in new media: for example film, literary adaptation to film, film and television.

6260* Studies in Literary Criticism. 3 credits, maximum 9. Selected work in literary criticism: for example ancient and neo-classical, 19th Century, 20th Century.

ENTOMOLOGY (ENTO)

2001 (N)Introduction 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 beekeeping.

3112 (N)Horticultural 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.

3463 (N)Forest Insects. Lab 2. The biology and control of insects injurious to shade tree, forest and forest products.

3553* (N)Insect Biology and Classifications. Lab 4. Prerequisite: 2001. Biology of insects and the family classification. Use of taxonomic keys. Collection, preparation, and recognition of insects.

3883* Survey of Entomology for Agriculturists. Lab 2. Entomology for workers in the field of agriculture. Current identification, biology and control of Agricultural pests.

4123* Household and Structural Pests. Lab 4. Prerequisite: 2201 or 3553. Classification and practical work on control of insects and rodents in dwellings, warehouses and other commercial establishments.

4223* (L)Statistical Ecology. Lab 2. Prerequisites: 2001, plus one course in ecology and statistics. Interrelations of insects with their environment. Population ecology of insects and environmental contamination problems of insect control.

4523* Principles of Insect Pest Management. Lab 2. Prerequisite: 3112 or 3332 or 3553. Modern concepts of pest regulation and the influence of alternatives on the agroecosystem and economics of crop production. Identification of economically important insect pests in the Southwest.

4800 Undergraduate Traineeship. 1-5 credits, maximum 5. Prerequisite: consent of instructor. Participation in research or extension pest management programs of departmental faculty.

4854* Medical and Veterinary Entomology. Lab 4. Prerequisite: 3553. Biology and control of insects affecting public health.

4913* Pesticides in the Environment. 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.

5003* Acarology. Lab 3. Biology, behavior, development and classification of ticks and other mites.

5043* Insect Physiology. Prerequisite: course in organic chemistry and 9 hours BISC. Functions of the organ systems of insects. Lecture-demonstrations of selected insect physiology techniques.

5224* Classification of Immature Insects. Lab 6. Prerequisite 3553. Classification, collecting and preservation of immature forms.

5330* Advanced Systematic Entomology. 1-5 credits, maximum 5. Prerequisite: 5464. Special problems in advanced systematic entomology.

- 5332* Literature of Zoological Science.** Prerequisites: ENTO 2001 or RISC 1602 or equivalent. Mechanics of the library, use and preparation of bibliographies, preparation of a scientific paper, taxonomic indices and literature.
- 5442* Araneology.** Lab 3. Biology, behavior, development and classification of spiders.
- 5464* Systematic Entomology.** Lab 4. Prerequisite: 3553 or equivalent. Classification and comparative biologies of terrestrial insects.
- 5484* Advanced Biology and Classification: Aquatic Insects.** Lab 4. Prerequisite: 3553. 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. Principles and practices of insect control with inimical organisms.
- 5550* Advanced Agronomic Entomology.** 1-5 credits, maximum 5. Prerequisite: 4523. Special problems in advanced agronomic entomology.
- 5612* Host Plant Resistance to Insects.** Prerequisites: AGRON 3553. Insect population management by host plant resistance.
- 5644* Insect Morphology.** Prerequisite: 3553. Insect development and comparative morphology.
- 5660* Readings in Integrated Pest Management.** 1-2 credits, maximum 2. Prerequisite: 4523 or equivalent. Reading and discussion of current publications relating to biological and economic theories which form the basis for integrated pest management (IPM) programs.
- 5710* Advanced Medical and Veterinary Entomology.** 1-5 credits, maximum 5. Prerequisite: 4854. Special problems in methods of disease transmission, animal parasite control and the relationships existing between parasite and host.
- 5733* Ecological Systems Analysis.** Lab 2. Prerequisite: COMSC 2113 and STAT 4023. Concepts, methods, and materials of systems analysis. Use and application of systems theory in an agricultural context. Examples from many agricultural endeavors. Application of systems theory to problems in their specific area of study.
- 5753* Insecticide Toxicology.** Prerequisite: organic chemistry 15 hours biology. Properties and mode of action of the major insecticidal materials. Assessment of their impact on the environment.
- 5850* Epidemiology of Arthropod-Borne Diseases.** 1-4 credits, maximum 4. Lab to be arranged. Prerequisite: 4854 or equivalent. The relationships existing between the hosts, arthropod vectors and causal agents of disease and the principles of disease prevention or suppression by the intelligent use of biological principles.
- 5870* Seminar.** 1 credit, maximum 5. Prerequisite: consent of instructor. Written and oral reports and discussion of recent developments in entomology.
- 6000* 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. Special problems in advanced insect physiology.

ENVIRONMENTAL SCIENCES (ENVIR)

- 5000* Research for Thesis or Report.** 1-6, maximum 6. Prerequisite: approval of advisory committee and Environmental Sciences Steering Committee. 5000 Research leading to Master's thesis or report.
- 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. Selected environmental problems, individual research, seminar reports and group discussion of reports.
- 6000* Research for Dissertation.** 1-12 credits, maximum 24. Prerequisite: approval of advisory committee and Environmental Sciences Steering Committee. 6000 Research leading to the Ph.D. dissertation.

FAMILY RELATIONS AND CHILD DEVELOPMENT (FRCD)

- 1113 (S)Human Sexuality and the Family.** Sexual development emphasizing personal adjustment and interaction with family and culture.
- 2003 (S)Dynamics of Family Relationships.** An ecological approach to interpersonal relationships through study of the processes in the family which influence the way members relate to each other throughout their lives. Practice in application of principles is included.
- 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
- 2611 The Professional in Family Services** Prerequisites: HEC 1111 or equivalent. Builds skills in decision-making, priority-setting self-assertion, and self-assessment. Volunteer and field experience options available in the field of family services.
- 3013 (S)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 this information in creating appropriately nurturant environments and devising effective guidance strategies. Directed observation in preschool laboratories.
- 3220 Early Childhood Education Practicum.** 1-4 credits, maximum 4. Participation in the Child Development Laboratories. Experiences related to guidance, activities and program planning.
- 3233 Early Childhood Education: Program Development.** Creating learning environments which facilitate children's physical development; skills in communication, inquiry, creative expression, and interpersonal relations; cognitive development; and emotional development. Planning, implementing, and evaluating developmentally appropriate integrated learning experiences.
- 3253* Child Development and Guidance: School Age.** Influence of the family experience on the physical, intellectual, social and emotional development of children in the school and pre-adolescent years. The role of parents, teachers and community leaders. Application of principles of development and guidance in actual work with children.
- 3303 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.** 1-9 credits, maximum 9. Observation and participation in programs for children, youth, adults and families. Supervision by 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 Programs for Families and Young Children.** Development, management, and evaluation of programs serving families and children.
- 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.
- 4420* Preschool Teaching.** 1-7 credits, maximum 7. Lab 3-21. Prerequisites: 3213, 3233, 3303, 3403, 3503, and pre-registration with director of Child Development 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 interaction and behavior with consideration of support services in communities which serve families.
- 4743 (L)Introduction to Research Methodology in Family Relations and Child Development.** Scientific literature and the research process in family relations, child development and early childhood education.
- 4793 * (I)The Family: A World Perspective.** Family structure and interaction which transcend specific cultures or nationalities; historical perspectives; and examination of specific cultural and national examples of family forms.
- 4811 Seminar in Family Services.** Prerequisite: HEECS 4113 or concurrent enrollment. Pre-employment seminar. Individual competencies related to family services, career options, and the process of seeking employment.
- 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.
- 5110 * Research Developments in FRCD.** 1-3 credits, maximum 3. Prerequisite: concurrent enrollment in HEC 5102. Current development and needs in research in FRCD including application of research methods to FRCD and research planning.
- 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.** Implications of child development theory and research for planning educational programs and learning experiences appropriate for young children.
- 5323* Issues in Family Studies.** Prerequisite: 3753. Current and classic literature in family studies. Consideration of philosophical bases and current research issues relevant to the family as a field of study.
- 5360 Individual, Marriage, and Family Counseling.** 2-3 credits, maximum 3. 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.
- 5443 Early Childhood Education: Theory and Practice of Group Programs.** Prerequisites: 3303, 3404, 3503. Daily and long-range curriculum development for children under six in relation to age needs, individual development, and equipment and physical facilities.
- 5470 Developments and Innovations in Family Relations, Child Development and Early Childhood.** 1-9 credits maximum 9. Analysis of current developments and innovative practices in one or more of the specified areas. Emphasis upon evolving concepts with implications for programs serving societal needs in these areas.
- 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.** 1-8 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.** 1-9 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 conceptual frameworks in family relationships. Overview of theory construction.
- 6000 Doctoral Thesis.** 1-12 credits, maximum 30. Prerequisite: consent of major professor. Research in home economics for the Ph.D. degree under supervision of a graduate faculty member.
- 6110 Research Problems in Family Relations and Child Development.** 1-6 credits, maximum 6. Prerequisite: consent of instructor. Special research studies under the supervision of a Graduate Faculty member.
- 6250 Seminar in Child Development.** 1-6 credits, maximum 6. Prerequisite: 5213 or equivalent. Selected topics in child development with special attention given to recent research literature and current theory.
- 6350* Seminar in Family Studies.** 1-6 credits, maximum 6. Prerequisite: 5323 or consent of instructor. Current research and theory in the family area; selected topics.
- 6783* Advanced Research Methods in Family Relations and Child Development.** Prerequisites: one course in research methods and in statistics. Research design and analysis of data appropriate to the areas of family relations and child development.
- 6810* Advanced Problems in Family and Child Studies.** 1-9 credits, maximum 9. Individual or group study of significant aspect of family and child studies.
- 6993* Analysis and Application of Family Theory.** Prerequisite: 5993. Family theory process, including logic, theory construction, and relating conceptual orientations to current research areas.

FINANCE (FIN)

- 2123 Personal Finance.** A first course in the management of the individual's financial affairs. Budgeting, use credit, mortgage financing, investment and estate planning.
- 3113 Finance.** Prerequisites: STAT 2023, ACCTG 2203, ECON 2123, and completion of lower division math requirements. Operational and strategic financial problems including allocation of funds, asset management, financial information systems, financial structure, policy determination and analysis of the financial environment.
- 3613 General Insurance.** Introduction to the theory and general principles of insurance. A broad analysis of the elements and operation of property, casualty, health and life insurance.
- 3623 Property and Casualty Insurance.** Prerequisite: 3613. Emphasis on loss and the insurance contract from fire, marine, property damage, automobile and other liability and loss adjustment. Rate formulation, social implications, government regulations and government regulation of the insurance industry.
- 3633 Life and Group Insurance.** Prerequisite: 3613. Principles of insurance applied to life and human values. Group plans in industry, with coverage emphasizing the managerial point of view.
- 3713 Real Estate Investment and Finance.** Prerequisite: 3113. An introductory course in real estate investment and finance. Financing real estate, financial leverage and financial planning, the institutional structure of mortgage lending, managing risks, investment strategies and decisions.
- 3813 Trust and Estate Management.** Prerequisites: 3113, ACCTG 2203, BUSL 3213. 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, commercial banks and other financial intermediaries.
- 4213* International Financial Management.** Prerequisite: 3113. Financial problems of multinational corporations. Designed to develop a sound conceptual understanding of the environmental factors that affect decisions of financial managers; to extend the current developments in the theory of financial management to incorporate variables peculiar to international operations; and to formulate financial strategies under different business systems and ideologies.
- 4223* Investments.** Prerequisite: 3113. Various approaches to selecting and timing investment opportunities, e.g., common stocks, bonds, commodities and options. Modern concepts of portfolio theory.
- 4333* Financial Management.** Prerequisite: 3113. Theories and practice applicable to the financial administration of a firm. A variety of teaching methods used in conjunction with readings and cases to illustrate financial problems and techniques of solution.
- 4443* Banking Strategies and Policies.** Prerequisites: 3113 and ECON 3313. Theories and practices of bank asset management; banking markets and competition.
- 4550* Selected Topics in Finance.1-6** hours credit, maximum 6. Prerequisite: 3113. Advanced topics in finance. Topics are updated each semester.
- 4613* Risk Management.** Prerequisite: 3613. Elements of corporate risk control and management.
- 5123* Investment Theory and Strategy.** Selected investment topics and advanced portfolio management techniques.
- 5243* Financial Systems.** 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.** 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. Prerequisite: consent of instructor. Advanced research with emphasis on theoretical problems and solutions. Selected topics covered.
- 5513* Cost-Benefit Analysis.** Prerequisite: 5353. Theoretical and applied aspects of profit and nonprofit financial decision-making; relationship of cost-benefit analysis to PPBS (plann-

ing programming budgeting systems). Cost-benefit ratios and internal rates of return, appropriate discount rates, constraints and externalities.

- 5550* Special Topics in Finance.1-3** credits, maximum 6. Theoretical and applied aspects of specialized financial areas. Evaluation of models, current trends and problems.
- 5613* Corporate Financial Planning.** Prerequisite: 5353. Financial planning in a systems framework. An integration of existing financial theory and practice. Financial planning systems allowing the manager to acquire an overview of the various functions of the firm; to examine alternative courses of action with speed and thoroughness; to reduce the response time in reacting to change in the environment and to improve future decisions by learning from feedback of previous decisions.

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 Recognition.** Lab 3. "The Fire Problem." Physical, chemical and electrical hazards and their relationship to loss of property and/or life. Safe storage, transportation and handling practices to eliminate or control the risk of fire in the home, business and industry.
- 1373 Fire Suppression and Detection Systems.** Lab 3. The design, installation, maintenance and utilization of portable fire extinguishing appliances and pre-engineered systems. Operational capabilities and utilization requirements of fire detection and signaling systems. Fire detection and suppression applied in practical laboratory problems.
- 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 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 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: PHYS 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.
- 4050 Advanced Fire Protection and Safety Problems.** 1-4 credits, maximum 6. Prerequisite: consent of department head. Special technical problems in fire protection and safety.
- 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.
- 2111 Career Options in FNIA.** Prerequisite: HEC 1111. Career options in foods, human nutrition and institution administration fields. Educational requirements and employment prospects reviewed. Career goals and the design of an undergraduate program to facilitate reaching these goals.
- 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. Experience in organization and management of table and beverage service in varied food service settings. Same course as HRAD 2123.
- 3133 (L)Science of Food Preparation.** Prerequisites: 2113 or HRAD 1113, organic chemistry. Application of scientific principles to food preparation.
- 3213 Management in Hospitality/Food Service Systems.** Prerequisite: A course in economics. Function and methods of management as related to the hospitality and food service industries. Same course as HRAD 3213.
- 3222 Nutrition of Children.** Prerequisite: 1113. Principles of nutrition and nutrition education applied to children.
- 3333 Nutrition and Dietetics.** Prerequisites: 1113, organic chemistry, physiology. Metabolism of nutrients; their role and function in the human living organism and the further application to selection of diet.
- 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.
- 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 (I,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 Purchasing in Hospitality/Food Service Systems.** Lab 2. Prerequisite: 3133 or concurrent enrollment. Procurement of food and nonfood materials in hospitality and related industries. Same as HRAD 3553.
- 3652 Food Conservation and Preservation.** Lab 3. Prerequisites: 3133, organic chemistry, microbiology. Modern methods and principles of food conservation and preservation including freezing techniques; laboratory experience with different methods.
- 4013 * Experimental Foods.** Lab 6. Prerequisite: 3133 or consent of instructor. Investigations in physical, chemical and sensory qualities of foods under experimental conditions. Development of an individual research project.
- 4123 * Diet Therapy.** Lab 2. Prerequisites: 3333; a biochemistry course. The nutritional management through diet of persons with altered clinical conditions, i.e. 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 4. 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. 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. Super-vised 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. Prerequisite: 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.
- 5110* Research Developments in FNIA.** 1-3 credits, maximum 3. Prerequisite: concurrent enrollment in HEC 5102. Current developments and needs in research in FNIA including application of research methods to FNIA and research planning.
- 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: 1113. Current emphases in nutrition, with implications for nutrition research, education, and public service.
- 5233 * Quantity Food Development.** Lab 5. Prerequisite: 4363 or equivalent. Experimental approach to methods in quantity food production as related to time factor, institution equipment and proportions of ingredients.
- 5343 * Food Service Systems Management I.** Prerequisite: 4573 or equivalent. Organization and management of food service systems.

- 5373** * **Advanced Child Nutrition.** Lab 6. Prerequisite: 3333. Child nutrition problems and their application to the feeding of children. Critical study of scientific literature.
- 5393*** **Nutrition for the Elderly.** Prerequisites: one course in nutrition or consent of instructor. Nutritional needs, issues and concerns of the elderly. Implications for food and nutrition programs, policies, research and education.
- 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 problem 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. Organizing equipment and operation of school lunchrooms. Special problems required.
- 5650*** **Advanced Food Conservation and Processing.** 2 credits, maximum 2. Lab 3. Prerequisite: 4013. Recent advances in food processing in relation to quality of product and conservation of food nutrients.
- 5673 Food Service Systems Manpower Management.** Lab 3. 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. Experiment design for research in food and nutrition based on analytical laboratory techniques and other research methodology.
- 5753** * **Administrative Dietetics.** Organizing and managing food service systems as indicated in Competencies for the Dietetic Internship. Includes leadership competence, professional development, interpretation of research, implementation of change, financial planning and computer applications. Dietetic interns enroll concurrently with the internship; open to other FNIA graduate students.
- 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 9. 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: for M.S. students. Individual reports and group discussion of current issues in food, nutrition and institution administration.
- 6000** * **Doctoral Thesis** 1-12 credits, maximum 30. Prerequisite: consent of major professor.
- 6113*** **Critical Analysis of Current Research in FNIA.** Prerequisites: graduate standing in FNIA, 3333 and 5463 or equivalent, or consent of instructor. Recent research relevant to issues in food, nutrition and institution administration.
- 6960*** **Seminar in Food, Nutrition and Institution Administration.** 1 credit, maximum 3. Oral presentations of research papers and group discussions of recent literature and findings in food, nutrition and institution administration. Doctoral level.

FOREIGN LANGUAGES AND LITERATURES (FLL)

The Department of Foreign Languages and Literatures offers courses under the prefix FLL, and in the following languages each of which has its own prefix: Chinese, French, German, Greek, Italian, Japanese, Latin, Russian and Spanish. These languages are listed in alphabetical order of prefix.

- 1000 (I)Special Studies In Foreign Language** 1-10 credits, maximum 10. Special studies in languages not regularly offered; basic level.
- 2000 (1)Special Study In Foreign Language** 1-5, maximum 10. Prerequisites: 10 hours or equivalent in target language. Special study in languages other than those offered in regular program. Intermediate level.
- 2443 (H,SpD)Languages of the World** A comprehensive survey of world languages. The essential structural and historical organization of languages. The process of languages as a basic human function. Same course as ENGL 2443.
- 3000 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 Specialized Study in a Modern Foreign Language.** 1-20 credits, maximum 20. Lab 1-5. Prerequisite: consent of instructor. Instruction and/or tutorial work in a modern foreign language other than those offered in a major program.
- 4000 Specialized Studies in Foreign Language and Literature.** 1-9 credits, maximum 9. Lab 1-9. Prerequisite: junior standing or consent of instructor. Individual guided study, tutorial or seminar on specially selected topics in a foreign language or literature.

FORESTRY (FOR)

- 1123 Elementary Forestry.** Lab 3. Modern forestry and related resource management.
- 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 I.** 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.
- 3001 Multiple Use of Forest Resources.** Segment of a 8 week field summer camp. Management of regional forest resources, including wildlife, watershed, range, recreation and timber.
- 3002 Silvics and Field Silviculture.** Prerequisites: 2413 and 2134. Segment of eight week field summer camp. Forest ecological concepts and their relationship to trees and stands together with studies in principles and practices of silviculture.
- 3004 Forest Measurements II.** Prerequisite: 2523. Segment of 8 week field summer camp. Forest mensuration principles including: cruise design, implementation and data analysis, volume table construction, growth studies and timber and land appraisal.
- 3011 Harvesting and Utilization.** Segment of eight week field summer camp. Descriptive role of timber harvesting and forest products utilization in forest management including demonstrations, tours to logging operations and manufacturing facilities, and participation in field practices.
- 3223* Regional Silviculture.** Prerequisite: 2413. Silviculture and its application 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 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.
- 4103* Wood Treatments and Preservation.** Prerequisite: 3554. Industrial treatment of wood with respect to drying, adhesion, protective coatings, resistance to decay, and dimensional stability.
- 4113* Forest Products.** Prerequisite: 3554. Production, distribution and uses of major forest products.
- 4223* Timber Management.** Lab 2. Prerequisites: 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. Forest recreation and the agencies involved in administering such areas; their policies and management programs and the 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.
- 4601* Contemporary Issues in Forest Policy.** Prerequisite: senior standing. 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.
- 4613* Forest Biometry.** Lab 2. Prerequisites: 3004, STAT 2013, MATH 2713. Statistical methodology applied to the unique characteristics of trees and forests. Individual tree volume and taper equations. Yield and stand table analysis, forest growth and yield and forecasting, and multi stage and multi resource sampling.
- 4811* Forest Hydrology Laboratory.** Lab 2. Prerequisite: 4813, previous or concurrent. Techniques to evaluate the hydrologic processes and characteristics of forest and other wildland watersheds; precipitation, runoff, infiltration, erosion processes. Water quality assessment in wildland settings.
- 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. 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. 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. 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. Individual problems in advanced forestry subject-matter appropriate to students with capability at the master's level.
- 5032* Advanced Timber Management.** Case studies exemplifying biological and business principles for managing timberlands. Public and industry policies and objectives for timber management.
- 5043 Forestry Research Methods.** Methods used in forestry research; choice of biological materials and species; experimental design in forestry, analysis of forest data and interpretation of results for integrated forest.
- 5143 Economics of Multiple Use Of Forests.** Prerequisite: 3993. 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.
- 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.
- 5813* Land Use and Water Quality.** Prerequisites: A basic hydrology class, general chemistry. Nonpoint source pollution; relationships between land use and water quality with an emphasis on forestry, mined land, agriculture, and urban land uses. Focus on current research.

FRENCH (FRNCH)

- 1115 (I)Elementary French I.** Lab 1 1/2. Speaking, comprehension, reading, writing.
- 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 1. 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)Intermediate 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.** Translation of French readings into English.
- 3023 French for Reading Requirements II.** Prerequisite: 3013. Translation of French readings into English.
- 3203 (I)Advanced Composition and Conversation.** Lab 1. Prerequisite: 20 hours of French or equivalent. May be taken before or after 3213.
- 3213 (H,I)Advanced Grammar and Conversation.** Lab 1. 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.
- 3343 (I)Business French.** Prerequisite: 2223 or equivalent. Continuation of applied French for students in commercial and technical fields. Overview and strategies of business and economic climate in France.
- 3463 (I)Advanced Diction and Phonetics.** Lab 1. Prerequisite: 20 credit hours of French. Required course for teacher certification. French speech sounds and intonation patterns, with practice to improve the student's pronunciation.
- 4113 (H,I)French Literature in Translation.** Cultural and humanistic significance of French literature; reading and discussion of selected complete works, using combined lecture, discus-

sion and seminar approaches. Independent tutorial study encouraged for part of course. Taught in English.

- 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 (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 Modern French Civilization.** Prerequisite: 20 credit hours of French or equivalent.
- 4483 (H,I)Introduction to French Poetry.** Prerequisite: 20 credit hours of French or equivalent. 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 hour of French or equivalent. Analysis of French plays from the 19th and 20th centuries.

GENERAL ADMINISTRATION (GENAD)

- 2103 Business Data Processing Concepts.** Prerequisites: 30 credit hours and MATH 1513. Concepts and terminology. Computer hardware/software components, file structures, information systems and futuristic trends, and an introduction to computer programming in a business-oriented language.
- 2113 Introduction to Business Communication.** Basic writing skills as they apply to business communications.
- 3103 Computer Programming for Business.** Prerequisites: 2103 or COMSC 2113 or equivalent. Computer programs for business applications using the COBOL language. File structures, file updating techniques, sorting, report writing, magnetic tape and disk file handling. Same course as COMSC 3103.
- 3113* Written Communication.** Prerequisite: 50 semester credit hours. Analysis of business communication problems in terms of generally accepted communication principles. Practice in written messages; specifically, special goodwill letters, neutral and good-news, disappointing, persuasive and employment messages.
- 3223* Organizational Communication.** Prerequisite: 50 credit hours. Communication theory and process; common and special problems associated with interpersonal and organizational communication affecting business decisions and operations. Principles and methods of basic and applied research in business and communication; practice in administrative report writing. Analysis of selected business cases.
- 3303 Business Systems Analysis.** Prerequisites: 2103, 3103, ACCTG 2203. Systems analysis as a profession and role of the systems analyst in the analysis, design, and implementation of computer-based business information systems. Current system documentation through use of classical and structured tools and techniques for describing flows, data flows, data structures, file designs, input and output designs, and program specifications. Information gathering and reporting activities and transition into system analysis and design.
- 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 non-public consumer protection efforts; and personal and family financial planning and decision making, including budgeting, savings and investments, credit, buying problems and insurance.
- 4113* Management of Information Processing.** Prerequisite: 2103 or equivalent. 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.
- 4203* Advanced Computer Programming for Business.** Prerequisite: GENAD/COMSC 4103. Advanced programming features are examined with an emphasis on the development of computer programs for business application. File processing including magnetic

tape sequential files, disk indexed sequential files, and virtual storage applications are an integral part of the course. Subjects and techniques such as TSO, segmentation, debugging tools and procedures, and pertinent JCL are also studied and applied.

- 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.
- 4413* EDP Auditing.** Prerequisites: 50 credit hours, or 2103 or COMSC 2113 or equivalent, or consent of instructor. EDP auditing as it applies to the business environment. Impact of computer-based systems on control and auditing, total systems control analysis, and specific EDP auditing techniques as they apply to computer-based systems.
- 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.** Understanding and application of valid and relevant communication principles and theories. Designed to develop management-level personnel who can effectively and efficiently use oral and written communications as administrative tools to organizational functioning.
- 5210* Business Communication Applications.** 1-3 credits, maximum 3. Application of communication techniques to the business setting. Interpersonal communication skills necessary for the manager in a business organization. Problems and applications within the modern business setting.

GENERAL ENGINEERING (GENEN)

- 5000* Thesis.** 3-6 credits, maximum 6. Prerequisite: approval of major professor. Thesis or report.
- 5030 Engineering Practice.** 1-12 credits, maximum 12. Professionally supervised engineering problem involving authentic projects for which the student assumes a degree of professional responsibility. Activities must be approved in advance by the student's adviser and may consist of engineering experience on-campus or off-campus or both. Periodic reports both oral and written required as specified by the adviser.
- 5110* Seminar.** 3-6 credits, maximum 6. Prerequisite: 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.
- 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 PHYS 1114. Forces acting on bodies at rest; forces, moments of force, distributed forces, reactions, free body diagrams, friction, internal forces and moments of inertia. Applications.
- 2650 Technical Projects.** 1-4 credits, maximum 4. Prerequisite: completion of three semesters' work in a Technical Institute curriculum. Special projects assigned by advisers with the approval of the director. A comprehensive written report must be prepared and an oral examination may also be required.
- 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.
- 3113 Principles of Supervision.** Prerequisite: junior standing. A study of the fundamental principles of organizing, planning, staffing, controlling and directing as applied to first-line supervisory roles in industry.

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. Prerequisite: one course in genetics. Advanced studies in classical, population and/or molecular genetics. Course content varies with instructors.

GEOGRAPHY (GEOG)

- 1113 (S,SpD)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,SpD)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. Non-mathematical 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: An introductory course in geography. Techniques and strategy for teaching basic geographic concepts and skills.
- 3013 (N)Biometeorology.** 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)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.
- 3313 Cartography.** Lab 2. Prerequisite: junior standing. Theory, design, and effective portrayal of data on maps.
- 3363 (I,S)Geography of Africa.** General patterns of population and cultural heritage in Africa; focus on element 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 Geographical Concepts and Techniques I.** Lab 2. Prerequisites: 1113 or 1114, and STAT 2013. Modern concepts and techniques for geographical analysis and research including data acquisition and manipulation from field and secondary sources.
- 3533 Geographical Concepts and Techniques II.** Prerequisite: 3523. The utility and goals of geographic inquiry in the solution of problems including concepts of spatial structures, distributive processes, networks, interactions and areal associations.
- 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 (S,SpD)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)Geography of Latin America.** Areal distribution and analysis of physical, cultural and economic features of Middle and South America.
- 3753 (I)Geography of Asia.** Systematic interpretation of significant spatial patterns of man and natural environment. (Exclusive of USSR.)
- 3813 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 group and other cultural characteristics. Spatial aspects of social issues, problems and policies in the United States and the world.
- 4003 Natural Hazards.** Human perception of and response to extreme natural events (such as tornadoes, floods, earthquakes, drought and disease). Examination of mitigation and relief procedures at local, state and national levels.

- 4101 Undergraduate Cooperative Education Internship.** 1-9 credits, maximum 9. Prerequisite: consent of departmental adviser and prior permission of instructor. 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.** Prerequisite: 3123. Spatial aspects of urban planning: development of planning theory, various planning tools, and specific problem areas such as urban renewal and urban transportation.
- 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 (H,S)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.
- 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 5021 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. Prerequisite: permission of instructor prior to enrollment. Specialized directed study of specific local and foreign regions.
- 4713 History and Philosophy of Geography.** Historical research questions and techniques, the structure of contemporary geography and its relations to other fields of study, and future prospects for geography.
- 4910* Topics in Geography.** 1-6 credits, maximum 9. Prerequisite: permission of instructor prior to enrollment. 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. Prerequisite: permission of instructor prior to enrollment. 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 and prior permission of instructor. 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 interpretation 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. Prerequisite: permission of instructor prior to enrollment.
- 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)

- 1011 (L)General Geology Lab.** Lab 2. Prerequisite: previous or concurrent registration in 1014 lecture. Environmental experiments in the geosciences. Field trips required.
- 1014 (N)General Geology.** Optional Lab 1011. The influence of geology on the human environment. Basic physical and historical geology related to other subjects and to personal life. Emphasizes energy and material resources, beneficial and hazardous natural processes, and the earth's development.
- 1114 (N,L)Physical Geology.** Lab 2. Composition and structure of the earth and the modification of its surface by internal and external processes. Mineral resources, sources of energy, and environmental aspects of geology. A background in precollege science and math is recommended. Field trips required.
- 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.
- 1224 (L,N)Historical Geology.** Lab 3. Prerequisite: 1114. Earth history, with major emphasis on mountain-building, development of continents and oceans and evolution of animals and plants. Field trips required.
- 2014 (N)Scenic Geologic Regions.** Prerequisite: 1014 or equivalent recommended. The geologic story of national parks and scenic regions in North America and throughout the world.
- 2031 (L,N)Geologic Field Investigation.** Prerequisite: Introductory Geology. One week of required field study at sites of geological interest and significance.
- 2254 Mineralogy.** Lab 3. Prerequisites: 1114 or equivalent, CHEM 1314 or equivalent. Crystallography and systematic study of mineral groups and their genesis. Identification of minerals by physical and chemical properties. Field trips required.
- 2353 Optical Mineralogy.** Lab 2. Prerequisite: 2254. Study of the optical properties of non-opaque crystals by transmitted light using the petrographic microscope. Mineral identification using oil-immersion and thin-section methods.

- 2364 Elementary Petrology. Lab 3.** Prerequisite: 2254, previous or concurrent enrollment in 2353. Origin, occurrence and classification of rocks; hand-specimen identification. Field trips required.
- 3014 Structural Geology.** Lab 3. Prerequisites: 1224, 2364, MATH 1613 and PHYS 1114. Behavior of earth materials during various deformational processes and analysis of the resulting structural features. Field trips required.
- 3024* Geology for Engineers.** Lab 3. Prerequisite: junior standing in engineering. Physical geology with emphasis on applications to civil engineering. Field trips required.
- 3034* Stratigraphy.** 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.
- 3043 (N) Water Resources.** Water cycle with emphasis on surface water, ground water, water quality pollution, and water law. Interrelations between the sciences and humanities.
- 3104* Paleontology and Biostratigraphy.** Lab 3. Prerequisites: 1224 and BISC 1114. Morphology and systematics of major invertebrate macro- and microfossil groups. Basic principles of biostratigraphy. Field trip 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.
- 3202 Map and Airphoto Interpretation.** Lab 3. Prerequisites: 2254, 3014. Interpretation of geology using topographic, geologic and geophysical maps, aerial photographs and remotely sensed imagery.
- 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. Transportation and room and board fees required.
- 4010* Geology Colloquium.** 1 credit, maximum 8. Prerequisites: junior standing. Lectures and demonstrations of timely interest in geology. Field trips may be required.
- 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. 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.
- 4102* Selected Topics in Paleobiology.** Prerequisite: grade B or higher in 3104. Biological approach to macro- and microfossils emphasizing such topics as: classification of fossils, functional morphology, paleo-environments and paleoecology, evolution and biostratigraphy, paleobiogeography, paleoclimatology. Field trip required.
- 4213* Global Tectonics.** Prerequisite: 3014 and 3034. Major concepts of global tectonics. Emphasis on major structural features of North America, Caribbean region, South America, and Eastern Asia. Field trip required.
- 4454* Hydrogeology.** Lab 3. Prerequisite: 3034. Physical ground-water 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 ground-water system and to construct and analyze a water budget. Field trips required.
- 4564* Sedimentology.** Lab 3. Prerequisite: senior standing, 3546. 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.
- 4990* Special Problems in Earth Science.** 1-8 credits, maximum 8. Prerequisites: 25 hours of geology and permission of instructor. Individually designed study projects involving assigned reading, library work, field work, laboratory work or a combination of these. Field trips may be required.

- 5000*** **Thesis.** 1-6 credits, maximum 6. Prerequisite: approval of graduate committee. Work toward master's thesis in geology.
- 5054*** **Subsurface Geologic Methods.** Lab 3. Prerequisites: 3014, 3034. Use of subsurface geologic information from core and well logs to prepare maps and identify hydrocarbon prospects. Field trip required.
- 5100** **Problems in Hydrogeology.** 1-4 credits, maximum 4. Prerequisite: 4454. Advanced problems in hydrogeology with emphasis on quantitative methods. Field trips may be required.
- 5102*** **Advanced Paleontology-Microfossils.** Prerequisites: 3104 or equivalent. Microfossil group(s). Student projects of assigned fossil groups, collections and studies, with results presented both orally and in writing. Field trips required.
- 5112*** **Advanced Paleontology-Macrofossils.** Prerequisite: 3104 or equivalent. Selected macrofossil group(s). Student projects of assigned fossil groups collections, studies, and presentation of results both orally and in writing. Field trips required.
- 5150*** **Problems in Engineering Geology.** 1-3 credits, maximum 3. Prerequisite: 4754. Advanced problems in engineering geology with emphasis on problem solving. Field trips may be required.
- 5153*** **Advanced Map Interpretation.** Lab 3. Prerequisites: 3014. Geometric techniques and analysis of complex structural terrain. Elucidation of geological history by study of selected maps. Field trip required.
- 5203*** **Advanced Structural Geology.** Lab 3. Prerequisite: 3014. The theoretical and experimental approach to structural geology with emphasis on rock mechanics; includes correlation between stress field, rock type and deformational style. Field trips required.
- 5254*** **Diagenesis of Clastic Rocks.** Lab 3. Prerequisites: 2254, 2364. Structure, composition, occurrence, and identification of clay minerals and other diagenetic minerals in clastic rocks. Identification of minerals by x-ray diffraction and optical methods. Use of diagenesis in exploring for hydrocarbons. Field trips required.
- 5304*** **Applied Geophysics.** Lab 3. Prerequisite: PHYS 1214. Principles of exploration geophysics with emphasis upon shallow exploration techniques, especially those applicable to hydrogeology and engineering geology. Field trips required.
- 5353*** **Engineering Geophysics.** Lab 3. Prerequisites: 1114 or 3024; PHYS 1214 (or equiv.). Geological aspects of problems associated with environmental engineering, ground-water pollution and regional and urban planning. Problem assessment and field methods. Two required field projects include geophysical surveys using resistivity and seismic refraction methods.
- 5354*** **Igneous and Metamorphic Petrogenesis.** Lab 3. Prerequisites: 2364, 4414. Identification and study of rocks by means of the petrographic microscope; igneous and metamorphic rocks and the processes that form them. Field trips required.
- 5364*** **Sedimentary Petrography-Nonelastic Rocks.** Lab 3. Prerequisite: 4564. Systematic classification of nonclastic marine and nonmarine sedimentary rocks. Recognition of evidence of depositional environments and diagenesis, using petrographic methods. Field trips required.
- 5403*** **Geochemistry.** Prerequisites: 2364 and general chemistry Application of chemical principles to geological processes. Chemical sedimentation, ore solutions, wall-rock alteration and eH-pH diagrams. Field trips required.
- 5450*** **Problems in Economic Geology.** 2 credits, maximum 6. Prerequisite: permission of instructor. Individually designed problems in economic geology. Field trips may be required.
- 5454*** **Advanced Hydrogeology.** Lab 3. Prerequisites: 4454, COMSC 2113 or 4113, and MATH 2265 and 2365 or equivalent. Advanced quantitative techniques used to address ground-water management and pollution. Advanced field and laboratory techniques as well as management and chemical Transport Models applied to actual field problems and case studies. Field trip required.
- 5503*** **Environmental Geology.** Prerequisites: 1114 and 4074. 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.
- 5504*** **Organic Geochemistry.** Lab 3. Prerequisite: CHEM 1515. Production, accumulation of organic material and the various transformations into fossil fuels. Interpretation of organic

geochemical data with respect to petroleum exploration. Introduction to some environmental aspects of organic **geochemistry**.

- 5553*** **Environmental Geochemistry.** Lab 3. Distribution and mobility of elements in the secondary environment. Origin and evolution of natural ground-water quality. Soils and sediments as pollutant receptors, sources of pollutants and selected aspects of environmental health.
- 5604*** **Basin Analysis.** Lab 1. Prerequisites: 5202, 5203, 3546, 5254, 5364. Team-taught course. Interpretations of the evolution of selected sedimentary basins. Emphasis on facies analysis, **petrography**, diagenesis, and structural evolution. Field trips required.
- 5710*** **Advanced Studies in Geology.** 1-4 credits, maximum **4**. Prerequisite: permission of instructor. Individual library, laboratory and/or field projects on facets of geology not covered by existing courses. Field trips may be required.

GERMAN (GRMN)

- 1115 (I)Elementary German I.** Lab 1 1/2. Pronunciation, conversation, grammar, reading.
- 1225 (I)Elementary German II.** Lab 1 1/2. Prerequisite: 1115 or equivalent.
- 2112 (H,I)Intermediate Conversation and Composition I.** Lab I Prerequisite: 1225 or equivalent competence. (May have been gained in high school.) Colloquial speech patterns and grammar.
- 2113 (H,I) First Readings In German.** Prerequisite: 1225 or equivalent competence. (May have been gained in high school.) Selections from German newspapers and other contemporary material.
- 2222 (H,I)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 Modern German Civilization.** Prerequisite: 20 credit hours of German or equivalent. Historical, cultural, political and literary trends in the formation of German civilization.
- 3463 (I)Advanced Diction and Phonetics.** Lab 1. Prerequisite: 15 credit hours of German or equivalent. Required course for teacher certification. German speech sounds and intonation patterns. Practice to improve the student's pronunciation.
- 3803 (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.
- 4243 (I)Introduction to Business German.** Lab 1. Prerequisites: 20 hours of German or equivalent. Specialized vocabulary. Business practices and economic environment in Germany.
- 4513 (H,I)The Age of Goethe.** Prerequisite: 20 credit hours of German or equivalent. Principal figures of German Classicism and Romanticism.
- 4523 (H,I)19th Century German Theatre.** Prerequisite: 20 credit hours of German or equivalent. Kleist, Buchner, Grillparzer, Heibel, Hauptman and others.

- 4533 (H,I)19th Century German Novelle and Lyric.** Prerequisite: 20 credit hours of German or equivalent. Prose and lyric from Romanticism to Naturalism.
- 4543 (H,I)20th Century German Literature.** Prerequisite: 20 credit hours of German or equivalent. Main currents in German literature from Naturalism until present day.
- 4550 (I)Studies in German.** 1-3 credits, maximum 9. Prerequisite: 20 credit hours of German or equivalent competence. Reading and discussion of vital subjects in German.

GRADUATE (GRAD)

- 5880* Graduate Traveling Scholar.** 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. Prerequisite: graduate standing. Graduate-level instructional program in research and teaching techniques and procedures. Graded on pass-fail basis.
- 6010 Research or Intern Practicum.** 1-9 credits, maximum 12. Prerequisite: graduate standing. Graduate-level internship program for public administration, service or research. Blends the theoretical and absolute phase of the academic with practical on-the-job experience.

GREEK (GREEK)

- 1115 (I)Elementary Classical Greek I.** Grammar and vocabulary of Ancient Greek.
- 1225 (I)Elementary Classical Greek II.** Prerequisite: 1115 or equivalent. A continuation of 1115. Grammar and readings of classical Greek authors.
- 2213 (H,I)Intermediate Readings.** Prerequisite: 1225 or equivalent. An introduction to a variety of classical authors to increase reading facility and grammatical comprehension.
- 3330 (I)Advanced Readings.** 1-6 credits, maximum 9. Prerequisite: 2213. Prose authors, epic poetry, drama, Koine Greek and religious texts.

HEALTH (HLTH)

- 2602 First Aid.** Lab 2. A competency/performance based first aid course.
- 2603 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.
- 2643 School and Community Health Services.** Nonteaching service including screening, appraisal and referral systems in both schools and communities.
- 2653 Applied Anatomy.** Action and location of individual muscles and muscle groups. Anatomy as applied to a living person. Common anatomical injuries and diseases will be presented with each joint structure.
- 3613 Community Health Programs.** Structure and function of health agencies and programs in the total community.
- 3622 First Aid Instructor.** Lab 2. Prerequisite: 2602. Theory and practical experiences instructing first aid.
- 3623 School Health Programs.** Prerequisite: 2603. The identity and relationships of school health instruction, services and environments.
- 3643 Methods in School and Community Health Education.** Conceptual and value approach to health education through a variety of teaching methodologies.
- 3652 Kinesiology/Biomechanics.** Human movement with respect to musculoskeletal system and to biomechanical principals. Kinematic and kinetic analysis of human movement by visual analysis.

- 3653 Care and Prevention of Athletic Injuries II.** Lab 2. Prerequisite: 2633. Facts and principles relative to specific athletic injuries.
- 4603* Energetic Aspects of Exercise.** Prerequisite: PHYSIO 3113 or equivalent. Facts and principles of nutrition as related to exercise metabolism, including facts and fallacies of diets, pre-game meals and aids.
- 4902 Athletic Therapy Modalities.** Lab 1. Prerequisite: 4992. Commonly used therapeutic devices used for training rooms.
- 4992 Strength, Conditioning and Rehabilitation.** Lab 1. Prerequisites: 2653, 3652. Scientific methods in conditioning athletes and rehabilitation of injured athletes. Practical rehabilitation will be under the direct supervision of the OSU medical faculty.

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 proposals and results.
- 5013* Research Methods 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, PHSI 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 and Community Health Education.** Basic functions and principles of organization and administration pertaining to both school and community agencies.
- 5523* Critical Issues in Health.** 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* Health Education In The Schools.-A** practical approach to the complete school health program for all health personnel emphasizing specific curricular components.
- 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* Bionchanics of Humans in Motion.** Prerequisite: HLTH 2654. Kinetics and kinematics of humans in motion.
- 5753* Laboratory Assessment of Human Work Capacity.** Prerequisite: PHSI 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 Kinesiology.** 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.
- 5833* Methods in Physical Education.** Prerequisites: PE 4712 and 3773, CIED 5043 recommended. Differentiation between teaching methods in physical education; advantages of the application of the individual methods to particular situations in teaching physical education. Same course as CIED 5833.
- 5853* Stress Testing and Exercise Prescription.** Lab 2. Prerequisite: PHSI 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)American 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 student with credit in HIST 1103.

- 1613 (H,I,S,SpD)Western Civilization to 1500.** Lab 1. History of western civilization from ancient world to Reformation. Laboratory discussion sessions on interpretation of primary sources in translation.
- 1623 (I,H,S,SpD)Western Civilization After 1500.** Lab 1. History of western civilization from Reformation to present. Laboratory discussion sessions on interpretation of primary sources in translation.
- 1713 (H,S,I)Survey of Non-European History.** Basic introduction to South Asia, East Asia, Africa, and Latin America, stressing traditional religious beliefs, family systems, social structure, and political and aesthetic ideas, how these traditions and ideas were affected by European imperialism, and the present mixture of old and new.
- 2322 Oklahoma History.** Establishment of Indian Territory; allotments and homestead 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)Russia to 1861.** Political, institutional, societal and economic development of Russia from the Kievan period to the Great Reforms.
- 3163 (H,I)Russia Since 1861.** Modernizations of Russia in the 19th and 20th centuries. Great Reforms and their effects and the 1917 revolutions and their consequences.
- 3173 (H,I)Eastern Europe, 1000-1800.** Formation of the eastern European nations and the influence of Rome, Byzantium, the Ottoman Empire, Russia, Austria and Prussia on them.
- 3183 (H,I)Eastern Europe Since 1800.** Formation and impact of nationalism, industrialization, and power politics on the peoples of eastern Europe.
- 3203 (H,I)Byzantium, 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)The Age of Kings: Europe 1618-1815.** Economic, social, political, cultural, intellectual and religious transformation of Europe from the opening of the Thirty Years War to the Congress of Vienna.
- 3263 (H,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.
- 3333 (I)History of the Second World War.** Problems leading to World War II with their international implications and consideration of the war years.
- 3373 (S,I)Medieval England: 55 B.C.-A.D. 1485.** English History from Roman Britain to the beginning of the Tudor period. Development of the English constitution from the early Germanic state through feudalism to the New Monarchy.
- 3383 (S,I)Tudor-Stuart England.** History of England from the War of the Roses through the coming of the House of Hanover in 1714. Development of the centralized state, parliamentary reaction, reorientation of the English society and economy, and the English Reformation.
- 3393 (S,I)Modern England: 1714-Present.** English history from the arrival of the house of Hanover through the decline of British influence following the Second World War. Political,

social, and economic problems encountered as a result of the creation of the first modern industrialized state.

- 3403 (H,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 (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)The Jacksonian Era, 1828-1850.** Development of a modern political system and an entrepreneurial economy; social reform; territorial expansion; and sectionalism.
- 3653 (S)Civil War and Reconstruction, 1850-1877.** Causes, decisive events, personalities and consequences of the disruption and reunion of the United States.
- 3663 (S)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-Appalachian West.** Settlement and development of the frontier east of the Mississippi River including the French and Spanish provinces, British occupation, Indian resistance and American conquest through the Jacksonian Era.
- 3753 (S)Trans-Mississippi West.** Emergence of the modern West from Spanish and French settlement and exploration, the Rocky Mountain fur trade, the settlement of Texas, Oregon, California, and Utah, the mining, ranching and farming frontiers, the Indian Wars and transportation.
- 3763 (S)American Southwest.** Southwestern states of Texas, Arizona, New Mexico and California from the Spanish colonial period to the present. Mining, ranching, farming frontiers, Indian wars of the Apache, Comanche and other southwestern tribes, and the emergence of the modern Southwest.
- 3773 (S)Old South.** Social, political and industrial conditions in the South before the Civil War.
- 3783 (S)New South.** Recent history and major current social and economic problems of the southern regions of the United States.
- 3793 (S)Indians in America.** American Indian from Columbus to the present, emphasizing tribal reaction to European and United States cultural contact and government policy.

- 3913 (H,S)History of Medicine.** Historical growth of medicine and its relationship to the society in which it develops. Scientific problems, cultural, religious, economic problems associated with the historical development of medicine.
- 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 (I)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.
- 4353 American Military History.** Civil-military relations, the military implications of American foreign policy, and the impact of technological advances on warfare since colonial times.
- 4443 (H)Religious 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.
- 5063 Historic Preservation.** The development of and current trends in historic preservation, including its legal basis and methodology, in the United States to the present.
- 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 24. 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. Graded on pass-fail basis.
- 4110 The Home Economist in the Contemporary World.** 1-2 credits, maximum 6. Prerequisite: senior standing. 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.** 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.** Analysis of current issues from the perspective of home economics. Application of research findings related to issues.
- 6180* Research Seminar.** 1-3 credits, maximum 3. Prerequisite: graduate course in research methods or consent of instructor. Research in 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: 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. Those entering the teacher certification option need to spend the equivalent of 2 hours per week in the public schools.
- 3313 Home Economics Curriculum Development and Evaluation.** Lab 2. Prerequisite: Full admission to teacher education. Theory and application of models of curriculum development and evaluation. Administration and interpretation of assessment techniques; design and use of teacher made tests. Utilization of educational objectives, strategies, resources, and evaluation of learning and programs.
- 4102 Philosophy of Home Economics Education and Community Services.** 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 and strategies for professional development and 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.** Development, organization and methods of home economics public service programs.
- 4213* Media, Materials and Techniques in Home Economics Education.** Lab 6. Prerequisite: 3313 and full admission to university teacher education. Application of educational principles to specific home economics subject matter. Experiences with verbal and non-verbal communication, teaching and evaluation techniques, audiovisual materials, computers and a variety of teaching aids. Development of proficiency in use of various media.
- 4333* Organization of School and Community Home Economics Programs.** **Prerequisite:** Full admission to teacher education. Responsibilities and activities of the home economics teacher in youth organizations, adult education, advisory councils, home experience, leadership responsibilities and informal education activities.
- 4353* Strategies for Working with Adults in Community Services.** Theories of adult development as they effect learning activities of adults in family related programs. Implications are analyzed in relation to planning and selecting programs, media, and teaching strategies.
- 4413* Management of Volunteer Programs.** Prerequisite: junior, senior or graduate standing. For family and human service professionals who will have responsibility for utilizing volunteer personnel in achieving program goals. Overview of issues in volunteering, management and leadership strategies for maximizing volunteer effectiveness and strategies for evaluating volunteer service.
- 4610* Supervised Field Experience in Home Economics Education and Community Services.** 1-8 credits, maximum 8. Prerequisites: consent of adviser and department head. Practical experience in special programs such as extension, occupational instruction and communication.
- 4620* Seminar in Occupational Home Economics.** 1-6 credits, maximum 6. 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: Full admission to university teacher education and student teaching. Study and development of a philosophy and competencies in home economics education through directed teaching experience in an approved vocational program. Participation starts at the beginning of the semester in the assigned school.
- 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.
- 4820* Program Planning.** 2-4 credits, maximum 4. Factors that influence planning and change in educational programs relating to community services and home economics. Principles of program development in agencies and institutions with differing purposes and organizational structures.
- 5000 Masters Thesis or Report.** 1-6 credits, maximum 6. Prerequisite: consent of major adviser. Research in home economics for M.S. degree.
- 5010* Seminar in Family and Community Services.** 1-6 credits. Prerequisite: consent of instructor. Philosophy, trends, and issues affecting leadership, management, implementation, and accountability of family and community service organizations.
- 5103* Research Methods in Home Economics.** 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. Prerequisite: methods course. A study of major concepts, philosophies and strategies which influence curriculum decisions in home economics programs at all educational levels.
- 5212* Administration and Supervision of Nonformal Education Programs.** **Prerequisite:** 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 Programs in Home Economics Education and Community Services.** Educational philosophies, trends, policies and issues which impact upon home economics and community service programs.
- 5312* Participative Leadership in Nonformal Education Programs.** Prerequisite: graduate standing. An examination of contemporary theory and practice related to participative leadership, collaborative planning, and shared responsibility for resource development and program accountability in nonformal educational programs. Practical application of theoretical constructs in group leadership skills, conflict management and team building.
- 5330 Teaching Consumer Education and Resource Management.** 1-3 credits, maximum 3. Prerequisites: ECON 1113, HIDCS 2413 or equivalent or consent of instructor. Objectives, methods, materials and evaluation in teaching consumer education and resource management cooperatively planned and/or taught with HIDCS.
- 5340 Supervision of Student Teaching in Home Economics.** 2-3 credits, maximum 3. Prerequisite: teaching experience. The preparation of home economics teachers with emphasis upon the provision of learning experiences for student teachers.
- 5413 Management of Family and Community Service Programs.** Prerequisites: graduate standing and one year work experience. Planning, personnel development, resource development, management and evaluation for community service.
- 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 and Community Services.** 1-6 credits, maximum 6. Prerequisite: consent of department head. Selected learning experiences relating to career goals in approved settings.
- 5663* Evaluation in Home Economics Education and Community Services.** Fundamental principles of evaluation; instruments for use in home economics.
- 5750 Home Economics Education and Community Services Workshop.** 1-6 credits, maximum 6. Selected phases of home economics education and community services.
- 5810 Seminar in Home Economics Education and Community Service.** 1-3 credits, maximum 3. Prerequisite: consent of instructor. Concerns of educators and community service professionals.
- 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 Design and Implementation of Programs in Home Economics and Community Services.** Theories, resources, strategies and issues for bringing about change in groups and individuals applied to home economics and community services programs.
- 6203 Research Design in Home Economics.** 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.** Principles, processes, techniques and issues in relation to administration.
- 6523 Home Economics in Higher Education.** 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 and Community Services Seminar.I-6** credits, maximum 6. Prerequisite: consent of instructor. Critical study of problems and recent developments in home economics education and community services.

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 Horticultural principles and practices; basics of landscape design; characteristics and use of horticultural plants; scope and development of the horticultural industry.
- 2112 (N)Indoor Plants.** Lab 2. Prerequisite: 1013. Identification, cultural requirements and use of ornamental foliage and flowering plants for indoor gardens.
- 2212 Herbaceous Plants.** Lab 2. Prerequisite: 1013. Identification, cultural requirements and landscape value of ornamental flowering herbaceous plants.
- 2652 Basic Floral Design.** Lab 2. Fundamentals of floral arrangement and design for the home and the retail shop; basic skills useful to flower shop employment and operation.
- 3010 Internship in Horticulture and Landscape Architecture.** 1-6 credits, maximum 6. Prerequisites: 45 credit hours and approval of adviser. Supervised work experience with approved public and private employers in horticulture, landscape architecture, or related fields. Credit will not substitute for required courses.
- 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)Plant 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. 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, product costs. Practical crop production stressing major crops.
- 3153 Turf Management.**Prerequisite: 1013, AGRON 2124 and BISC 1402. Selection, establishment and maintenance of grass species and other plant materials for special use areas.
- 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.
- 3312* Landscape Plant Materials I.** Lab 2. Prerequisite: BISC 1114 or 1402. Identification, adaptation, tolerance and use of deciduous trees, shrubs, vines and ground covers in the landscape.
- 3322* Landscape Plant Materials II.** Lab 2. Prerequisites: 3312 and BISC 1114 or 1402. Identification, adaptation, tolerance and use of evergreen trees, shrubs, vines and ground covers 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.
- 4212 Vocational Horticulture.** Lab 4. Prerequisite: concurrent enrollment in AGED 4200. An overview of horticulture including floriculture, ornamentals, vegetables, landscape design,

fruits and nuts as they relate to vocational agriculture programs. Taken in conjunction with AGED 4200.

- 4313* Commercial Flower Production and Marketing.** Lab 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.
- 4453* Advanced Turfgrass Management.** Lab 3. 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.
- 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.
- 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.
- 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, BOT 3460 or equivalent or senior standing. The basics of applied physiological responses of plant growth as related to horticulture plants. Includes hormonal, genetic and environmental influences on horticultural plant growth and production.
- 5233* Experimental Horticulture.** Methods of conducting research with horticultural crops including organization and plans, field plot techniques and analysis of data.
- 5343* Advanced Nursery Systems.** Physiological, cultural and economic factors affecting nursery plant production. Economic considerations and analysis of current and theoretical nursery systems.
- 5412* Mineral Nutrition in Horticultural Crops.** Prerequisites: BOT 3463, AGRON 4233. Fertilizer use and plant response in horticultural crops.
- 5422* Flowering and Fruiting in Horticultural Crops.** Prerequisite: BOT 3463. Environmental, chemical and cultural factors affecting the flowering and fruiting of horticultural crops.
- 5432* Postharvest Physiology.** Prerequisites: BOT 3463 and 3460. Physiological causes for postharvest changes in horticultural crops (ripening and senescence) and the basis for certain postharvest treatments (precooling at harvest, controlled atmosphere storage, refrigeration, packaging techniques, etc.) Commodity specific postharvest phenomena.
- 6000* Research and Thesis.** 1-12 credits, maximum 20. Research on thesis problems required of candidates for the Ph.D. in crop science.

HOTEL AND RESTAURANT ADMINISTRATION (HRAD)

- 1102 Orientation and Survey of Hotels and Restaurants.** 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.
- 2111 Professional Sanitation in Food Service Industry.** Lab 1. Prerequisite: introduction to professional food preparation, chemistry. Sanitation for the hospitality industry. Food preparation and service, equipment, and guest accommodations.
- 2123 Fundamentals of Dining Room Management.** Lab 3. Prerequisite: 1113. Experience in organization and management of table and beverage service in varied food service settings. Same course as FNIA 2123.
- 2223 Executive Housekeeping.** Lab 2. Prerequisite: 2111. Housekeeping management in the hospitality industry. Organization, labor controls, material and equipment costs, customer expectations of today's lodging, foodservice, and institutional housekeeping departments.

- 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 (L)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 Management in Hospitality/Food Service Systems.** Prerequisites: 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 Purchasing in Hospitality/Food Service Systems.** Lab 2. Prerequisite: 3133 or concurrent enrollment. Procurement of food and nonfood materials in hospitality and related industries. Same as FNIA 3553.
- 4103 Legal Aspects of Hotel and Restaurant Management.** Research and problems concerning leasing and the legal responsibilities of innkeepers and restaurateurs. 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. Food, beverage and labor cost control systems associated with hospitality industry operations. Same course as FNIA 4333.
- 4363 Quantity Food Production Management.** Lab 4. Prerequisites: HRAD 2123, 3133, 3553, a course in accounting or mathematics. Organization, purchasing, preparation and service of food for large groups. Same course as FNIA 4363.
- 4413 Hotel Operation Systems Analysis.** Conceptual 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.
- 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.
- 4723 Survey of Beverages in the Hospitality Industry.** Prerequisite: senior standing. History, classifications, production techniques and quality factors of beverages such as wines, distilled spirits, beers, and non-alcoholic beverages.
- 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, INTERIOR DESIGN AND CONSUMER STUDIES (HIDCS)

- 2123 Graphic Design for Interiors.** Lab 6. Design and visual communication techniques related to interiors.
- 2213 Contemporary Issues in Housing, Interior Design and Consumer Studies.** 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)Heritage 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, cost of residential construction and remodeling.
- 3253 Environmental Design for Interior Spaces.** Prerequisite: 3243. Design factors and human performance criteria for lighting, acoustics and thermal/ atmospheric comfort as they relate to the practice of interior design.
- 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)Familles 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 Pre-professional Internship.** 1-3 credits, maximum 3. Prerequisite: consent of instructor. Participation in a monitored, practical housing, design or consumer related experience.
- 3821 Pre-employment Seminar.** Prerequisite: consent of instructor. Future professional role and responsibilities, business procedures and employer-employee relationships which characterize the employment situation in housing, design and consumer resources.
- 4113* Housing and Government.** Prerequisite: 3353. The role of government in the production of housing in the United States.
- 4143* Housing for Special Groups.** 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.
- 4153* Energy Efficient Residential Design.** Lab 6. Prerequisites: 2123, 3243 or equivalent. Studio course in the analysis, space planning, and construction techniques involved in the design of residential spaces to achieve efficient use of energy and space.

- 4163 (H,I)Housing In Other Cultures.** 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 III.** Prerequisite: 4264. Designing residential, nonresidential and contract interior spaces with complete drawings and specifications.
- 4323 (H)Heritage of Interiors II.** 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 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.
- 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.
- 4822 Professional Internship.** Prerequisite: consent of instructor. A supervised internship experience which simulates the responsibilities and duties of a practicing professional.
- 4850* Special Unit Course in Housing, Interior Design and Consumer Studies.** 1-6 credits, maximum 6. In-depth study of specific areas of housing, design, and consumer resources.
- 5000* Masters Thesis.** 1-6 credits, maximum 6. Prerequisite: graduate standing. Individual research relating to problems and thesis.
- 5110* Research Development in HIDCS.** Prerequisites: graduate standing and concurrent enrollment in HEC 5102. Current developments and needs in research in HIDCS including application of research methods to HIDCS and research planning.
- 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, Interior Design and Consumer Studies.** 1-6 credits, maximum 6. Investigation into special areas in the fields of housing, design and consumer studies. A maximum of 6 hours to be used by graduate students following Plan III for master's degree.
- 5363 Housing and Energy.** Prerequisite: consent of instructor. The impact of changing energy supply and cost on housing. Energy and housing policies, alternate energy sources and future implications.
- 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 advocates and opposition and involvement and/or action by consumers, business and government.
- 5453 Graduate Seminar in Interdisciplinary Consumer Education.** Prerequisite: consent of instructor. For teachers and professionals who have or expect to have responsibility in consumer education in both formal (school or college) or informal (extension, community, government, business) settings. An intensive study of the purposes, content, materials, methods and evaluation techniques necessary for effective education consumer education programs.
- 5473* Consumer and the Market.** Prerequisite: consent of instructor. Social, economic and political implications of traditional, current and emerging marketplace practices from an analysis of consumer behavior. Moral, ethical and social responsibility of business in relation to the profit motive in each segment of the market place.
- 5482 Experimental Problems in Home Equipment.** Prerequisite: 3423 or consent of instructor. Techniques for investigations with home equipment.
- 5810 Problems in Housing, Interior Design and Consumer Studies.** 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, Interior Design and Consumer Studies Seminar.** 1-6 credits, maximum 6. Prerequisites: consent of instructor. A selected group of current issues in housing, design and consumer resources.
- 5000* Doctoral Thesis.** 1-12 credits, maximum 30. Prerequisite: consent of major professor. Research in home economics for the Ph.D. degree under supervision of a graduate faculty member.
- 6353* Housing Market Analysis.** Prerequisite: 3353. Mechanisms for allocating resources to the production of housing; supply and demand functions in the housing market, characteristics of the housing industry, the role and responsibilities of the consumer along with interactions among the many participants in the operation of the housing market.
- 6410* Independent Study in Housing, Interior Design and Consumer Studies.** 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.
- 6823 Economic and Social Foundations of Consumer Studies.** Prerequisite: Graduate standing; consent of instructor. The lives, times and ideas of great economic and social thinkers and how their influence on the economic and social development of our society affects the economics of family living.

6830* Housing, Interior Design and Consumer Studies 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.
- 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 (Modern)** 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.
- 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)Asian 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.
- 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 (I)The World of Islam-Cultural Perspectives.** The cultural heritage of the World of Islam explored through its expression in the art, architecture and literature of the Muslim peoples.
- 4223* Greek Tragedy.** Greek tragedy as an expression of the human condition. Study organized mainly around the mythological order of the events of the plays. Same course as TH 4223.
- 4333* Contemporary Global Issues in Humanistic Perspective.** Prerequisites: three courses in Humanities, Philosophy, or Religion. Contemporary issues such as international develop-

ment, global conflict, poverty, etc. seen in the light of cultural and humanistic values in an international context.

4910 Research Problems in the Humanities. 1-3 credits, maximum 9. Prerequisites: three courses in the Humanities, Philosophy, or Religion. Directed readings and study for students wishing to pursue topics of special interest in the Humanities.

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 Arts 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.
- 3103 Industrial Arts Design.** Lab 2. History and theory of product design. Laboratory exercises in the design and development of industrial arts projects with application for local schools.
- 3223 Electronics.** Lab 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 implication 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.

- 3423 Methods for Instructing Drafting.** Lab 3. Prerequisite: GENT 1153 or equivalent. Application of teaching principles as they apply to drafting. Emphasizes current high-technology practices and computer assisted drafting.
- 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.
- 4343* Curriculum Development in Industrial Arts.** Prerequisite: admission to teacher education. Principles, practices and problems in construction of industrial arts curricula.
- 4440* Industrial Crafts.** 1-2 credits, maximum 6. Development of knowledge and skills in working with materials, tools and equipment used in various industrial crafts. 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.** 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.** Lab 2. Prerequisites: ENGR 1412; MATH 2265. Industrial engineering techniques in production **control, inventory control, quality con-**

trol, layout, methods engineering, material handling, and engineering economy. Laboratory sessions provide additional learning experiences with these topics.

- 3302 Industrial Processes I**. Lab 3. Prerequisite: 3313. Industrial manufacturing processes which are used to transform raw materials into finished goods. Basic metal cutting theory and process selection and planning. Field trips to manufacturing plants.
- 3312 Industrial Processes II/Numerical Control**. Lab 3. Prerequisite: 3302. Continuation of 3302. Further study of additional manufacturing processes in joining, finishing, metrology, non-traditional machining, tool design, and numerical control. Includes field trips to manufacturing plants.
- 3503* Engineering Economic Analysis**. Prerequisite: MATH 2365. 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 economic equivalence and in formulating economic comparisons based on present worth, annual equivalent, rate of return and payout criteria. Accounting, depreciation and income tax considerations. Benefit-cost and cost-effectiveness analysis. Cost estimation and allowance for variance in estimates. Not available for credit in Industrial Engineering curriculum.
- 3603* Industrial Operations Analysis**. Prerequisite: sophomore standing. Production management, covering the main aspects of organization, design and control. Decision making within a systems approach. Not available for credit in Industrial Engineering curriculum.
- 3703 Engineering Computations and Interactive Modeling**. Prerequisites: ENGR 1412 and MATH 2265. Interactive computer techniques. Using a digital computer for engineering analysis and design. Fundamental computer concepts. Advanced FORTRAN programming.
- 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 concurrently and INDEN 3822 concurrently. Determining the most effective utilization of effort in human activity systems. Physiological and psychological factors are included with engineering concepts in the design and evaluation of work methods, environments, equipment and standards.
- 3822 Human Performance**. Lab 2. An examination and investigation into the characteristics of human performance in the work environment. How and why employees perform at various levels in different situations and for different tasks.
- 4010* Industrial Engineering Projects**. 1-3 credits, maximum 6. Prerequisite: consent of School head. Special undergraduate projects and independent study in industrial engineering.
- 4014* Operations Research I**. Prerequisites: MATH 3623; 3703; STAT 4033. Fundamental methods, models, and techniques of operations research. Computational techniques of linear programming, integer and mixed integer programming, dynamic programming, non-linear optimization, and queueing theory.
- 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. Principles and practices of industrial quality control. Use of variables and attributes control charts to achieve and maintain a state of statistical control. Process capability analysis. Acceptance sampling plan design by attributes and variables. Single, double, sequential, and continuous sampling. MIL-STD 105D, MIL-STD 414, Dodge-Romig sampling schemes. Quality programs and management of the quality function.
- 4203 Facility Location and Layout/Material Handling Systems**. Prerequisite: 3813. Facility location, facility layout and material handling systems design with emphasis on applications in widely varying industries. Design principles and analytical solution procedures are presented with a concentration on modern practice including computerized approaches.
- 4323* Manufacturing Systems Design**. Prerequisites: 3312, 3503. Principles and procedures related to the design, implementation, documentation, and control of manufacturing systems.

Consideration of transfer lines, numerical control, flexible automation, robotics, and manufacturing support activities such as cost, quality, and materials control. Introduction to basic computer aided design and computer aided manufacturing (CAD/CAM).

- 4413* Industrial Organization Management.** Prerequisites: 3822 and senior standing; graduate standing and consent of instructor. Organization and management of human activity systems. Production and service organizations as integrated systems. Inputs of human skills, capital, technology and managerial activities to cause the transformation of inputs into more valuable outputs of products, services, profits, satisfactions.
- 4613* Production Control.** Prerequisite: 4014. Concepts of planning and control of production environments. Design of operation planning and control systems. Techniques used in demand forecasting, operations planning, inventory control, scheduling, and progress control. A production simulator is used to provide a realistic application experience.
- 4712 System Simulation.** Prerequisites: 3703; STAT 4033. Basic concepts of simulation of discrete-event systems. Problem formulation, translation of problem to a computer model, and use of model for problem solution. Use of SIMLIB and GPSS simulation languages.
- 4723 Information Systems for Management Decisions and Control.** Prerequisite: 3703. Systems engineering methodology applied to the design of information systems for management of all types of organizations. Data base management systems. Distributed and centralized systems. Different phases of system design and implementation.
- 4913* Senior Design Projects.** Lab 6. Prerequisites: 3503; 3813. 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 verbal 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 and Water Management.** Lab 2. Prerequisite: ENGSC 2213, 3233, INDEN 3503. Objectives, design, implementation and management of energy and water management programs. Energy and water conservation, choice of energy sources, safety and security of fuel storage, contingency planning and use of standby fuels. Philosophy is to improve profits through optimal energy and water utilization. Outside speakers utilized when appropriate. Lab work required on audit equipment.
- 4931 Industrial Engineering and Management Seminar.** Prerequisite: senior standing. Communications, ethics and professionalism, graduate school, registration, money and time management, resume preparation, interviewing, job expectations, dress, and professional society membership. This course is designed to better orient seniors to the world of the professional engineer. Emphasis upon communications.
- 5000* Research and Thesis** 1-6 credits, maximum 6. Prerequisite: approval of major adviser. Research and thesis for master's students.
- 5003 Quantitative Foundations for Industrial Engineering.** Prerequisites: MATH 2613 or 3623. Fundamental quantitative methods necessary for advanced study in various areas of industrial engineering. Includes matrix algebra, real analysis, calculus of finite variables and transform methods. Application of theorems to industrial engineering and related areas.
- 5010 Industrial Engineering Projects.** 1-2 credits, maximum 6. Prerequisites: consent of school head and approval of major adviser. Special graduate projects and independent study in industrial engineering.
- 5013* Linear Programming.** Prerequisites: 4014, 5003; FORTRAN. Simplex algorithm to solve deterministic linear optimization models considering maximization and minimization objectives; degeneracy, alternative optima and no feasible solutions. Revised simplex procedures. Duality theory, economic interpretations, dual simplex and complementary pivoting. Sensitivity analysis and parametric programming. Special cases of linear optimization problems and underlying mathematical foundations. Large-scale models including computational considerations.
- 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: 4014; 5003. The determination of policy that optimally allocates resources to the various stages of a

finite-stage system. Deterministic and stochastic systems including serial systems, diverging branch systems, converging branch systems and loop systems.

- 5103 Advanced Industrial Quality Control.** Prerequisites: 4103, STAT 4033, STAT 4013; FORTRAN. Acceptance sampling and control charting by both attributes and variables. Statistically and economically-based treatments of sampling plan and control chart design. Analysis and design of sampling under inspection and measurement errors. Experimental design and analysis of variance in quality control. Qualitative topics covering modern quality program development and work elements from engineering design through field failure analysis.
- 5133* Stochastic Processes.** Prerequisites: MATH 2613 and STAT 4113. Definition of stochastic processes, probability structure, mean and covariance function, the set of sample functions. Renewal processes, counting processes, Markov chains, birth and death processes, stationary processes and their spectral analyses. Same course as STAT 5123 and MATH 5633.
- 5203. Advanced Facility Location and Layout/Material Handling Systems.** Prerequisite: 3503, 4014; 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.
- 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. 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. 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: 4413. 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, 4014; 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*** **Project 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: 4014; 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: 5003; STAT 4033; FORTRAN. 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: 4014; 4613. 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: 4014; 5003. Network approach to the modeling and analysis of complex systems. Deterministic and stochastic network topics include PERT, CPM, decision trees, network flows, flowgraphs, and GERT (Graphical Evaluation and Review Technique). 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 SLAM simulation language.

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; STAT 4013 or STAT 4053. Basic consideration of the human factors in engineering systems with emphasis on the interface of man-machine systems. Development of human abilities and limitations in relation to equipment designs and work environments.

5813 **Productivity Measurement and Improvement.**

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: 4014. Quantitative and qualitative aspects of multiple criteria decision making. Dynamics of the decision process are examined and the multi-objective nature of most managerial decision problems is illustrated. General concepts and solution methodologies of the multi-objective problem. Multi-objective linear programming, goal programming, and compromise programming. Attribute importance, risk measurement, and utility measurement.

5923 **Advanced Energy and Water Management.**

Prerequisite: 4923. Continuation of material covered in 4923 with an emphasis on modern management techniques of energy and water management. Energy accounting techniques, alternative energy source applications in industry, simulation and other quantitative approaches, water management audits. Significant case study or term project required.

6000

Research and Thesis. 1-15 credits, maximum 30. Prerequisites: approval of major adviser and advisory committee. Independent research for Ph.D. dissertation requirement under direction of a member of graduate faculty.

6023

Nonlinear Programming. Prerequisites: 5003; 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: 4014 or 5013; 5003. 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 enumeration, 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.
- 6113 * Reliability and Maintainability.**Prerequisites: 5003; STAT 4033; FORTRAN. Probabilistic failure models of components and systems. Detailed study of reliability measures, and static and dynamic reliability models. Classical and Bayesian reliability testing for point and interval estimation of exponential and Weibull failures. Realiability optimization through allocation and redundancy. Fundamentals of maintainability.
- 6123 * Analysis and Design of Queeuing Systems.** Prerequisites: 5003; STAT 4033; FORTRAN; CO: 5703. Modeling, analysis and design of Poisson and nonPoisson queeuing systems including infinite and finite population models, bulk arrivals and networks of queues. Decision models of queeuing systems, including cost and aspiration level models. Transient analysis and special topics. Brief review of probability and transform methods.
- 6423* Theory of Systems Organization II.** Prerequisite: 5413. 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, Likert, Maslow, Drucker et al. Application of modern theories to organizations of various kinds.
- 6513* Analysis of Decision Processes.** Prerequisites: 5003, STAT 4113 or STAT 4203; FORTRAN. Bayesian decision theory with application to optimal decision making in industrial engineering and allied fields. Extensive and normal form analysis. Sufficient statistics, noninformative stopping and conjugate prior distributions. Additive utility, opportunity loss (regret) and value of information. Terminal analysis, preposterior analysis and optimal sampling. Applications using Bernoulli, Poisson and normal processes.
- 6713* Continuous Systems Simulation/Systems Dynamics.** Prerequisite: 5703 or consent of instructor. Continuous systems via simulation, using the DYNAMO and SLAM simulation languages. Concepts of combined discrete and continuous simulation modeling. Simulation of large scale systems, particularly socio-economic systems.

ITALIAN (ITAL)

- 1115 (I)Elementary Italian I.** Pronunciation, conversation, grammar, reading.
- 1225 (I)Elementary Italian II.** Prerequisite: 5 hours of Italian or equivalent. Continuation of 1115.

JAPANESE (JAPAN)

- 1115 (I)Elementary Japanese.** Pronunciation, conversation, grammar and reading.
- 2115 (H,I) Intermediate Japanese.** Prerequisite: 1115 or equivalent. Reading, the writing system, culture, grammar, conversation.
- 2123 (H,I)Intermediate Japanese II.**Prerequisites: 1115 and 2115 or equivalent. A continuation of 2115.
- 2223 (H,I) Intermediate Japanese III.**Prerequisites: 1115, 2115 and 2123 or equivalent proficiency. A continuation of 2115 and 2123.

JOURNALISM (JM)

(See also Advertising and Public Relations, Mass Communications and Radio-Television-Film)

- 1013 (S,SpD)Mass Media in American in American Society.** 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. Same as RTVF 1123.

- 2113 Newswriting I. Lab 3.** Prerequisites: MC 1123; 30 wpm typing ability. News values, information gathering techniques, newswriting.
- 2133 News Editing I.** Lab 3. Prerequisite: 2113. Copyediting and headline writing for newspapers and magazines.
- 2143 News Editing II.** Lab 3. Prerequisite: 2133. Advanced copy editing; ethics and legal considerations from an editor's viewpoint; design techniques for newspapers and magazines including picture editing, introduction to type, makeup and design practices, and special pages.
- 2173 History of Journalism.** Prerequisite: 1123 or RTVF 1123. Growth and development of mass communication systems in America, with emphasis upon the economic, social and political interaction of the media.
- 3083 Advanced Reporting and Writing.** Lab 6. Prerequisite: 3113. Evaluating news sources, reporting of public affairs and investigative reporting.
- 3090 Journalism/Advertising/Public Relations Laboratory.** 1-3 credits, maximum 5. Laboratory and/or internship practice for qualified students who wish creative communications experience beyond that available in the classroom.
- 3123 Public Affairs Reporting.** Lab 3. Prerequisites: 2113; POLSC 3613. Coverage of courts, local government and social problems.
- 3163 Mass Communication Law.** Statutes and case decisions in print and broadcast law, including government regulation of broadcasting by the FCC and media relations with other regulatory agencies. Same as RTVF 3163.
- 3213 Editorial Writing.** Prerequisite: 3083. Editorial interpretation of social, economic and political events.
- 3323 Visual Communication.** Use of photographs, charts, graphs and other visual representations in the mass media; the language of pictures; theories of non-verbal communication visual aids in education and other information systems.
- 3333 Photography I.** Lab 3. 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.
- 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.
- 4013 Senior Seminar.** Prerequisite: senior standing. 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.
- 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.
- 4253 Photography II.** Lab 3. Prerequisite: 3333. Technical and scientific phases of photography; basics of color photography; studio problems; photographic communication theory.
- 4443 Basic Motion Picture Techniques.** Lab 3. Prerequisite: 3333. 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. Same as RTVF 4443.
- 4723 Journalistic Management.** Prerequisite: senior standing. Business and editorial management of newspapers, magazines, industrial, business and farm publications.

LANDSCAPE ARCHITECTURE (LA)

- 2002 Landscape Architectural Delineation.** Lab 6. Illustration techniques for presenting Landscape concepts and designs.
- 3002 Advanced Landscape Architectural Delineation.** Lab 4. Prerequisite: 2002. The application of multimedia presentation and delineation techniques to more complex plans, drawings and programs.
- 3673 (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 Architectural Design I.** Lab 4. Prerequisites: drawing and drafting skills recommended. Application of landscape architectural design theory to the planning and design of outdoor spaces and elements for best human use and enjoyment.
- 3883 Landscape Architectural Construction I.** Lab 6. Site grading, equipment, earthwork calculations, runoff and drainage as they relate to landscape architecture.
- 3893 Landscape Architectural Construction II.** Lab 6. Prerequisite: 3883. Preparation of construction details, staking plants, estimates and construction specifications for landscape architectural site development.
- 4013* Landscape Architectural Design II.** Lab 6. Prerequisite: 3773. A continuation of LA Design I with an emphasis on design methodologies.
- 4023* Landscape Architectural Design III.** Lab 6. Prerequisites: 4013 and admission to LA program. Complex site developments with an emphasis on landforms and structures.
- 4024* Landscape Architectural Design IV.** Lab 8. Prerequisite: 4023. Large scale sites with an 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 2. Prerequisites: HORT 3334 and LA 3773. Plants in the landscape as esthetic and functional elements. Environmental enhancement by and for plants. Preparation of planting sketches, plans, and specifications.
- 4434* Landscape Analysis and Use.** Lab 8. Prerequisites: LA 4024 and admission to LA program. The inventory and analysis of natural and man-made landscape resources and their application to land use.
- 4573* Recreation Design. Lab 4.** Prerequisite: BISC 1114 or 1402, upper division and some background in recreation, natural resources , or design. Design concept development for large-scale recreation areas or systems with an emphasis on natural resources.
- 4680 Landscape Architecture Assembly.** 1-4 credits, maximum 4. Presentations by faculty and guest speakers dealing with various aspects of landscape architecture.
- 4893* Landscape Architectural Construction III.** Lab 6. Prerequisites: 3893 and LIVEN 3603. Preparation of construction plans for irrigation, lighting, water features, drainage systems, and roadway alignment for landscape architectural site development.
- 4990* LA Special Problems.** 1-6 credits, maximum 6. Prerequisite: consent of appropriate faculty member. Landscape architectural related problems.
- 5024* Landscape Architectural Design V.** Lab 8. Prerequisite: 4024. 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 Special Problems.** 1-12 credits, maximum 20. Prerequisite: consent of appropriate faculty member. Specific landscape architectural problems.

LATIN (LATIN)

1115 (I)Elementary Latin I. Grammar, vocabulary, translation practice.

- 1225 (I)Elementary Latin II.** Prerequisite: 1115 or equivalent. Continuation of 1115. Grammar, vocabulary and readings.
- 2213 (H,I)Intermediate Readings.** Prerequisite: 1225. Prose selections in Latin from a variety of authors.
- 3330 (I)Advanced Readings in Latin.** 1-6 credits, maximum 9. Prerequisite: 2213. Prose authors, poetry, medieval Latin, etc.

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 foot-work, 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 Modern 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 inter-relationship of special agencies and institutions which serve the recreation needs of society.
- 2422 Social Recreation.** Lab 2. Methods and materials for planning, organizing and conducting social activities for groups of various sizes and ages in a variety of social situations.
- 2433 Introduction to Therapeutic Recreation.** Theory and application of therapeutic recreation with emphasis on types of illnesses and disabilities, delivery systems, programming and services.
- 2512 Advanced Swimming and Life Saving.** Lab 2. Prerequisite: 2372 or equivalent. Theory and practice of advanced swimming, lifesaving and water safety skills.
- 3430 Practicum.** 1-3 credits, maximum 3. Prerequisites: 2413, 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.
- 3473 Evaluation of Leisure Services.** Prerequisite: 3463: Methods, techniques and application of the evaluation process related to a wide variety of leisure service functions: clientele, programs, personnel, facilities and organization.
- 3483 Principles and Clinical Practices in Therapeutic Recreation.** Prerequisite: 2433. Clinical intervention techniques and strategies, including treatment techniques, leisure education and role of recreation in the treatment process.
- 3491 Pre-Internship Seminar.** Prerequisite: completion of 15 hours in LEIS. Preparation for internship in recreation and leisure services.
- 4213 Methods of Teaching Swimming.** Lab 2. Prerequisite: 2512 or equivalent. American Red Cross Water Safety Instructor's Certification.
- 4222 Swimming Pool Management.** Prerequisite: 2232. Design, operation, programming and personnel management. May yield Oklahoma State Health Department Swimming Pool Operation Certificate.
- 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*.
- 4463* Areas and Facilities in Recreation.** Prerequisites: 3463; PE 3773 or 4712. Planning, design and development of areas and facilities in recreation and physical education.
- 4473* Outdoor Recreation.** Theory and practical application of outdoor recreation concepts with emphasis on philosophies, principles, policies, economics, trends and problems.
- 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.
- 4513* Facilitation Techniques in Leisure Counseling.** Prerequisite: 3483. Philosophy, history, trends, models, legal aspects and basic methods of leisure counseling and leisure education.
- 4523* Program Design in Therapeutic Recreation.** Prerequisite: 3483. Systematic approach to the development, design and evaluation of therapeutic recreation programs.
- 4563 Industrial/Commercial Recreation Management.** Prerequisite: 3463. Industrial and commercial recreation management: budgeting, facilities, programming and operational procedures.

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 resource 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.
- 5613* Bibliography of Special Fields.** Prerequisite: consent of instructor. Bibliographical literature/data banks in the humanities, sciences, and social sciences; theory and underlying principles, practices, and control of descriptive and systematic bibliography; practice in preparation of subject bibliographies. Print and computer data banks.
- 5713 Documents and Pamphlets Material.** Introduction to the most-used governmental publications and indexes; selection, acquisition and care of pamphlet materials.

MANAGEMENT (MGMT)

- 3013 Management.** Prerequisites: Completion of 50 credit hours and ACCTG 2203, ECON 2013, GENAD 2103, STAT 2023. Management principles and techniques of analysis. Decision making as applied to management systems, organizations, interpersonal relationships and production.
- 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. Behavioral science concepts relevant to the study of organizational and managerial behavior. Provides an understanding of the components and dynamics of organizational behavior essential to any manager. Managerial applications stressed.
- 3223* Production/Operations Management.** Prerequisite: 3013. Production/operations management utilizing a management science approach. Management decision-making techniques and their application to problems in production and operations management. Examples of applicable techniques include linear programming and decision analysis.
- 4023* Management Science Methods.** Prerequisites: 3223 and completion of lower division math requirements. Deterministic operations research techniques applied to the resource allocation and operational problems encountered in accounting, marketing, finance, economics and management. Linear programming and network models.
- 4113* Personnel Management and Industrial Relations.** Prerequisite: 3013. 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 management 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 completion of lower division math requirements. Decision processes under risk and uncertainty. The use of models in business decision making with outcomes governed by probability distributions. Bayesian decision analysis, utility measurements, game theory, Markov chains, queuing, simulation probabilistic forecasting and inventory, network models, dynamic programming.
- 4223* Management Information Systems.** Prerequisites: 3223 and an introductory course in computing. Design, operation and implementation of computer-based information systems for decision making: current developments in management information theory. Value of information, data bases, decision support systems, interactive languages and statistical software; and applications to managerial problems in marketing, manufacturing and finance.
- 4313* Organization Theory and Development.** Prerequisite: 3123. The design of formal organizations with an emphasis on topics related to organizational and managerial effectiveness. Focus on what is known about managerial and organizational effectiveness and how this knowledge may be applied.
- 4413* Management Systems Applications.** Prerequisites: 4023 and a course in a scientific programming language. Development and implementation of complex computerized decision models. Projects include data-base utilization, optimization and report generation.
- 4443* Computer-Based Simulation Systems.** Prerequisites: 3223, completion of lower division math requirements and a course in a scientific programming language such as FORTRAN, PL/1, or PASCAL. Discrete computer systems simulation using languages such as GPSS, GASP, or SLAM. Cases include queuing, layout planning and evaluation, and financial modeling.
- 4713* Conflict Resolution in Industry.** Prerequisite: 3013. An integrated and interdisciplinary approach to the issues of industrial conflict and conflict resolution. An analytical development stressing both theory and empirical research. Models of conflict; conflict between the individual, the group and the organization; economic conflict and industrial conflict.
- 4813 Human Resource Management and Planning.** Prerequisite: 4113. Management of human resources at the organization level including human resource forecasting, planning, and development. Forecasting techniques, job analysis, career planning, and personnel information systems.
- 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. 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.** 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: admission to MBA program or approval from MBA director and 5610. The management of operations in manufacturing and service organizations. Production planning, facility location and layouts. Inventory control, waiting line problems and simulation. Project management and quality control. Emphasis is on a management science approach.
- 5333 Advanced Decision Theory for Management.** Prerequisite: 5313 or equivalent. Case studies and examples involving decision analysis. Studies taken from current literature.
- 5413 Management Science for Managerial Decisions I.** Prerequisite: 5313 or equivalent. Advanced management science methods, with computer applications. Mathematical programming, simulation, forecasting, queuing, Markov processes.
- 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* Quantitative Methods in Business .3 credits, maximum 3.** Prerequisites: MATH 2713; MATH 2813 or equivalent is strongly recommended; admission to MBA program or approval from MBA director. Application of quantitative techniques to business problems.

quantitative approaches to economic analysis, input/output analysis, management decision-making; financial analysis, and constrained and unconstrained optimization.

- 5613* Advanced Production/Operations Management.** **Prerequisite:** graduate standing, MGMT 5313 or equivalent. Production system, including a synthesis of production and management techniques used by operations managers. A computerized management simulation game provides decision-making experience.
- 5623* Advanced Management Information Systems.** Prerequisites: 5313, BUSAD 5110, ACCTG 5103, STAT 3013. Design and use of management information systems in businesses and other organizations. Model building, information resource management and decision support systems.
- 5713* Labor Relations and Collective Bargaining.** 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. 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 techniques as a means of program improvement. Assessment of the long- and short-run effects of manpower programs in both the private and public sectors.

MANUFACTURING TECHNOLOGY (MFGT)

- 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.
- 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 Applied Metallurgy and Heat Treating.** Lab 3. Prerequisites: GENT 1103. Mechanical properties of ferrous metals 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.
- 3343 Physical Metallurgy.** Lab 3. Prerequisite: GENT 1103 and CHEM 1314. Ferrous and nonferrous metals including alloy steels and cast irons. Atomic theory, dislocation theory and corrosion. The influence of micro-structure and heat treatment on the mechanical properties of metals. Metallographic specimen preparation, inspection and testing.
- 3573 Production Processes.** Lab 3. Prerequisites: GENT 1103, MATH 1513. Processes used by the manufacturing industries in the production of durable goods. Foundry, plastics, powder metallurgy, hot and cold forming, and welding. Techniques of design, application and selection.
- 4050 Advanced Manufacturing Problems.** 1-4 credits, maximum 4. Prerequisite: junior standing and consent. Special problems in manufacturing.
- 4303 Industrial Machine Processes.** Lab 3. Prerequisites: GENT 1103, 1222, 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.

MARKETING (MKTG)

- 3213 Marketing.** Prerequisite: ECON 2023. Marketing strategy and decision-making. Consumer behavior, marketing institutions, competition and the law.
- 3323 Consumer and Market Behavior.** Prerequisite: 3213. Qualitative and quantitative analyses of the behavior of consumers; a marketing consideration of the contributions of economics and the behavioral disciplines to consumer behavior.
- 3433 Promotional Strategy.** Prerequisite: 3213. Promotional policies and techniques and their application to selling problems of the firm.
- 3513 Sales Management.** Prerequisite: 3213. Sales planning and control, organization of the sales department, developing territories, motivating salesmen and control over sales operations.
- 3613 Retailing Management.** Prerequisite: 3213. 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 and MGMT 3223. An economic and operational analysis of the physical flow of goods and materials. A system interpretation of marketing channels.
- 4333* Marketing Research.** Prerequisites: 3213 and STAT 3013. Basic research concepts and methods. Qualitative and quantitative tools of the market researcher.
- 4433 Problems in Marketing.** Prerequisites: 3213. Problems in marketing. Specific topics vary from semester to semester.
- 4443 Social Issues In the Marketing Environment.** Prerequisite: 3213. Social and legislative considerations as they relate to 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 emphasis 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.** 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.** 1-3 credits, maximum 3. Prerequisite: 5133. Selected topics in marketing. Industrial marketing, product management, strategic marketing planning, public policy and services marketing.
- 5313* Advanced Marketing Research.** Research methodology applied to marketing problems. Measurement, survey research, experimentation and multivariate statistical analysis.
- 5513* Seminar in Marketing Theory.** Prerequisite: 5133 or consent of instructor. Development of evaluation of marketing theory.
- 5613 Seminar in Consumer Behavior.** Prerequisite: 5133 or consent of instructor. Psychological, sociological, and anthropological theories related to consumer decision processes. Special emphasis on current empirical research in consumer behavior.
- 5713* Seminar In Promotional Strategy.** Promotional problems encountered by a firm and approaches to their solution.
- 5813* Seminar in Logistics.** Customer service policies, transportation mode choice, transportation regulation, warehousing, inventory management and location analysis.

MASS COMMUNICATIONS (MC)

- 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.
- 4913* General Semantics in Mass Communication.** Prerequisite: senior or graduate standing. 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* Responsibility in Mass Communication.** Interaction between mass media and society, with emphasis upon the communicator's ethics and responsibilities.
- 5770* Seminar in Communications Media.** 1-3 credits, maximum 3. Topics include: international communication, media history, legal research, new technology, women and the media, TV and children and communication research.
- 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. Carries no credit toward graduation in : Colleges of Agriculture; Arts and Sciences; Business Administration; Engineering, Architecture, and Technology; Home Economics. In the College of Education, may be used as a free elective only. No credit for those with prior credit in any other math course.
- 1213 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. No credit for those with prior credit in any math course for which 1213 is a prerequisite.
- 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. No credit for those with prior credit in 1715 or any math course for which 1513 is a prerequisite.
- 1613 (A)Trigonometry.** Prerequisites: one unit of high school plane geometry, and 1213 or high school equivalent. Trigonometric functions, logarithms, solution of triangles and applications to engineering. No credit for those with prior credit in 1715 or any course for which 1613 is prerequisite.
- 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. Credit limited to 3 hours for those with prior credit in 1513. No credit for those with prior credit in any course for which 1613 is a prerequisite.

- 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)Arithmetic 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)Finite 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* Modern Algebra.** Prerequisite: 3113. Basic properties of groups, rings, polynomial rings and fields including homomorphism theorems and quotient structures.

- 4243* Theory of Numbers.** Prerequisite: 3113. Divisibility of integers, congruences, quadratic residues, distribution of primes, continued fractions and the theory of ideals.
- 4253 Numerical Mathematics: Analysis.** Prerequisites: 2613, 3013, and COMSC 2113 or COMSC 4113. 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.
- 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 stability. Applications.
- 4673* Complex Analysis.** Prerequisite: 4013 or 4353. Complex variables for students in engineering and the physical sciences. Analytic functions, power series, residues 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.
- 5113* Probability Theory.** Prerequisite: STAT 4113. Transformations of random variables, generating functions, sequences of random variables and convergence theorems. Same course as STAT 5113.
- 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* General Topology.** Prerequisite: 3113 or consent of instructor. Topological spaces including continuous functions, compactness, separation properties, connectedness and metric spaces.
- 5313* Geometric 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 Analysis III.** 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 Mathematics II.** Prerequisite: 5583 or consent of instructor. A continuation of 5583.
- 5633*** **Stochastic Processes.** Prerequisites: 2613 and STAT 4113. Definition of stochastic processes, probability structure, mean and covariance function, the set of sample functions. Renewal processes, counting processes, Markov chains, birth and death processes, stationary processes and their spectral analyses. Same course as STAT 5123 and INDEN 5133.
- 5683*** **Partial Differential Equations I.** Prerequisite: 4013 or 5353. 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. 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. 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 Instrumentation.** 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 ECEN 3723. Advanced modeling of mechanical engineering systems (mechanical, electromechanical, fluid and thermal). Numerical techniques for simulating system response. Model verification and identification, non-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.** 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. 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)Experimental 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.
- 4613 Fundamentals of Reservoir Engineering.** Prerequisites: MATH 2613, CHENG 3473 or MAE 3613. Properties of porous media, properties and phase behavior of reservoir fluids. Computational schemes, including numerical methods, for predicting and optimizing production rates and establishing reserves.

- 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. A student studying for a master's degree who elects to write a thesis must enroll in this course.
- 5010 Mechanical Engineering Projects.** 1-12 credits, maximum 12. Project in research or design selected by the student, or assigned by the instructor. A student who wishes to complete a master's degree under Plan III must enroll in this course.
- 5030* Engineering Practice.** 1-12 credits, maximum 12. 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. Analysis of nonlinear vibrations, classical analysis of continuous systems and numerical methods.
- 5083* Engineering Acoustics.** Acoustical analysis and measurement techniques, with emphasis on design applications for noise and vibration control in machinery and in buildings.
- 5093* Numerical Engineering Analysis.** 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. Fluid dynamics of compressible flows at subsonic and supersonic speeds for two-dimensional and axisymmetric geometries. Comprehensive treatment of linear aerodynamic theories and the generation and propagation of aerodynamic noise.
- 5323* Plasticity and Metal Forming.** Prerequisites: ENGSC 2114 or equivalent. Basic theory of plasticity and its applications to metal forming problems. Application of computer-aided design (CAD) and computer-aided manufacturing (CAM) techniques in part and tool design and manufacture.
- 5373* Instrumentation.** Lab 2. Analysis and design of instrumentation systems, laboratory experiences with electronic instrumentation and transducers, application of digital and analog integrated circuit components to measurement problems.
- 5403* Computer-Aided Analysis and Design.** Prerequisite: basic FORTRAN programming. Theory, application and implementation of digital computer oriented algorithms for the synthesis, simulation, analysis and design of engineering systems. Advanced FORTRAN methods for optimization, simulation and data analysis. Implementation of these methods uses program libraries, batch processing, remote terminals and graphic display units.
- 5413* Motion Programming of Planar Mechanisms.** Prerequisite: 3033. 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.** Static and dynamic force analysis of plane and space mechanisms using vector, matrix and dual quaternion approaches. Simulation of mechanical systems. Study of transient effects. Vibration analysis and balancing of linkages.
- 5433* Robotics: Kinematics, Dynamics and Control.** Design and performance analysis of robots and manipulators as applied in flexible manufacturing and automation. Structural synthesis, kinematic and dynamic analysis, dexterity analysis, motion programming, and control system analysis and synthesis.
- 5443 Lubrication, Friction and Wear.** Prerequisite: ENGSC 3233. Theories of lubrication, friction and wear; fundamentals of viscous fluid flow; the Navier-Stokes equations; Reynolds

equations; **hydrodynamic** theory and **applications** to fixed, pivoted and thrust plane-slider bearings, journal bearings, disks, gears; optimization of bearing performance; hydrodynamic squeeze theory and applications; analysis of hydrostatic bearings; gas lubrication; solid friction and theories of adhesion and deformations; wear and theories of adhesion and abrasion.

- 5453*** **Fluid Power Control I.** Prerequisite: 4053 or concurrent enrollment. Static and dynamic modeling of hydraulic and pneumatic control systems and components. Energy and power transfer and impedance matching concepts. Dynamic performance and stability of open- and closed-loop servodrives. Introduction to system design.
- 5463*** **Fluid Logic.** 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 ECEN 4413. An advanced course in the analytical design of linear control systems. Modeling, compensation, time domain response description, stability analysis, simulation and parameter optimization.
- 5523*** **Photoelastic Stress Analysis.** Prerequisite: 4363. 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.
- 5533** **Analysis of Structural Systems.** Prerequisite: 4513. Computer-oriented matrix methods in the analysis of linear structural systems; energy principles; matrix equations for static and dynamic analyses of elastic systems; stability.
- 5543*** **Modem Materials.** Prerequisites: ENGSC 3313. Properties, applications and recent innovations of structural engineering materials. Metals, ceramics, polymers and composites considered.
- 5553*** **Fatigue and Fracture Mechanics.** Prerequisite: 4333. 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.** 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. Modern theory of corrosion and its applications in preventing or controlling corrosion damage economically and safely in service.
- 5613*** **Fluid Flow in Porous Media.** 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.** Methods of analysis related to design, development and utilization of conventional and unconventional energy conversion systems.
- 5633*** **Applied Thermodynamics.** 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.** 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.** Solar space and water heating systems including economic considerations.
- 5723*** **Nonlinear Systems Analysis I.** Prerequisites: 4053 and ECEN 4413. Failure of superposition; phase plane and phase space techniques; method of perturbations; asymptotic, orbital and structural stability; subharmonic generation; generalized approaches to nonlinear systems analysis.
- 5803*** **Advanced Thermodynamics I.** Prerequisite: 3223. A rigorous examination of the fundamental principles of engineering thermodynamics; the First Law, the pure substance, flow processes, Second Law availability, properties of substances, thermochemistry, mixtures and equilibrium.
- 5823*** **Radiation Heat Transfer.** The mechanism of the transfer of energy by thermal radiation; radiant properties of materials, energy transfer prediction methods and solar energy topics.
- 5843*** **Conduction Heat Transfer.** Prerequisite: ENGSC 3233. Advanced heat transfer analysis and design, with primary emphasis on conduction.

- 5873* Advanced Indoor Environmental System.** Prerequisite: 4703. Heating, cooling, and ventilating systems. System and component design, building thermal simulation and energy calculation procedures.
- 5933 Aeroelasticity.** Prerequisites: 4063, 4283, 4523. Interaction between aerodynamic, inertial and elastic forces. Influence coefficients of modern wings. Calculations of the normal modes and frequencies of flexible airplane and missile structures. Deformation of structures under dynamic loads by rigorous and approximate methods of analysis.
- 5943* Jet and Rocket Propulsion.** Prerequisite: 4243. Thermodynamic and aerodynamic principles applied to turbojet, turbofan, ramjet and rocket engines 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. Application of probability theory to the analysis of physical systems. Introductory probability theory and random processes.
- 6233* Turbulent Fluid Dynamics.** Prerequisite: 5233. Isotropic turbulence, turbulent wakes and jets, bound turbulent shear flows, transition, hydrodynamic stability and integral calculation methods for turbulent boundary layers.
- 6263* Computational Fluid Dynamics.** Prerequisite: 5233. 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. Static and dynamic modeling of fluidic components for sensing, signal processing and transmission and control. Component interconnection and impedance matching problems. Synthesis of proportional, 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 ECEN 5413. Methods of formulation and solution of engineering system control problems based on optimal dynamic behavior, advanced techniques for model identification, computational solution of dynamic optimization problems. Applications include mechanical, electrical, fluid and thermal systems.
- 6543* Advanced Aerospace Structures.** Prerequisites: 4523 and 5533. Modern methods for the design and stress analysis of complex flight structures. Analysis of thin-walled plate and shell structures by exact and approximate analytical methods.
- 6563* Advanced Solid Mechanics.** General nonlinear problems of elasticity including thermal, dynamic and anisotropy effects; stresswave propagation; consideration of plasticity.
- 6723* Nonlinear Systems Analysis II.** Prerequisite: 5723 or ECEN 5723. Advanced topics of nonlinear systems theory selected from the current literature. Topics may include nonlinear stability theory, multi-input describing functions, nonlinear feedback control theory, the problem of Lure and Popov's criterion and multiparameter perturbation 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. Advanced 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. 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: 1213 or consent of instructor. Pictorial drawing with applications to industrial production work.
- 2743 Electronics and Electrical Drafting.** Lab 6. Prerequisite: MATH 1513 or equivalent. 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 components and structures.
- 3152 Structural Fabrication Design.** Lab 3. Prerequisites: GENT 1153 and PHYS 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: 1213 and GENT 1222. Basic design and development of special tools for processing engineering materials.
- 4003 Machine Design I.** Prerequisites: 3323 and MATH 2383. Applications of statics and strength to the design of machine components. Problems of choosing materials, impact and fatigue loading.
- 4013 Computer Graphics and Design.** Lab 6. Prerequisites: 1213, COMSC 2113, GENT 2323. Basic language programs for production of graphic output and design parameters. Laboratory exercises will require solution of graphic, machine drawing, electronic drawing, piping drawing, manufacturing and machine design problems.
- 4050 Advanced Mechanical Design Problems.** 1-4 credits, maximum 4. Prerequisite: junior standing and consent. Special problems in mechanical design.
- 4123 Senior Design Projects.** Lab 6. Prerequisites: 1213, 3003, 4003, and MFGT 3343. Selected problems in design integrating principles of drafting, analysis, materials and manufacturing. Design projects are typically supplied by industry.
- 4203 Machine Design II.** Lab 6. Prerequisite: 3323, MATH 2383. continuation of 4003 emphasizing the design of machine components such as gears, bearings, fasteners, springs, and weldments.
- 4213 Kinematics and Mechanisms.** Lab 6. Prerequisites: 3003, GENT 1153. Analysis and design of mechanisms such as the 4-bar linkage, slider-crank, cam and gear. Graphical techniques are emphasized.

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: MATH 2373. Data analysis. Theory, operational characteristics and application of transducers for measurement of strain, force, velocity, acceleration, displacement, time, frequency, temperature, pressure, fluid flow, vibrations and constituent analysis.
- 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. 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. Basic scientific principles of energy and the behavior of substances as related to engines and systems. Gas laws, vapors and engine cycles.
- 3553 Gas Turbine Powerplant.** Lab 3. Prerequisite: 3433. Major engine sections including accessories and systems. Student participation in engine disassembly, inspection, assembly, operation and testing.
- 4050 Advanced Technology Problems.** 1-4 credits, maximum 6. Prerequisites: junior standing and consent of department. Special technical problems in a mechanical power area.
- 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 or 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. Electricity applied to the farm and rural home including farmstead distribution and use and National Electric Code requirements. Laboratory activities include simple circuits, practical wiring, home wiring planning, electric motors, water systems and controls.
- 3173* Buildings for Agriculture.** Lab 2. Prerequisite: MATH 1213. Planning and selection of buildings and equipment for agriculture, including functional, environmental and structural requirements. Laboratory activities include materials selection, materials testing, wind and solar effects and farmstead planning.
- 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. 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.
- 3313 Flood Control and Drainage.** Lab 3. Prerequisite: MATH 1613. Topographic and construction surveying. Planning and analysis for flood control reservoirs. Introduction to earth-fill 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 1214. Machine elements and their application to the design and development of field machinery.
- 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. 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.

MEDICAL TECHNOLOGY (MTCL)

- 4117 Clinical Microbiology.** Lab 12. Prerequisites: Concurrent internship in affiliated hospital and all degree requirements for B.S. in medical technology except 30 hours MTCL. The theory and laboratory study of pathogenic bacteria, viruses, rickettsiae, fungi, and parasites. Includes isolation, identification, antimicrobial susceptibility testing, and medical significance.
- 4125 Clinical Chemistry I.** Lab 9. Prerequisites: Concurrent internship in affiliated hospital and all degree requirements for B.S. in medical technology except 30 hours MTCL. The theory and laboratory methodology of analytical biochemistry, clinical microscopy, routine and special procedures, and medical significance.
- 4236 Clinical Hematology.** Lab 12. Prerequisites: Concurrent internship in affiliated hospital and all degree requirements for B.S. in medical technology except 30 hours MTCL. Systematized study of disease and abnormal derivation, maturation and function, principles of hemostasis; methodology used in routine and special hematology studies; and correlation of hematological findings with physiological conditions.

- 4246 Clinical Immunology.** Lab 12. Concurrent internship in affiliated hospital and all degree requirements for B.S. in medical technology except 30 hours MTCL. Immunologic responses and procedures used in serological determinations; immunohematology, fundamentals of antigen-antibody reactions, blood groups and types, compatibility testing, blood components, and the lab methods used as they relate to the medical significance of immunology and infectious diseases.
- 4325 Clinical Chemistry II.** Lab 9. Concurrent internship in affiliated hospital and all degree requirements for B.S. in medical technology except 30 hours MTCL. The theory and laboratory methodology of analytical biochemistry, instrumentation, lab mathematics, routine and special procedures and medical significance.
- 4351 Topics in Medical Technology.** Prerequisites: Concurrent internship in affiliated hospital and all degree requirements for B.S. in medical technology except 30 hours MTCL. Principles and practices of the medical laboratory including basic management, special education methodology, and special projects in selected areas.

MICROBIOLOGY (MICRO)

- 2124 (L) Introduction to Microbiology.** Lab 4. Prerequisites: one year of chemistry; and BISC 1303, and 1402 or 1603. 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: 2124 and BISC 3014 or a course in biochemistry. Examination of pathogenic bacteria as they relate to humans, other animals, plants and insects.
- 3143 Medical Mycology.** Lab 4. 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 3. Prerequisites: 2124 and BISC 1603. Human and parasitological problems including endemic, exotic and zoonotic organisms. Life cycles, diagnosis and control procedures. Principles applicable to all areas of zoology, medicine, veterinary medicine and medical technology.
- 3154* Food Microbiology.** Lab 4. Prerequisites: 2124 and organic chemistry. Relationship of microorganisms to food manufacture and preservation, to food spoilage and microbial food poisoning and to various aspects of primary food production.
- 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. 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.
- 4124* Virology.** Lab 4. Prerequisites: BISC 3124 or BISC 3014. Theory and practice of virus host interactions including structure-function of animal, plant, and bacterial viruses.
- 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.
- 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. 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 3014 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. 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.** 1-3 credits, maximum 6. Prerequisite: one graduate course in biochemistry. Discussion and evaluation of recent scientific contributions in terms of the living organism.
- 6143* Microbial Anatomy.** Lab 3. Prerequisite: one graduate course in biochemistry. The chemistry and integrated functioning of microbial structures and macromolecules.

MILITARY SCIENCE (MILSC)

- 1000 Land Navigation and Survival.** 1 credit, maximum 1. Lab 1. Prerequisites: concurrent enrollment in 1111, 1211, or 1312. Land navigation through interpretation of maps, use of compass and terrain association. Survival techniques for outdoor living in a military environment. Outdoor practical exercises are required.
- 1111 Introduction to Military Science.** Prerequisite: concurrent enrollment in 1000 or 2000. The Reserve Officer Training Corps Program, customs and courtesies, service life, benefits of the military and the role of the active Army and Reserve Forces in the current national defense policy.
- 1211 Leadership.** Prerequisite: concurrent enrollment in 1000 or 2000. Individual and group behavior and the principles and techniques of applied leadership.
- 1312 Ranger Platoon.** Individual tactical training; chemical, biological, and nuclear protection; individual battlefield casualty treatment; small unit tactics with practical exercises in patrolling, raid and ambush techniques (practical exercises on two selected weekends.)
- 2000 Marksmanship and Rappelling.** 1 credit, maximum 1. Lab 1. Prerequisites: concurrent enrollment in 1111, 1211, 1312. Techniques of rifle marksmanship and fundamentals of rappelling.
- 2131 Military-political Issues.** Role of the United States in the world as seen from a military/political perspective with emphasis on national security policy, US global military commitments, and current areas of international conflict.
- 2231 Army Management Simulation.** Simulation exercises based on real problems which require knowledge and skills applicable to both military and civilian management en-

vironments. Management skills such as problem analysis and decision-making, planning and organization, delegation and control, and interpersonal skills.

- 2330 Fundamentals of Military Operations.** 1-3 credit hours, maximum 3. Lab 2. Prerequisites: 1111 or 1211 and 1000 or 2000. Basic tactical doctrine with emphasis on squad tactics; includes principles of war, offensive and defensive operations, wargaming/simulations, modern battlefield, Soviet Threat, NBC (nuclear, biological, and chemical) warfare, communications, and law of land warfare.
- 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, introduction 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 Military Ethics and Professionalism.** Lab 2. Prerequisites: 3112 and 3223. Special obligations and responsibilities of the military profession.
- 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.**
- 1092 Brass Class Lessons.**
- 1102 Brass Class Lessons.**
- 1110 Elective Organ.** 1-4 credits, maximum 8.
- 1120 Elective Piano.** 1-4 credits, maximum 8.
- 1130 Elective Voice.** 1-4 credits, maximum 8.
- 1140 Elective Brass.** 1-4 credits, maximum 8.
- 1150 Elective Strings.** 1-4 credits, maximum 8.
- 1160 Elective Woodwinds.** 1-4 credits, maximum 8.

- 1170 Elective Percussion.** 1-4 credits, maximum 8.
- 1180 Secondary Organ.** 1-2 credits, maximum 8.
- 1190 Secondary Piano.** 1-2 credits, maximum 8.
- 1200 Secondary Voice.** 1-2 credits, maximum 8.
- 1210 Secondary Brass.** 1-4 credits, maximum 8.
- 1220 Secondary String.** 1-2 credits, maximum 8.
- 1230 Secondary Woodwind.** 1-2 credits, maximum 8.
- 1240 Secondary Percussion.** 1-2 credits, maximum 8.
- 1250 Major Organ.** 1-4 credits, maximum 8.
- 1260 Major Piano.** 1-4 credits, maximum 8.
- 1270 Major Voice.** 1-4 credits, maximum 8.
- 1280 Major Violin.** 1-4 credits, maximum 8.
- 1290 Major Viola.** 1-4 credits, maximum 8.
- 1300 Major Cello.** 1-4 credits, maximum 8.
- 1310 Major Double Bass.** 1-4 credits, maximum 8.
- 1320 Major Guitar.** 1-4 credits, maximum 8.
- 1330 Major Harp.** 1-4 credits, maximum 8.
- 1340 Major Flute.** 1-4 credits, maximum 8.
- 1350 Major Oboe.** 1-4 credits, maximum 8.
- 1360 Major Clarinet.** 1-4 credits, maximum 8.
- 1370 Major Saxophone.** 1-4 credits, maximum 8.
- 1380 Major Bassoon.** 1-4 credits, maximum 8.
- 1390 Major Trumpet.** 1-4 credits, maximum 8.
- 1400 Major French Horn.** 1-4 credits, maximum 8.
- 1410 Major Trombone.** 1-4 credits, maximum 8.
- 1420 Major Baritone.** 1-4 credits, maximum 8.
- 1430 Major Tuba.** 1-4 credits, maximum 8.
- 1440 Major Percussion.** 1-4 credits, maximum 8.
- 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: Successful completion of Music Theory Placement Examination. Choral and instrumental writing and analysis correlated with keyboard skills. Taken concurrently with MUSIC 1531
- 1543 Theory of Music II.** Prerequisites: 1533 and 1531. A continuation of 1533, taken concurrently with 1541.
- 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.
- 2250 Major Organ.** 1-6 credits, maximum 12. Prerequisite: 1250.
- 2260 Major Piano.** 1-6 credits, maximum 12. Prerequisite: 1260.
- 2270 Major Voice.** 1-6 credits, maximum 12. Prerequisite: 1270.
- 2280 Major Violin.** 1-6 credits, maximum 12. Prerequisite: 1280.
- 2290 Major Viola.** 1-6 credits, maximum 12. Prerequisite: 1290.
- 2300 Major Cello.** 1-6 credits, maximum 12. Prerequisite: 1300.
- 2310 Major Double Bass.** 1-6 credits, maximum 12. Prerequisite: 1310.

- 2320 Major Guitar.** 1-6 credits, maximum 12. Prerequisite: 1320.
- 2330 Major Harp.** 1-6 credits, maximum 12. Prerequisite: 1330.
- 2340 Major Flute.** 1-6 credits, maximum 12. Prerequisite: 1340.
- 2350 Major Oboe.** 1-6 credits, maximum 12. Prerequisite: 1350.
- 2360 Major Clarinet.** 1-6 credits, maximum 12. Prerequisite: 1360.
- 2370 Major Saxophone.** 1-6 credits, maximum 12. Prerequisite: 1370.
- 2380 Major Bassoon.** 1-6 credits, maximum 12. Prerequisite: 1380.
- 2390 Major Trumpet.** 1-6 credits, maximum 12. Prerequisite: 1390.
- 2400 Major French Horn.** 1-6 credits, maximum 12. Prerequisite: 1400.
- 2410 Major Trombone.** 1-6 credits, maximum 12. Prerequisite: 1410.
- 2420 Major Baritone.** 1-6 credits, maximum 12. Prerequisite: 1420.
- 2430 Major Tuba.** 1-6 credits, maximum 12. Prerequisite: 1430.
- 2440 Major Percussion.** 1-6 credits, maximum 12. Prerequisite: 1440.
- 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 (H,I,SpD)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 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 Piano 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 Fundamentals Of MuSiC.** Accepted for certificate/license 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 Elective Organ.** 1-4 credits, maximum 8. Prerequisite: 1110.
- 3120 Elective Piano.** 1-4 credits, maximum 8. Prerequisite: 1120.
- 3130 Elective Voice.** 1-4 credits, maximum 8. Prerequisite: 1130.
- 3140 Elective Brass.** 1-4 credits, maximum 8. Prerequisite: 1140.
- 3150 Elective String.** 1-4 credits, maximum 8. Prerequisite: 1150.
- 3160 Elective Woodwind.** 1-4 credits, maximum 8. Prerequisite: 1160.
- 3170 Elective Percussion.** 1-4 credits, maximum 8. Prerequisite: 1170.
- 3180 Secondary Organ.** 1-2 credits, maximum 8. Prerequisite: 1180.
- 3190 Secondary Piano.** 1-2 credits, maximum 8. Prerequisite: 1190.
- 3200 Secondary Voice.** 1-2 credits, maximum 8. Prerequisite: 1200.
- 3210 Secondary Brass.** 1-2 credits, maximum 8. Prerequisite: 1210.
- 3220 Secondary String.** 1-2 credits, maximum 8. Prerequisite: 1220.
- 3230 Secondary Woodwind.** 1-2 credits, maximum 8. Prerequisite: 1230..
- 3240 Secondary Percussion.** 1-2 credits, maximum 8. Prerequisite: 1240.
- 3250 Major Organ.** 1-4 credits, maximum 8. Prerequisite: Upper Division Exam, 2250.

- 3260 Major Piano.** 1-4 credits, maximum 8. Prerequisite: Upper Division Exam, 2260.
- 3270 Major Voice.** 1-4 credits, maximum 8. Prerequisite: Upper Division Exam, 2270.
- 3280 Major Violin.** 1-4 credits, maximum 8. Prerequisite: Upper Division Exam, 2280.
- 3290 Major Viola.** 1-4 credits, maximum 8. Prerequisite: Upper Division Exam, 2290.
- 3300 Major Cello.** 1-4 credits, maximum 8. Prerequisite: Upper Division Exam, 2300.
- 3310 Major Double Bass.** 1-4 credits, maximum 8. Prerequisite: Upper Division Exam, 2310.
- 3320 Major Guitar.** 1-4 credits, maximum 8. Prerequisite: Upper Division Exam, 2320.
- 3330 Major Harp.** 1-4 credits, maximum 8. Prerequisite: Upper Division Exam, 2330.
- 3340 Major Flute.** 1-4 credits, maximum 8. Prerequisite: Upper Division Exam, 2340.
- 3350 Major Oboe.** 1-4 credits, maximum Prerequisite: Upper Division Exam, 2350.
- 3360 Major Clarinet.** 1-4 credits, maximum 8. Prerequisite: Upper Division Exam, 2360.
- 3370 Major Saxophone.** 1-4 credits, maximum 8. Prerequisite: Upper Division Exam, 2370.
- 3380 Major Bassoon.** 1-4 credits maximum 8. Prerequisite: Upper Division Exam, 2380.
- 3390 Major Trumpet.** 1-4 credits, maximum 8. Prerequisite: Upper Division Exam, 2390.
- 3400 Major French Horn.** 1-4 credits, maximum 8. Prerequisite: Upper Division Exam, 2400.
- 3410 Major Trombone.** 1-4 credits, maximum 8. Prerequisite: Upper Division Exam, 2410.
- 3420 Major Baritone.** 1-4 credits, maximum 8. Prerequisite: Upper Division Exam, 2420.
- 3430 Major Tuba.** 1-4 credits, maximum 8. Prerequisite: Upper Division Exam, 2430.
- 3440 Major Percussion.** 1-4 credits, maximum 8. Prerequisite: Upper Division Exam, 2440.
- 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 (H,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 (H,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 and satisfactory upper-division examination. Analysis and application of contrapuntal techniques of the 18th century.
- 3782 Form and Analysis.** Prerequisite: 2564 and satisfactory upper-division examination. 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 Piano 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.

- 4100 Music Industry Internship.** 1-6 credits, maximum 8. Prerequisites: 90 hours, 3733 and 3743. Directed practical experiences in an approved retail store or in a work situation related to the music industry.
- 4250 Major Organ.** 1-6 credits, maximum 12. Prerequisite: 3250.
- 4260 Major Piano.** 1-6 credits, maximum 12. Prerequisite: 3260.
- 4270 Major Voice.** 1-6 credits, maximum 12. Prerequisite: 3270.
- 4280 Major Violin.** 1-6 credits, maximum 12. Prerequisite: 3280.
- 4290 Major Viola.** 1-6 credits, maximum 12. Prerequisite: 3290.
- 4300 Major Cello.** 1-6 credits, maximum 12. Prerequisite: 3300.
- 4310 Major Double Bass.** 1-6 credits, maximum 12. Prerequisite: 3310.
- 4320 Major Guitar.** 1-6 credits, maximum 12. Prerequisite: 3320.
- 4330 Major Harp.** 1-6 credits, maximum 12. Prerequisite: 3330.
- 4340 Major Flute.** 1-6 credits, maximum 12. Prerequisite: 3340.
- 4350 Major Oboe.** 1-6 credits, maximum 12. Prerequisite: 3350.
- 4360 Major Clarinet.** 1-6, maximum 12. Prerequisite: 3360.
- 4370 Major Saxophone.** 1-6 credits, maximum 12. Prerequisite: 3370.
- 4380 Major Bassoon.** 1-6 credits, maximum 12. Prerequisite: 3380.
- 4390 Major Trumpet.** 1-6 credits, maximum 12. Prerequisite: 3390.
- 4400 Major French Horn.** 1-6 credits, maximum 12. Prerequisite: 3400.
- 4410 Major Trombone.** 1-6 credits, maximum 12. Prerequisite: 3410.
- 4420 Major Baritone.** 1-6 credits, maximum 12. Prerequisite: 3420.
- 4430 Major Tuba.** 1-6 credits, maximum 12. Prerequisite: 3430.
- 4440 Major Percussion.** 1-6 credits, maximum 12. Prerequisite: 3440.
- 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.
- 4753*** **Advanced Music History and Literature.** Prerequisite: two semesters of music history. Advanced music history and literature. Historical and stylistic analyses of musical forms and composers' techniques. Open to graduate students and advanced undergraduate students.
- 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)Science Perspective I.** Nature, process and integrating principles of natural science. Modular format permitting students to individualize learning experiences. For the nonmajor.
- 1214 (N)Science Perspective II.** 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 identifying and analyzing the knowledge, skills and competencies require for satisfactory job performance. Procedures for translating such information into instructional programs. No credit for students with credit in TIED 3112.
- 3113* 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 multi-cultural backgrounds and specific needs. Same course as DIS-ED 3113.
- 3143 Career Education: An Introduction.** Introduce current and prospective teachers to the fundamental concepts and operational practices of career education. Historical development, needs assessment, goals, implementation strategies, evaluation, developmental concepts, curriculum planning and articulation.
- 3901 Seminar in Distributive Education.** Procedures for gaining admission to teacher education and student teaching. Requirements for certification and graduation and course planning to meet those requirements. Includes information on career opportunities and procedures for acuring employment. Same course as DISED 3901.
- 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. 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. Same course as DISED 4103. 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.** 1-12 credits, maximum 12. Prerequisite: admission to teacher education. Organized teaching experiences under

the guidance and direction of a local school cooperating teacher and university teacher educator. Participant assigned to a cooperating teacher with responsibility for planning, implementing and evaluating the classroom, laboratory or shop. Same course as DISED 4470.

- 5000* Masters 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: 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 critiques of contemporary adult and continuing education activities, materials and clientele groups served and their implications for new and existing programs in the field.
- 5213* Characteristics of Adult Learners.** Learning patterns, interests and participation patterns among adults in a variety of educational settings. Theories of learning and behavior modification for adults, with implications for adult and continuing education programs. Particular attention given to learners in occupational, adult basic, community junior college, extension and proprietary program settings.
- 5222* Needs Assessment in Occupational and Adult Education.** 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: elementary statistics. Seminar on the methods of research, review, synthesis and interpretation with application to particular fields of occupational and adult education.
- 5480 Modern Technology in Occupational Education.** 1-6 credits, maximum 6. Technical developments in specialized occupational areas examined and analyzed for educational curriculum and program implications.
- 5533* Manpower Analysis in Human Resources Development.** 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 resource 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. 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; pretranscription 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, capitalization 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 Automated Office Applications.** 1-3 credit hours, maximum 3. Lab 4. Prerequisites: 2313 or equivalent and 24 semester credit hours. Application of automated office equipment to work processes in the office. Operation and use of word processing equipment for text editing, operation and use of the microcomputer in text editing and other office information systems, and transcription of office communications.
- 3523 Office Problems in 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 Office Procedures.** Prerequisite: 2630. 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 2. Prerequisite: High school algebra. Exploration, drilling, production, transportation and marketing.
- 1234 Petroleum Fluid Properties.** Lab 2. Prerequisite: MATH 1513 and 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 2. Prerequisites: 2234 and 2333 (Pre or Co-requisite). Basic well planning. Casing setting depths. Casing design and costs. Drill string design. Bit selection. Mud and mud circulation system requirements. Drilling and cementing practices. Well control. Specification and selection of rig components and power requirements. Drilling cost estimates.
- 2234 Petroleum Industry Pipeline Transportation and Storage.** Lab 2. Prerequisite: 1234. 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.
- 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.
- 3234 Petroleum and Natural Gas Processing Fundamentals.** Lab 3. Prerequisites: 2234, COMSC 2113, MATH 2383. 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; COMSC 2113. Petroleum and natural gas operations are studied qualitatively and quantitatively. Distillation, absorption, dehydration, sweetening, refinery processes, instrumentation and controls.
- 4050 Advanced Technology Problems.** 1-4 hours credit, maximum 6. Prerequisites: junior standing and consent of department. Special technical problems in a petroleum area.
- 4122 Advanced Petroleum Problems.** Lab 3. Prerequisite: 3454 and 4224. Individually selected topics in advanced petroleum drilling, production (primary, secondary or tertiary), recovery, transportation and storage.
- 4224 Petroleum Reservoir Engineering.** Lab 3. Prerequisites: 3234, MATH 2383, COMSC 2113, senior standing or consent of instructor. Reservoir mechanics, reservoir fluids, flow through porous media. Petroleum and gas reservoir measurements, analyses, evaluations and predictions.
- 4334 Advanced Petroleum Production.** Lab 3. Prerequisites: 2333, 4224, and MECDT 3323. Remedial and workover operations on producing oil and gas wells. Analysis and design of artificial lift techniques. Well testing and problem well evaluation.

PHILOSOPHY (PHILO)

- 1013 (H-SpD)Philosophical Classics.** Basic works by great thinkers, including Plato, Descartes and Hume.
- 1213 (H)Philosophies of Life.** Introductory ethics and social philosophy. Moral decision-making, the good life, social values, freedom and responsibility.
- 1313 (A)LogiC and Critical Thinking.** 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. Applications in various fields. Nature of axiom systems.
- 3113* (H,I)Ancient and Medieval Philosophy.** Main systems of Western thought from the Greeks to 15th Century Europe. Emphasis on Plato, Aristotle, Augustine and Aquinas.
- 3213* (H,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)Philosophy and the Quality of Life.** 1-3 credits, maximum 6. Series of self-paced, one-credit modules dealing with the argument 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 authority, human rights, political forms and justice. Emphasis on Aristotle, Locke, Mill and Marx.
- 3533 (H,I)Philosophical Study Of Marxism.** Prerequisites: 12 semester credit hours in HIST, POLSC, and/or PHILO. The work of Marx and Engels and of selected later writers such as Kautsky, Lenin, and Gramsci.
- 3613 (H)Philosophy of Religion.** Nature of religion, religious experience and religious language. God-concepts, theistic arguments, God and evil, God and immortality.
- 3713 (H)Philosophy Of Education.** Traditional and contemporary American educational theories. Educational conservatism, humanism in education, moral education, vocationalism and radical reform movements.
- 3803 (H)Moral Issues in Business.** Ethical issues in business, such as employer-employee duties and loyalties, advertising uses, preferential treatment practices. Analytic grounding in basic theories of ethics.
- 3813* (H)Recent American Philosophy.** Dominant trends in American philosophy during the last 100 years, with emphasis on pragmatism.
- 3823 (H)Engineering Ethics.** Philosophical analysis of moral issues in engineering practice, such as whistleblowing, conflicts of interest and product liability. Professional codes of ethics.
- 3833* (H)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)Existentialism.** Selected writings and themes in the development of existentialism and related intellectual movements. Subjectivity, phenomenological description, hermeneutics, freedom and value; and such writers as Kierkegaard, Nietzsche, Heidegger, Sartre, Marcel and Buber.
- 3923 (H)Contemporary Issues in Philosophy.** Selected current controversies and recent trends in 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.
- 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. Same course as REL 4013.
- 4113* (H)Philosophy of Art and Literature.** Nature of aesthetic objects and experiences; form, meaning and value in the arts; the function of art in society; criteria of criticism of the arts.
- 4313* (H)Philosophy of Mind.** Problems in philosophical psychology. Mind and body, freedom and determinism, personal identity and survival, self-knowledge, analysis of mental concepts.
- 4453* (H)Philosophy in Literature.** Selected literary works examined for philosophical ideas and themes. Attention to the interrelation of form and content. Thematic approach.
- 4613 (H)S cientific 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. phasis on Plato, Aristotle, Quintilian, Comenius, Locke, Rousseau and Dewey.
- 5610 * Philosophical Issues in Education.** 2-3 credits, maximum 3. Contemporary issue.. educational theory and practice. The relation of education to political thought, religion, public law and culture.
- 5713* Contemporary Philosophies Of Education.** Analysis of contemporary educational philosophies, with attention to recommended aims, curricula and methods.
- 5910 * Research Problems in Philosophy.** 1-3 credits, maximum 10. Prerequisite: consent of instructor and Department head. Individual or group research on specific philosophical problems.

PHYSICAL EDUCATION (PE)

- 1710 Team Sports I.** 1-2 credits, maximum 2. Lab 2. Theory and practice of soccer 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.
- 1753 Sport and Movement Foundations.** Lab 2. Basic movement principles, scientific principles, historical and philosophical foundations of physical education and career opportunities.
- 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: LEIS 2332. Methods and techniques necessary for teaching folk, square and social dance.
- 3763 Physical Education for Elementary Age Children.** Prerequisites: 1755, 1765; or LEIS 2422; or one of the following: PE 2712, CIED 2450 (2 hrs), FRCD 3303, ABSED 3113 or 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: HLTH 2653, 3652, and all activity proficiencies. 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.**
- 3842 Coaching Baseball.** Prerequisite: junior standing. Coaching baseball with emphasis on skill development, organization and development of offenses and defensive play, safety mechanics, budgeting, pre and post season training, organization and administration of competition.

- 4712 Methods in Teaching Elementary Physical Education.** Prerequisites: 1755, 1765; and concurrent enrollment in 3763. For physical education majors, and elementary education majors seeking an area of concentration in physical education. The spectrum of teaching styles ranging from teacher-centered command-oriented physical education to student-centered problem-solving/discover physical education.
- 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.** 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: 2712, 3762, HLTH 2653 and 3652, and PHSI 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.**
- 4862 Method and Techniques of Coaching Gymnastics.Lab 2.** Prerequisites: 65 hours including 1740 or equivalent. Coaching gymnastics with emphasis on skill development, recognizing skill profiles, safety mechanics, budgeting for equipment and travel, pre and post season training, organization and administration of competition.
- 4972 Methods and Techniques of Teaching Adapted Aquatics.** Prerequisite: LEIS 2512. Mechanical principles, skill analysis, evaluation techniques, lesson and unit planning, and practical experience in teaching swimming to persons with mental and/or physical impairments.

PHYSICS (PHYS C)

- 1014 (N)Descriptive 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.
- 1514 Introduction to Lasers.** Lab 3. Prerequisite: MATH 1613. Principles and operation of a laser, its output characteristics, and safe operating practices. Electro-optics involved with lasers.
- 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.
- 3321* (L)Laboratory I.** Lab 3. Use of lasers, lens systems, spectroscopy, interferometry, interaction of light with matter, thermal physics, and wave propagation.
- 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. 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.
- 3621 (L)Laboratory II.** Lab 3. Laboratory experiments on atomic physics, electron interference, gamma ray spectroscopy, the photoelectric effect, and nuclear resonance.
- 3713 Modern Physics I.** Prerequisite: 2114. Atomic physics, special theory of relativity, and introduction to solid state and nuclear physics.
- 4010* Special Problems.** 1-3 credits, maximum 9. Prerequisite: consent of instructor. Individual laboratory work of an advanced nature.
- 4113* Electricity and Magnetism.** Prerequisites: 2114 and MATH 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.** 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. 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)Laboratory III.** Lab 3. Laboratory experiments on electrical measurements and microcomputer applications to analysis and control of measurements. Advanced individual research projects.
- 4812* (L)Laboratory IV.** Lab 3. Continuation of advanced projects from 4712.
- 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 relationships. Maxwellian velocity distribution; ideal gas law; Van der Waals law; transport phenomena; Boltzmann H-theorem and thermodynamic equilibrium.
- 5133** * **Theory of Spectra.** Line spectra, hyperfine structure, Lamb shift, band spectra, NMR spectra and ESR spectra.
- 5213** * **Statistical Mechanics.** Prerequisite: 5113. 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. Electric and magnetic fields in free space and in matter. Boundary value problems, Green's functions, stress tensors, multipole expansions, thermodynamics; electromagnetic waves.
- 5350** * **Special Problems.** 1-3 credits, maximum 3. Prerequisite: graduate standing in physics. Special problems of experimental or theoretical nature. Largely individual work with written report required.
- 5353*** **Membrane Biophysics and 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. Introduction to the various methods and techniques used in theoretical physics.
- 5513*** **Selected Topics in Acoustics.** Prerequisite: 3413, 5453. 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. 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. 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. Nuclear and elementary particle interactions, resonances, and models; relativistic quantum mechanics and quantum field theory.
- 6713* Classical Theory of Fields.** Prerequisite: 5313. Radiation theory, waveguides, scattering and dispersion relations; relativity.

PHYSIOLOGICAL SCIENCES (PHSI)

- 3034 (N) Introductory Anatomy and Physiology.** Lab 2. Prerequisites: CHEM 1215 and equivalent and BISC 1114 or BISC 1303. Structure and function of the mammalian body. For students majoring in applied biological sciences and non-biology majors. Lab sections specialized in human or domestic animal physiology. No credit for students with prior credit in 4125.
- 3113 (L) Physiology of Exercise.** Lab 2. Prerequisite: 3034. Physiological effects of exercise.
- 4023* Introductory Pharmacology.** Prerequisite: 4125 or 3034. 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.
- 4125* Mammalian Physiology.** Prerequisites: CHEM 3015 and 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, pre-dental and pre-veterinary) sciences.
- 4212* Mammalian Physiology Laboratory.** Lab 6. Prerequisite: 4125. 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.** Research and the integration of experimental biology with applied biology. Active participation by the student.
- 5000* Research and Thesis.** 1-6 credits, maximum 6. Prerequisite: consent of instructor. Research problems to meet the requirements of the M.S. degree.
- 5110* Problems in Physiology.** 1-5 credits, maximum 20. Prerequisite: approval of instructor. Investigations in physiology for graduate and advanced undergraduate students.
- 5113* Basic Reproductive Physiology.** Prerequisites: 3034. Female and male reproductive processes, the influences of environmental factors upon these processes and the application of reproductive physiology to animal production.
- 5115* Cellular and Comparative Physiology.** Lab 3. Prerequisite: BIOCH 3653 or BISC 3013. Cellular activities and fundamental physiological processes as applied to each animal phylum.
- 5116 Veterinary Gross and Developmental Anatomy.** Lab 7. Prerequisites: 1st year standing in College of Veterinary Medicine. 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 Primates and a brief study of Class Aves.
- 5125* Veterinary Histology and Cytology.** Lab 5. Prerequisites: 1st year standing in College of Veterinary Medicine. Organization and structure of cells and tissues of domestic animals.
- 5133* Veterinary Physiology I.** Lab, three 2-hour. Prerequisite: 1st year standing in the College of Veterinary Medicine. Cell physiology and the medical physiology of the cardiovascular and respiratory 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.
- 5243* Veterinary Physiology II.** Lab, six 2-hour and six 4-hour. Prerequisite: 5133. Medical physiology of the renal, digestive, connective tissue and integumentary systems of domestic animals.
- 5253* Veterinary Endocrinology and Reproductive Physiology.** Prerequisite: two 2-hour labs and one 4-hour lab. 1st year standing in College of Veterinary Medicine. Functions of the endocrine and reproductive systems of domestic animals.
- 5263* Veterinary Neurology and Animal Behavior.** Lab, six 2-hour and four 4-hour. Prerequisite: 1st year standing in the College of Veterinary Medicine. Anatomy and physiology of the nervous system. Behavior of domestic animals with emphasis on aspects applicable to veterinary medicine.
- 5273* Veterinary Metabolism.** Lab, three 2-hour. Prerequisites: 1st year standing in College of Veterinary Medicine. Functional metabolism in domestic animals. Metabolic disorders using certain diseases as models.
- 5311* Veterinary Agronomics and Poisonous Plants I.** Lab 1. Prerequisites: 2nd year standing in College of Veterinary Medicine. Recognition of the warm season plants important to veterinary medicine and discussions of their nutritive and toxic relationships to animals. Selected poisonous plants.
- 5323* Veterinary Pharmacology I.** Lab, four 4-hour. Prerequisites: 5243. Introduces the principles of absorption, distribution, metabolism and elimination of therapeutic drugs as well as the mode of action, contraindications and toxicities of antimicrobial agents and general anesthetics.
- 5433* Veterinary Pharmacology II.** Lab, eight 4-hour. Prerequisite: 5323. A continuation of PHSI 5323 which includes the mode of action, toxicities and contraindications of corticosteroids, antacids, antispasmodics, sedatives, tranquilizers, anticonvulsants, analgesics, antiinflammatory drugs, diuretics, cardiotonics, autocooids, bronchodilators, local anesthetics and antihypertensive agents.
- 5441* Veterinary Agronomics and Poisonous Plants II.** Lab 1. Prerequisite: 2nd year standing in College of Veterinary Medicine. Recognition of cool-season plants important to veterinary medicine and their nutritive and toxic relations to animals. Soil-plant-animal interrelationships. Selected poisonous plants.
- 5454* Veterinary Gross and Developmental Anatomy II.** Lab 6. Prerequisite: 2nd year standing in College of Veterinary Medicine. Comparative anatomy of representative species of Orders Carnivora, Perissodactyla, Artiodactyla and Primates with special emphasis on the limbs and locomotion.
- 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. Prerequisite: consent of instructor. Independent research for the doctoral dissertation under the supervision of a graduate faculty member.
- 6110* Advanced Physiology of Selected Systems.** 2-10 credits, maximum 10. Prerequisite: 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.** Theory of the preparation of specimens for and the operation of the electron microscope. Methods of evaluation of electron micrographs and special electron microscopical techniques.
- 6200* Topics In Advanced Pharmacology and Toxicology.** 1-5 credits, maximum 15. Prerequisite: consent of instructor. Selected topics in advanced pharmacology and toxicology such as cardiopulmonary, gastrointestinal or neuro-pharmacology; chemotherapeutics; heavy metal, chemical or plant toxicology or biotoxicology. Repeatable; re-enrollment permits study of additional topics.
- 6220* Veterinary Surgical Anatomy.** 1-3 hours credit, maximum 6. Lab 3-9. Gross anatomy of special areas related to surgical diagnosis and treatment.
- 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.
- 6273** **Comparative Neurophysiology.** Lab 2. Prerequisite: 5123. Physiology of mammalian nervous systems.
- 6330** [†] **Veterinary Neuroanatomy.** 1-3 hours credit, maximum 6. Lab 3-9. Gross and microscopic anatomy of the central and peripheral parts of the nervous system of domestic animals, including the special sense organs.
- 6415*** **Endocrinology.** Lab 6. Prerequisite: 4125. Structure, function and interrelationships of the endocrine glands.
- 6440** **Applied Veterinary Agronomics.** 1-3 credits, maximum 6. Lab 2-6. Applications of soil-plant-animal interrelationships to the practice of veterinary medicine.
- 6550** [†] **Veterinary Anatomical Problems.** 1-3 hours credit, maximum 12. Lab 3-9. Prerequisite: consent of instructor. Problems in gross, developmental or histologic anatomy.
- 6570*** **Seminar.** 1-6 credits, maximum 6. Consideration of literature and research problems pertaining to physiology and pharmacology.
- 6611** [†] **Veterinary Applied Anatomy.** Lab 2. Prerequisites: 3rd year standing in College of Veterinary Medicine. Anatomical topics designed to support other related courses in the 3rd year veterinary medical program.
- 6622*** **Veterinary Toxicology.** Lab, two 2-hour. Prerequisite: 3rd year standing in College of Veterinary Medicine. Veterinary toxicological problems and therapeutics.
- 6701** [†] **Veterinary Physiological Science Topics.** Lab 1. Prerequisites: 4th year standing in College of Veterinary Medicine. Elective topics in physiological sciences related to veterinary medicine. Course can fulfill one of elective options of fourth year veterinary medical students.
- 6711** * **Clinical Pharmacology.** Prerequisite: 5433. Problems associated with the application of pharmacological principles in the clinical setting including consideration of dose, dose form, dosing interval, route of administration, drug interactions and toxic manifestations of chemotherapeutic agents.
- 6720** [†] **Comparative Regional Anatomy.** 1-3 hours credit, maximum 12. Lab 3-9. Comparative study of limited parts or regions of the bodies of animals.
- 6810*** **Veterinary Special Anatomy.** 1-3 hours credit, maximum 9. Lab 3-9. Detailed study of the anatomy of a selected animal species.

PLANT PATHOLOGY (PLP)

- 3344 (N,L)** **Plant Pathology.** Lab 4. Prerequisite: BISC 1402. Concepts of disease development, spread and control of fungal, bacterial, viral, nematode, and environmental diseases.
- 3593*** **Forest Pathology.** Lab 2. Prerequisite: BISC 1402. The diseases of trees and the decays of woods.
- 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.
- 4054*** **Integration of Plant Health Management Practices.** Lab 4-8. Prerequisite: 3344. Practical application of the principles of plant health: grower operations and crop health status, plant specimen analysis, management procedures, problem diagnosis, and control measures. Several Saturday field trips required.
- 4062** **Plant Health Seminar.** Prerequisite: senior standing in plant health management. Holistic approach to maintenance of plant health. Problems with cultural practices, diseases, insects, weeds, and novel and classic control strategies, from the seeding of crop through postharvest.
- 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 move-

ment, 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.
- 5004* Plant Nematology.** Lab 3. Prerequisites: 3344 or concurrent enrollment. General morphology, taxonomy and bionomics of nonparasitic and plant parasitic nematodes. Plant parasitic nematode assay techniques, subfamily identification, symptomology, pathogenicity and control.
- 5014* Plant Virology.** Lab 4. Prerequisite: 3344 and one course in physiology or biochemistry. Transmission, characterization, differentiation, replication and control of plant viruses. Methods of investigating plant viruses.
- 5043* Plant Pathology.** Lab 4. Prerequisite: BISC 1402. Principles of plant pathology: disease development, spread and control of fungal, bacterial, viral, nematode and environmental diseases. For advanced, special, and non-plant pathology graduate students.
- 5104* Mycology.** Lab 6. A systematic study of the fungi.
- 5304* Phytobacteriology.** Lab 4. Prerequisite: 3344. Bacteria as plant pathogens, with examination of the taxonomy, genetics, ecology, physiology, host-parasite interaction and control of phytobacteria.
- 5503* Advanced Topics in Plant Pathology.** Prerequisite: 3344. A systematic consideration of recent advances on the causes of diseases, pathogen variability, physiology of host-parasite relationships, environmental factors in the development and spread of plant diseases and effective application of control practices.
- 5560* Problems in Plant Pathology.** 1-5 credits, maximum 10. Prerequisite: consent of instructor.
- 5604* Fungal Plant Pathogens.** Lab 4. Prerequisite: 3344. Fungi as plant pathogens: taxonomy, identification, isolation techniques, disease expression, ecology, control, historical, and economical impact.
- 5723* Physiology of Host-Pathogen Interactions.** Prerequisites: 3344 and BIOCH 3653 or BISC 3020. Physiology of the interactions between plants and pathogens. Mechanisms by which pathogens infect and by which plants resist infection.
- 5850* Plant Pathology Seminar.** 1 credit maximum per semester. 2 credits for M.S. and 4 credits for PhD required.
- 5852* Colloquium.** Prerequisite: 3344. Concepts and principles of plant pathology through discussions of pertinent literature.
- 6000* Research.** 1-12 credits, maximum 36. Research for the Ph.D. degree.
- 6104* Genetics of Fungi and Host-Parasite Interactions.** Lab 4. Prerequisites: 3344 or equivalent and a course in general genetics. Topics in fungal genetics including mating systems, parasexuality, and gene mapping. Genetics of host-parasite interactions based on the gene-for-gene hypothesis.
- 6204* Physiology of Fungi.** Lab 4. Prerequisite: 3344 or BISC 1502. Physiology of growth and reproduction of fungi and production of compounds of commercial, medical and veterinary interest. Laboratory exercises to demonstrate principles and to learn physiological methodology.
- 6303* Soil-Borne Diseases of Plants.** Prerequisite: 3344. Soil-borne diseases; their recognition and importance, the pathogens involved, rhizoplane and rhizosphere influences, inoculum potential, specialization of pathogens, suppressive soil effects and disease management. Problems and complexities associated with studies of soil-borne pathogens.
- 6403* Advanced Plant Nematology.** Lab 4. Prerequisite: 5004. Techniques for: generic and specific identification, morphometric determination, in vitro observation, biological illustration, photomicrography, and specialized manipulations in taxonomy.

POLITICAL SCIENCE (POLSC)

- 1013 American Government.** Organization, processes and functions of the national government of the United States.

- 2023 (S)Public 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.
- 2033 (S)Introduction to Public Administration.** Public administration, including administration, administrative organization, decision making, governmental public relations, and administrative responsibilities.
- 2043 (I,S)Introduction to International Politics.** Structure and function of the international system focusing on the interrelationships among states, international bodies and critical issues.
- 2111 Parliamentary Procedure.** Rules of procedure which permit assemblies of all kinds to deliberate rationally on proposals put before them and to arrive at reasonable decisions.
- 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: 1013, honors standing, and invitation by head of Department. For the special needs of the sophomore-level honors student majoring in political science who wishes to study individualized topics at an accelerated pace in a tutorial format. After mastering basic principles in an area of interest the student will conduct independent research under close faculty supervision and prepare a report or reports.
- 3013* (I,S)International Relations.** Political dynamics and machinery of international relations with emphasis on nationalism, imperialism, self-help, collective security and foreign policy formulation and execution.
- 3023* (I)International 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* International Law.** The nature and scope of public international law, with emphasis on problems related to the recognition of states and governments, jurisdiction over nationals and aliens, and state responsibility in cases of expropriation and revolutionary damage.
- 3113* (I)Governments 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)Politics and Administration in South Asia.** Political processes, governmental institutions and administration in India, Pakistan, Bangladesh, Ceylon and Nepal. Primary attention given to India.
- 3223 (I)Politics and Administration in East Asia.** Political processes, governmental institutions and administration in China, Japan and Korea.
- 3253 (I)Politics and Governments of Africa.** Political processes and governmental institutions of selected African countries.
- 3313 (I)Governments and Politics in the Middle East.** Analysis of political institutions and processes with emphasis on selected countries of the Middle East; the social and economic basis of politics; nationalism, political development and factors of instability and change.
- 3353* 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.

- 3423 Voting and Elections.** Electoral systems and their relationship to political development, political socialization, issue emergence, voting patterns, and electoral cycles.
- 3453* (S)The Legislative Process.** The 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.
- 3493* Public Policy.** Prerequisites: any one of 1013, 2033, 2113, ECON 1113, 2113, 2123, SOC 1113, PHILO 2113. Identification of policy options open to policy makers and examination of measurements and rationales underlying governmental programs.
- 3613* State and Local Government.** Political processes, government and administration of American states, cities and counties; special emphasis on Oklahoma.
- 3663* (H)Political Thought.** The teachings of the three lasting traditions of Western political thought: classical, Christian and modern.
- 3983* (S)The Judicial Process: Courts, Judges and Politics.** The American judiciary and legal process from a political perspective with particular emphasis on judicial organization and powers, recruitment, fact-finding, decision-making impact of decisions, the legal profession and relations among courts. Oklahoma judicial organization.
- 4003* (L)Political 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* (I)American Foreign Policy.** Major problems and policies of American foreign relations since World War II and description of foreign formulation and aid administration.
- 4053* (I) World Politics.** Foreign policies of major powers, areas of tension and sources of international conflict.
- 4100* Problems of Government, Politics and Public Policy.** 1-6 credits, maximum 6. Prerequisite: 60 credit hours, or 45 hours with GPA of 3.25, including 2013. Special problem areas of government, politics and public policy concentrating on topics not covered in other Departmental course offerings.
- 4113* (I)International Institutions.** The organization, procedures, functions and role of international institutions, with emphasis on the United Nations and related agencies.
- 4213* 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 Law.** Legal powers, limits, and procedures of administrative agencies with emphasis on federal and state administrative procedure acts.
- 4363* Environmental Law and Administration.** Statutory law, case law, and administrative practices relating to regulation of the environment including environmental impact statements, pollution, public lands, and preservation law.
- 4403* 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.
- 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** 3 credits, maximum 6. Administration in the public sector, stressing traditional and emerging organization structures. Emphasis on awareness

of administrative processes and environment that include program design and implementation and administrative accountability.

- 5313*** **Intergovernmental Relations.** Problems of American federal system necessitating new forms of local-state-federal relationships.
- 5320*** **Seminar in Public Budgeting and Finance.** 3 credit hours, maximum 6. Major processes and practices involved in governmental budgeting in the United States at national, state, and local level.
- 5330*** **Seminar in Public Personnel Administration.** 3 credit hours, maximum 6. Current practices, problems, and issues in public sector personnel administration, including merit system, civil service reform, collective bargaining, and equal opportunity and affirmative action.
- 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. Methodologies used by psychologists. Major topics include experimentation, the nature of psychological variables, survey and questionnaire research.
- 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* 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)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)Comparative Psychology.** Prerequisite: 1113. Comparative study of behavior characteristics of selected samples of the animal kingdom from protozoa to man.
- 3213 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 (S)Social Psychology.** Prerequisite: 60 credit hours or 45 hours with GPA of 3.25. Human behavior as affected by social stimuli.
- 3753 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.
- 4213 * Conflict Resolution.** Prerequisite: 1113. Interpersonal conflict studied from psychological perspectives. Types and uses of conflict, and conditions for constructive dispute settlement.
- 4333 * (S)Personality.** Prerequisites: 1113, 3443, or 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 * 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.
- 5043* Social Interaction.** Data sources and interaction of factors in social interactions; tools and techniques of analysis specifically related to interpersonal interaction.
- 5054 Proseminar in General Psychology I.** Major theories, methodologies, and substantive issues in psychology. In addition to topics of current relevance, the historical background of psychology will be explored, and the significance of psychological work will be explored relative to the scientific status of the discipline.
- 5064* Proseminar in General Psychology II.** Prerequisite: 5054. Continuation of PSYCH 5054*.
- 5083* Principles of Counseling Psychology.** Current theories, principles and approaches in the counseling situation.
- 5113* Psychopathology.** Prerequisite: 15 credit hours of psychology. Principles of diagnosis and treatment of major disorders.
- 5120 Psychology Workshop.** 2-6 credits, 6 maximum. Provides an opportunity to study specific psychological problems, both applied and theoretical.
- 5133* Minority Issues.** Prerequisite: six credit hours of psychology. Social issues related to pluralism with emphasis on community and social psychology.
- 5153* Individual Mental Tests.** Prerequisites: 3443, 4813. Practice in understanding, administering and interpreting the Stanford-Binet, WAIS, WISC-R and other mental tests.
- 5173 Child Psychopathology and Treatment.** Lab I. Prerequisites: 5113, 5153. Theoretical positions and issues in child psychopathology. Procedures used in the treatment of psychological disorders of children.
- 5253 Seminar in Human Development.** Prerequisite: 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.** 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* Quantitative Methods in Psychology I.** Prerequisite: 3213. Statistical methods of evaluating research hypotheses in psychology. Descriptive measures, student's t, one-way analysis of variance, comparisons among groups and statistical robustness are stressed.
- 5313* Quantitative Methods in Psychology II.** Prerequisite: 5303. A continuation of 5303. Higher-order analysis of variance designs, correlation and regression techniques, analysis of covariance, with emphasis on applications to psychological experimentation.
- 5323 Theory and Methods of Scaling.** Prerequisites: six credit hours of psychology and three hours in statistics. 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. Outline of theory and research in human and animal motivation.
- 5380* Research.** 1-12 credits, 12 maximum. Prerequisite: consent of instructor. Research project on some psychological problem.
- 5393* Verbal Processes.** 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 unforeseen and remote effects.
- 5423* Perception.** Prerequisite: 5483. 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 communication process. Same course as ABSED 5553.
- 5563* Advanced Social Psychology.** Prerequisite: 3743. History, theory and experimentation of dynamic interaction of group membership and individual behavior.
- 5573* Experimental Social Psychology.** Prerequisite: 3743. 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. Prerequisite: consent of instructor. Consideration of special topics that are particularly timely or technical in nature.
- 5623 Seminar and Workshop in Test Construction Techniques.** Prerequisite: 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. Prerequisite: consent of instructor. Primarily for graduate students in the clinical psychology and vocational rehabilitation counseling programs.
- 5650* Practicum.** 1-16 credits, 16 maximum. Primarily for graduate students in the areas in their specialization.
- 5660 Teaching Practicum.** 1-2 credits, 2 maximum. Prerequisite: consent of instructor. Primarily for graduate students with well defined new teaching responsibilities.
- 5713* Projective Psychodiagnostic Methods.** Prerequisites: 5113, 5153. 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. 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.** Prerequisite: 3743. 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. 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. 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.** Factor analysis and implications for measurement of mental abilities, personality traits and learning.
- 6313* Systems of Psychotherapy.** Prerequisite: 5113. The major approaches to psychotherapy. Methods for creating multiple impacts for behavioral change, including interpersonal, social, community and preventative interventions.

- 6393[†] Psycholinguistics.** 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.
- 6553* Advanced Practice-Marital and Family Treatment.** Prerequisites: 6523, concurrent enrollment in counseling or clinical practicum or consent of instructor. Assessment, diagnosis and treatment of marital and family problems. Skill development, professionalism, ethics and case management. Dynamics of co-therapy and conjoint treatment. Case consultation format. Same course as ABSED 6553.
- 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.** Experimental literature in the various areas of clinical psychology and personality research emphasizing problems of methodology and research design.
- 6913 Interpersonal Influence and Perception.** Prerequisite: 3743. 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.** 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 BISC 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)

- 1123 Mass Media Style and Structure.**Elementary writing and editing techniques in print, broadcasting and other media. Same as JM 1123.
- 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.** Film in our society and how it affects the individual. The bases of impact, program evaluation and criteria for intelligent and discriminating listeners and viewers.
- 2303 R-TV Announcing and Performance.** Lab 3. Prerequisites: 1123 and SPATH 1713. The announcer-newscaster's responsibilities as a communicator; analysis of announcer skills; drills in radio and television announcing and the development of an effective on-the-air personality.
- 2403 Radio Production Techniques.** 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.
- 3163 Mass Communication Law.** Statutes and case decisions in print and broadcast law, including government regulation of broadcasting by the FCC and media relations with other regulatory agencies. Same as JM 3163.
- 3663 Television Production.** Lab 3. Prerequisite: 2403 or consent of instructor. Television production techniques including camera, audio, lighting, staging, graphics and on-camera performance.
- 4003 Cable Communication.**Prerequisite: senior standing. Overview of the cable television industry and interacting technologies for the historical, social, economic, philosophical and political perspectives.
- 4103 Programs and Audiences.**Audience analysis, proper construction of programs for greatest appeal and use of appeals to attract the desired audience. Program types, rating systems, program selection and audience attention. Design and discussion of programs to reach specific audiences.
- 4213 Writing for Radio-Television-Film.** Lab 3. Prerequisite: 2403. Relationship of written to spoken language. Commercial continuity and specialized copy. Scripting and adaption to specific media.
- 4233* Advanced Television Practices.** Lab 3. Prerequisite: 4463 and consent of instructor. Production experience of a professional nature. Students produce and direct television programs for distribution on OSU-cable or other professional media, including 'specials.'
- 4303* Broadcast Promotion.** Prerequisite: 18 hours RTVF credit. Nature, tools and techniques of promotion in radio, television and cable; concepts of evaluation of promotion effectiveness; ethics of broad and narrowcast promotion.
- 4403 Broadcast Sales.** Prerequisite: 12 hours RTVF credit. Sales development, pricing, promotion and other aspects of broadcast sales and sales management.
- 4443 Basic Motion Picture Techniques.** Lab 3. Prerequisite: JM 3333. 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. Same as JM 4443.
- 4463 Television Directing.** Lab 3. Prerequisite: 3663. Techniques and aesthetics of television directing in various standard directing formats.
- 4533 Advanced Radio-TV News Reporting.** 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. 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)Religion 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)Introduction 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)Modern 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)Religion 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.
- 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. Same course as PHILO 4013.
- 4023 (H)Archaeology and the Ancient Near East.** Recommended: 2123. A study of archaeological 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.
- 4330* Seminar in Biblical Studies.** 3 hours credit, maximum 9. Prerequisites: two courses in biblical studies. Selected topics in the academic study of the Bible.
- 4440 Seminar in Religion and Culture.** 3 hours credit, maximum 9. Prerequisites: graduate standing or consent of instructor. Selected topics on the relationship between religion and culture, as reflected in art, literature, music, journalism, philosophy, the life sciences, or the social sciences.

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 II.** Lab 1 1/2. Prerequisite: 1115 or equivalent. Continuation of 1115.
- 2113 (H,I)Intermediate Russian I.** Prerequisite: 1225 or equivalent. Readings in Russian literature and culture. Classes conducted in Russian.
- 2223 (H,I) Intermediate Russian** ((Prerequisite: 2113 or equivalent. Continuation of 2113.
- 3013 (I)Russian for Reading Knowledge** (. Grammar and vocabulary designed for the student who wishes to be able to read Russian. Translation practice.
- 3023 (I)Russian for Reading Knowledge** II.Prerequisite: 3013 or equivalent. Practice at reading and translating Russian.
- 3123 (H,I)Russian Culture/Civilization.** Art, literature, music, architecture, and contemporary life of Russia. Course taught in English.

- 4113 (H,I)Russian Literature in Translation I.** Russian literature from its beginning to mid-19th century: Pushkin, Lermontov, Goncharov, Gogol, Turgenev and Dostoevsky. Readings in English. Classes conducted in English.
- 4123 (H,I)Russian Literature in Translation II.** Russian and Soviet literature from mid-19th century to present: Tolstoy, Chekhov, Gorky, Zamiatin, Sholokhov, Pasternak, Bunin, Solzhenitsyn, Arzhak (Daniel), Tertz (Sinyavsky), Voznesensky and Evtushenko. Readings in English. Classes conducted in English.

SOCIAL SCIENCES (SOCSC)

- 4000 Senior Thesis in Social Sciences.I-3** hours credit, maximum 6. Senior thesis for candidates for the bachelor's degree in Social Sciences.

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.
- 1123 (S,SpD)Social Issues and Human Values.** Social issues discussed and debated. Oral and written expression of views encouraged on a variety of social issues ranging from racism to the role of the police in the modern industrial state. Course draws on many of the social sciences, with major emphasis being in sociology.
- 2123 (S)Social Problems.** 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 Theoretical Thinking in Sociology.** Prerequisites: 6 credit hours of Sociology, including 1113. Sociological theory in three broad areas: the emergence of social theory, the major schools of social theory and the relevance of theory to sociological research.
- 3223 (S)Social Psychology.** Social basis of personality development and behavior, including symbolic environment, self and group, motivation, attitudes and opinions, and social roles.
- 3323* 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* 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.
- 4013 Qualitative and Applied Social Research Methods.** Prerequisites: 3113 and STAT 4013. Conducting, analyzing and reporting qualitative social research. Research design, data collection, analysis and write-up of evaluation research and social impact assessments. Individual research project included.
- 4023* 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.
- 4133 (L)Quantitative Methods in Social Research.** Prerequisites: 3113 and STAT 4013. Applying sociological theory to designing research, testing hypotheses by statistical techniques including sampling, scaling, use of documents and survey instruments. Applying research data to personal decision making and public policy questions. A research project is 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 community organization and planned change.
- 4433 (S)Social Ecology and Life Processes.** Human interdependencies and interrelationships with the social and physical environments, with special focus on the mutual impact of human values, human environment and life phases.
- 4533* (I,S)World Population Problems.** Fertility, mortality and migration, and other factors related to population size, density, and composition; the population explosion, worldwide famine, birth control, and other serious social issues.
- 4593* 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.
- 4643 (I)Women: A Cross-cultural Perspective.** 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.** 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. Examines sociologically significant topics and issues.

- 4993* (S)Medical Sociology.** Health and illness as social and societal phenomena including the doctor-patient relationship, distribution and etiology of disease, the social meaning of health and illness, basic epidemiology, and the social processes involved in medical practice. Cross-cultural comparisons and the sociology of the health professions.
- 5000* Thesis in Sociology.** 1-6 credits, maximum 6.
- 5113* Sociological Theory I.** Prerequisite: 3113 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 and STAT 4013, or equivalents. Advanced techniques in sociological research and data analysis focusing on the formulation of substantive research questions and application of a variety of statistical techniques and computer programs to answer such questions.
- 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: 3923 or equivalent. Nature and effects of custodial institutions on the inmates. Prison community, its structure, social processes and dynamics. Resocialization of prison inmates in new vocational and social skills.
- 5563* Community Treatment of Offenders.** Prerequisite: 3923 or equivalent. Treating offenders in the community without incarcerating them in prisons. Probation, parole and other rehabilitative services. Impact of new community treatment centers, group homes, probation hotels and halfway houses. Effectiveness of the individual, group and family therapies on the offenders.
- 5753* Complex Organizations.** Prerequisite: six hours of undergraduate Sociology or equivalent. Nature and types of complex organizations: organizational structure; organizations and society; organizational changes.
- 5883 Sociology of Education.** Manner in which social forces and institutions influence education and the educational system in the United States. 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 Sociological 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: six hours of undergraduate sociology 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 II.** Lab 1 1/2. Prerequisite: 1115, or equivalent.
- 2112 (H,I)Intermediate Reading and Conversation I.** Lab 1. Prerequisite: 1225 or equivalent. (May have been gained in high school.) May be taken concurrently with other 2000-level Spanish courses.
- 2113 (H,I)Intermediate 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. Prerequisite: 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 (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 (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)Hispanic Civilization I.** Prerequisite: 20 credit hours of Spanish or equivalent. Reading and discussion of selected texts outlining the development of contemporary Spanish civilization. Classes conducted in Spanish.
- 3463 (I)Advanced Diction and Phonetics.** Lab 1. Prerequisite: 20 credit hours of Spanish or consent of instructor. Required course for teacher certification/licensure. Spanish speech sounds and intonation patterns, with practice to improve the student's pronunciation.
- 4113 (H)Chicano Literature and Civilization.** Reading, analysis, and discussion of the most outstanding works in Chicano literature produced since 1848. Contemporary works are emphasized. Taught in English.
- 4173 (H,I)Hispanic Drama.** Prerequisite: 20 credit hours of Spanish or equivalent competence. Reading and interpretation of dramatic works selected from the Hispanic literatures.
- 4220 (I)20th Century Hispanic Literature.** 1-3 credits, maximum 3. Prerequisite: 20 credit hours of Spanish or equivalent. Major 20th century Hispanic writers. Classes conducted in Spanish.

- 4243 (I) Translation and Writing of Documents.** Prerequisite: 20 credit hours of Spanish or equivalent competence. Translation of documents produced by government agencies, universities, business and industrial organizations. Writing of letters, memos, 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) HispaniC Civilization II.** Prerequisite: 20 credit hours of Spanish or equivalent. Reading and discussion of selected texts outlining the development of contemporary Hispanic civilization outside the Iberian peninsula. Classes conducted in Spanish.
- 4550 (I) Seminar in Spanish.** 1-3 credits, maximum 9. Prerequisite: 20 credit hours of Spanish or equivalent. Readings and discussion of vital subjects in Spanish.
- 5110 Advanced Hispanic Studies.** 1-3 credits, maximum 9. Lab TBA. Prerequisite: 22 hours of Spanish or graduate standing in foreign language.

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 (S,SpD) Introduction to Speech Communication.** Principles and techniques of preparing for, participating in and evaluating communication behavior in the conversation, the interview, group discussion and the public speech. A competency-based approach.
- 3010 Speech Activity Participation.** 1-3 credits, maximum 6. Preparation for and participation in speech communication and/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 1. Prerequisite: junior standing. To understand, prepare for, and participate in 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 (S) 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.** Prerequisite: 2713. General principles of interviewing are considered along with specific guidelines for the interviewer in survey, journalistic, counseling, selection, appraisal, legal, medical, and sales interviews.
- 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* (H)History of Public Address.** Leading world orators and speakers. 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* (I)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* (L,S)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 of social influence.
- 5723 Oral Communication Theory.** Modern theories dealing with symbolic and communicative behavior.
- 5733 Human Relations in Organizations.** The place of oral communication in decision-making in organizations. Relationship of oral communication to organizational structure, organizational needs, patterns of leadership and techniques of information collection.
- 5763* Seminar in Organizational Communication Consultancy.** Diagnostic measures for identifying communication problems in organizations and the development of consulting or interventionist programs to solve such problems.

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* Communication Disorders in the Classroom.** 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: Senior standing in major. Supervised research and/or practicum in speech and language pathology and audiology.
- 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.
- 4252* Diagnostic Procedures in Communication Disorders I.** Prerequisite: 3010, 3224. Speech and language diagnostic testing and procedures, interpreting diagnostic information and deriving appropriate treatment goals.
- 4312* Articulation Disorders** (.Prerequisite: 3224. Phonological development, nature of deviant phonology, overview of treatment procedures.
- 4313* Speech Science.** Prerequisite: 4214. Research on the acoustic parameters, the perceptual and productive processes of speech and the interrelationships of these factors during speech communication. Laboratory applications.
- 4323* Language Disorders** (.Prerequisite: 3224. Linguistic and nonlinguistic characteristics of language acquisition. Overview of treatment procedures.
- 4333* Voice Disorders.**Prerequisite: 4313. 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.
- 5000* Research and Thesis.** 1-3 credits, maximum 6. Prerequisite: approval of Head of Department. Research in speech and language pathology and audiology.
- 5013* Research Methods in Communication Disorders.** Prerequisite: 2113. Research methods with emphasis on those used most frequently in speech and language pathology and audiology; experience devising and implementing research.
- 5112* Articulation Disorders** ((.Prerequisite: 4312. Recent research into the nature, causes and treatment of articulation disorders in children.
- 5123* Clinical Audiology.** Prerequisites: 3123, 4133, 4313. Hearing disorders and their etiologies. Clinical application of pure tone and speech audiometric tests, including special diagnostic tests. Overview of rehabilitation and amplification.
- 5133* Stuttering.** Prerequisite: Undergraduate SPATH degree requirements met. Recent research into the nature, causes and treatment of stuttering.
- 5154* Neurological Communication Disorders.** Prerequisites: 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: 4313. Recent research in the etiology repair, speech characteristics and communication remediation procedures with persons having cleft palate.
- 5210* Advanced Practicum.** 1-3 credits, maximum 9. Prerequisite: consent of instructor. Practical experience for the advanced student on or off campus.
- 5243* Language Disorders II.** Prerequisite: 4323. Nature, causes and treatment of language disorders in children.

- 5253* Diagnostic Procedures in Communication Disorders II.** Prerequisite: 4252. Theories, methods and techniques of evaluation of speech and language disorders.
- 5710* Special Topics in Communication Disorders.** 1-4 credits, maximum 9. Prerequisite: Approval of department head. Individual and group investigations of problems in speech and language pathology and audiology.

STATISTICS (STAT)

- 2013 (A)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)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)Intermediate 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)Statistical Methods I.** Lab 2. Prerequisites: 60 credit hours including MATH 1513. Basic experimental statistics, basic probability distributions, methods of estimation, tests of significance, linear regression and correlation, analysis of variance of one-way classification, two-way classification and nested classification.
- 4023* (A,L)Statistical 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.
- 4091* Statistical Analysis System.** Prerequisite: 4013 or equivalent. SAS Dataset construction, elementary statistical analyses, and use of graphics procedures.
- 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: 4203 and MATH 3013. Maximum likelihood methods, point and interval estimation, tests of hypotheses, linear regression, decision theory.
- 4223* Introduction to Statistical Inference.** Prerequisites: 4113, MATH 3013. Sampling distributions, point and interval estimation, sufficiency, completeness, maximum likelihood methods, tests of hypotheses, Rao-Cramer inequality.
- 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.
- 5013* Statistics for Experimenters I.** Prerequisite: MATH 1513 or consent of instructor. Statistics and the scientific method. Descriptive statistics, fundamentals of statistical inference, comparative experimentation to include two-group, paired and completely randomized experiments, linear regression and correlation, binomial and multinomial responses.
- 5023 Statistics for Experimenters II.** Prerequisite: 4043 or 5013. Use of variance components and their estimation, random block and latin square designs to include subsampling, factorial arrangement of treatments, single degree of freedom comparisons, split-unit experiments, analysis of covariance.

- 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.** Prerequisite: 4043. Descriptive techniques; probability models for time series, autoregressive processes, forecasting. Fourier methods and spectral 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: 4223 and MATH 4353. 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 IN-DEN 5133 and MATH 5633.
- 5203 Large Sample Inference.** Prerequisites: 4223, MATH 4353. Types of convergence in probability theory, central limit theorem, consistency, large sample estimation and tests of hypotheses, concepts of asymptotic efficiency, nonparametric tests.
- 5213* Bayesian Decision Theory.** Prerequisite: 5203 and MATH 4363. 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, variance components, mixed models.
- 5333* Theory of Linear Models II.** Prerequisite: 5323. Computing techniques, polynomial models, functional relationships, experimental design models, mixed models and variance component estimation.
- 5403 Theory of Sample Designs.** Prerequisite: 4113. Mathematical development of sampling, simple probability systems, methods of estimation, simple random, stratified random 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, discriminate analysis and applications.
- 5910* 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: 5113, 5213. Confidence intervals, point, estimation, 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.
- 2453 Acting I.** Prerequisite: 2423. Theories and techniques of acting; stage movement and vocal interpretation; performance of scenes.
- 2613 Technical Production I.** Lab 4. Elementary techniques of stagecraft, lighting and costume for the stage. Emphasis on basic skills. Practical experience preparing for departmental productions.
- 2623 Technical Production II.** Lab 4. Prerequisite: 2613. Intermediate course in costume, stagecraft and stage lighting. Refinement of basic technical skills, introduction of design and conceptualization principles.
- 2773 Stage Makeup.** Lab 2. Techniques of stage makeup. Application and relationship to character. Facial anatomy, prosthesis, wigs and hair. Laboratory work in preparation for departmental productions.
- 3010 Upper Division Projects.** 1-3 credits, maximum 6. Prerequisites: 60 SCH and consent of instructor. Individual or group study of techniques, history, or literature of the theatre. Required written survey of the project and self-evaluation of its results, or a term paper.

- 3442 Stagecraft Projects.** Prerequisite: 2613 and 2623. Extended laboratory for those with special abilities and interests in stagecraft.
- 3453 Acting II.** Prerequisite: 2453. Continuation and refinement of Acting I. Greater emphasis placed on text analysis, characterization, and honesty of emotional values.
- 3713 Stage Costume Design.** Lab 4. Prerequisites: 2413 and 2613 and 2623. Basic treatment of costume design; practical application through design sketches. Style of stage costume. Practical experience preparing for departmental productions.
- 4223* Greek Tragedy.** Greek tragedy as an expression of the human condition. Study organized mainly around the mythological order of the events of the plays. Same course as HUMAN 4223*.
- 4413 Lighting for Theatre and Television.** Lab 2. Stage lighting design, elementary electricity, design of lighting instruments. Practical experience in lighting in preparing for 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: 2613 and 2623. The designer's approach to the script; execution of sketches, models and working drawings.
- 4443* Directing.** Prerequisites: 2453 and 3453. Emphasizes play analysis for production, problems in staging, and the role of the director. Planning and direction of scenes in laboratory situations.
- 4453* (H)Theatre History I.** Prerequisite: 2413. Physical theatre, drama, production and management of Western theatre from primitive times to the mid-seventeenth century.
- 4463* (H)Theatre History II.** Prerequisite: 2413. Physical theatre, drama, production and management of Western theatre from the mid-seventeenth century through the nineteenth century.
- 4473* Theatre History III.** Prerequisite: 2413. Physical theatre, drama, production, and management of Western theatre in the twentieth century.
- 4523* Reader's Theatre.** Prerequisites: 2423, 2453 and 3453. Various approaches to Reader's Theatre production. Character analysis and vocal interpretation.
- 4713* Stage Costume History I.** Lab 2. Prerequisite: 2413. Comprehensive history of theatrical costume from ancient Egypt to 1700. Impact of fashion on the stage. Practical experience preparing for departmental productions.
- 4723* Stage Costume History II.** Lab 2. Prerequisite: 2413. Comprehensive history of theatrical costume from 1700 to the present; impact of fashion on the stage. Practical experience preparing for departmental productions.
- 5010 Seminar in Theatre.** 1-3 credits, maximum 6. Prerequisite: consent of instructor. Individual or group studies or techniques, history or literature of the theatre. A term paper or written report and self-evaluation of the study or project is required.
- 5413* Dramatic Theory.** Concepts of play construction and audience effects: classic, neoclassic and modern.
- 5423* Problems in Advanced Acting.** Prerequisite: 4413. Variable content: major acting problems.
- 5443 Problems in Advanced Directing.** Prerequisites: 4443, and 4463 or 4473. Problems arising out of staging a complete production. Group and individualized instruction.
- 5713 Advanced Stage Costume Design.** Lab 2. Prerequisites: 3713, 4713, and 4723. Theory, technique, and style of costume design for the stage. Emphasis on rendering techniques and period style.

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.
- 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.
- 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.
- 4123* Coordinating Trade and Industrial Youth Activities.** Youth clubs in vocational education at local, state and national levels. Procedures for planning programs of work, incorporation of youth activities into curriculum, adviser characteristics and responsibilities, fund raising activities, and techniques for recognizing outstanding members and community supporters.
- 4214* Safety, Organization and Management of Learning Facilities.** Techniques and procedures for organizing and managing shop and laboratory facilities and learner activities to enhance the quality of instruction and improve efficiency of equipment and space utilization including all safety rules and procedures.
- 4344* Trade Analysis and Instructional Planning.** Analysis of trades and occupational job activities; development of course outlines and specific 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 individual 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.
- 2223 Man and Society.** An interdisciplinary approach to social problems in a technological age.
- 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.
- 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 MEDICINE (VMED)

- 5111 Veterinary Medical Orientation I.** Prerequisite: first-year standing in College of Veterinary Medicine. Veterinary medical terminology, history and ethics of the profession, veterinary surveys of the biological kingdom, selected techniques and clinical presentations, and special topics.
- 5221 Veterinary Medical Orientation II.** Prerequisite: 5111. Major breeds of animals; veterinary perspectives concerning animal production and marketing systems; selected techniques and clinical presentations; and special topics. Graded on pass-fail basis.
- 6611* Veterinary Medical Specialty Conference I.** Prerequisite: third-year standing in College of Veterinary Medicine. Specialty conferences for third-year veterinary medical students presented by visiting professionals. A limited number of field trips will be conducted in which special presentations will be made.
- 6711 Special Lectures and Discussions.** Prerequisite: fourth-year standing in College of Veterinary Medicine. Special lectures and discussions involving interdepartmental subjects and activities.
- 6721 Veterinary Medical Clinic Conference I.** Prerequisite: fourth-year standing in College of Veterinary Medicine. Presentation and discussion of selected clinical cases by fourth-year students and interdepartmental faculty groups.
- 6811* Veterinary Medical Specialty Conference II.** Prerequisites: fourth-year standing in College of Veterinary Medicine. Specialty conferences for fourth-year veterinary medical students presented by visiting professionals. A limited number of field trips will be conducted in which special presentations will be made.
- 6821 Veterinary Medical Clinical Conference II.** Prerequisite: 6711. Presentation and discussion of selected clinical cases by fourth-year students and interdepartmental faculty groups.

VETERINARY MEDICINE AND SURGERY (VMS)

- 5312 Veterinary Nutrition and Dietetics.** Prerequisite: second year standing in the College of Veterinary Medicine. Principles of veterinary nutrition and the application of these principles in the prevention and treatment of diseases of animals.

- 6514 Systemic Medicine and Diseases of Domestic Animals I.** Prerequisite: third-year standing in College of Veterinary Medicine. Reproduction in domestic animals including principles of parturition and dystocia, genital diseases and breeding problems.
- 6515 Systemic Medicine and Diseases of Domestic Animals II.** Prerequisite: third-year standing in College of Veterinary Medicine. Diagnosis, prognosis, treatment and prevention of diseases of domestic animals.
- 6522 Surgery I.** Prerequisite: third-year standing in the College of Veterinary Medicine. The pathophysiology of surgery including an introduction to techniques in veterinary surgery and anesthesiology.
- 6531* Radiology I.** Prerequisite: third-year standing in the College of Veterinary Medicine. Veterinary radiology, radiological diagnosis and therapy; use of radioisotopes in veterinary medicine.
- 6542 Clinical Medicine and Surgery Techniques I.** Prerequisite: third-year standing in the College of Veterinary Medicine. Behavioral traits, physical examination and restraint of animals, introduction to clinical techniques of medicine and surgery relating to clinical handling of animals.
- 6615 Systemic Medicine and Diseases of Domestic Animals III.** Prerequisites: 6515 and third-year standing in the College of Veterinary Medicine. Continuation of 6515.
- 6624 Surgery II.** Prerequisites: 6522 and third-year standing in the College of Veterinary Medicine. Lectures and discussions in operative techniques and practice in veterinary surgery.
- 6632 Radiology II.** Prerequisites: 6531 and third-year standing in the College of Veterinary Medicine. Recitations and demonstrations pertaining to the interpretation of radiographs and evaluation of radiological therapy. Continuation of 6531.
- 6642 Clinical Medicine and Surgery Techniques II.** Prerequisites: 6542 and third-year standing in College of Veterinary Medicine. Continuation of 6542.
- 6701 Systemic Medicine and Diseases of Domestic Animals IV.** Prerequisite: 6615 and fourth-year standing in the College of Veterinary Medicine. Continuation of 6615.
- 6706* Preceptorship Clinic.** Prerequisite: fourth-year standing in College of Veterinary Medicine. Diagnosis, prognosis, prevention and treatment of diseases of animals presented in the preceptorship program.
- 6721 Surgery III.** Prerequisites: 6625 and fourth-year standing in the College of Veterinary Medicine. Continuation of 6625.
- 6756 General Clinic I.** Prerequisite: fourth-year standing in the College of Veterinary Medicine. Diagnoses, prognoses, treatment, and prevention of animal diseases. Students conduct introductory clinical studies by assignments in the following: food animals, small animals, equine, radiology, surgery and anesthesiology.
- 6764 Special Clinic I.** Prerequisite: fourth-year standing in the College of Veterinary Medicine. Special assignments for introductory clinical studies in the following: selected species clinic; herd-health program; necropsy, clinical pathology and parasitology, diagnostic laboratory, and special aspects of the basic sciences.
- 6791 Elective I.** Prerequisites: 6615 and 6625 and fourth-year standing in the College of Veterinary Medicine. Elective for selected areas of medicine and surgery. The diagnosis, prognosis, prevention and treatment of diseases of animals.
- 6811 Special Lectures and Discussions.** Prerequisites: 6701 and fourth-year standing in the College of Veterinary Medicine. Special lectures and discussions of selected topics in Veterinary Medicine and Surgery.
- 6821 Surgery IV.** Prerequisites: 6721 and 6625 and fourth-year standing in the College of Veterinary Medicine. Continuation of 6721.
- 6856 General Clinic II.** Prerequisites: 6756 and fourth-year standing in the College of Veterinary Medicine. Diagnoses, prognoses, treatment, and prevention of animal diseases. Students conduct continuing clinical studies by assignments in the following: food animals, small animals, equine, radiology, surgery and anesthesiology.
- 6864 Special Clinic II.** Prerequisites: 6764 and fourth-year standing in the College of Veterinary Medicine. Special assignments for continuing clinical studies in the following: selected species clinic; herd-health program; necropsy, clinical pathology and parasitology, diagnostic laboratory, and special aspects of the basic sciences.

- 6872* Jurisprudence and Medical Economics.** Prerequisite: third-or 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. regulations. Visiting lectures in specialty areas assist in this course.
- 6891 Elective II.** Prerequisites: 6615, 6755, 6615, and fourth-year standing in the College of Veterinary Medicine. Elective for selected areas of Medicine and Surgery.
- 6900 Clinical Problems and Investigation.** 1-6 credits, maximum 6. Prerequisites: 6053, 6754, 6854, or graduate standing in the College of Veterinary Medicine. Clinical research problems and techniques.
- 6910 Advanced Clinics.** 1-6 credits, maximum 6. Prerequisites: 6053, 6754, 6854, 6864, or graduate standing in the College of Veterinary Medicine. Diseases of animals.
- 6920 * Seminar.** 1-3 credits, maximum 3. Prerequisite: Graduate standing in the College of Veterinary Medicine or biological sciences. Literature and research problems pertaining to veterinary medicine and surgery.
- 6930 Comparative Anesthesiology.** 1-3 credits, maximum 3. Prerequisite: graduate standing in the College of Veterinary Medicine or consent of the head of the department. Anesthesiology of animals.
- 6940 Special Clinic III.** 1-4 credits, maximum 4. Prerequisites: fourth-year standing in the College of Veterinary Medicine and consent of the department. Elective for selected areas of medicine and surgery. The diagnosis, prognosis, and treatment of diseases of animals in selected areas.
- 6950* Special Surgical Problems and Techniques.** 1-5 credits, maximum 5. Lab, 3-5. Prerequisite: fourth-year standing in the College Veterinary Medicine. Advanced training in surgical problems and techniques especially as they are related to research.

VETERINARY PARASITOLOGY, MICROBIOLOGY AND PUBLIC HEALTH (V PARA)

- 3123 Animal Hygiene.** Prerequisite: junior standing in the College of Agriculture. Principles of sanitation and of prevention and control of common diseases of livestock.
- 5000 * Thesis.** 1-6 credits, maximum 6. Prerequisite: senior standing with registration for graduate credit or graduate standing. Research problem for credit in meeting requirements of the M.S. degree under the supervision of a graduate faculty member and with permission of the Department head.
- 5110 * Special Problems.** 1-6 credits, maximum 6. Prerequisite: graduate standing or consent of Department Head. Special research problems in veterinary microbiology and parasitology.
- 5113 * Veterinary Immunology.** Lab 3. Prerequisite: first-year standing in Veterinary Medicine or consent of instructor. Basic principles of immunology and their application to veterinary medicine.
- 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.
- 5231 * Veterinary Mycology.** Lab 3. Prerequisites: first-year standing in the College of Veterinary Medicine or consent of instructor. Fungi pathogenic for domesticated animals and their relationship to public health.
- 5241 * Veterinary Biometry.** Prerequisite: first-year standing in the College of Veterinary Medicine. Statistics applied to biological observations applicable to veterinary medicine.
- 5313 Veterinary Virology.** Lab 3. Prerequisite: second-year standing in the College of Veterinary Medicine or consent of instructor. Viruses responsible for disease in domesticated animals.
- 5323 Introduction to Public Health.** Prerequisite: second-year standing in the College of Veterinary Medicine or consent of instructor. Relationship and responsibilities of the veterinarian to public health programs. Topics in community and environmental 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.
- 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.
- 5452* Food Hygiene.** Prerequisite: second-year standing in the College of Veterinary Medicine. Public health principles and standards applying to the maintenance of a wholesome food supply. Regulations and procedures for inspection of animals slaughtered for food and of food products of animal origin; and human nutrition, environmental and consumer aspects of food quality.
- 5523* Advanced Helminthology.** 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: graduate standing in zoology or entomology or consent of instructor. Structure, life cycle, physiology, host-parasite relationships, and diagnosis concerned with protozoan parasites.
- 5833* Veterinary Diagnostic Microbiology.** Lab 6. Prerequisite: graduate veterinarian status or consent of instructor. Laboratory methods employed in the isolation of microorganisms and application of these methods in the diagnosis of specific animal diseases.
- 6000* Research Thesis.** 1-11 credits, maximum 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.
- 6711* Veterinary Preventive Medicine.** Prerequisites: fourth-year standing in the College of Veterinary Medicine or consent of instructor. The uses of epidemiology in the practice of veterinary preventive medicine.

VETERINARY PATHOLOGY (VPATH)

- 5000* Thesis.** 1-6 credits, maximum 6. Prerequisite: graduate standing. Research in veterinary pathology. Graduate credit in meeting requirements of the M.S. degree.
- 5315* Veterinary Pathology I.** Lab 2. Prerequisite: second year standing in the College of Veterinary Medicine or written consent of Department head. Lectures in cellular and tissue pathology, pigments, inflammation, disturbances of growth and circulation lead into pathology of the various systems. The functional disturbances that accompany changes in structures, as well as the cause and pathogenesis of disease, are stressed. Students are taught to correlate altered structure and function with clinical signs.
- 5425* Veterinary Pathology II.** Lab 2. Prerequisite: 5315 or written consent of Department head. Continuation of 5315.
- 5550* Pathological Techniques and Special Problems.** 1-4 credits, maximum 20. Prerequisite: graduate standing in biological sciences. Techniques and methods used in diagnosis, technical work and research in pathology.
- 6000* Thesis.** 1-15 credits, maximum 40. Prerequisite: graduate standing. Research in veterinary pathology. Graduate credit in meeting requirements of the Ph.D. degree.
- 6512 Avian Pathology and Diseases.** Prerequisite: 5425. Diagnosis, prevention and treatment of avian diseases.

- 6523*** **Pathology of Infectious Diseases.** Prerequisite: 5425. Pathology of specific infectious diseases of animals, including those communicable to man and methods employed in their diagnosis.
- 6633*** **Clinical Pathology.** Prerequisite: third-year veterinary standing or graduate standing with consent of Department head. Laboratory methods used in evaluation of pathology conditions in animals. Includes hematology, urinalysis and clinical chemistry.
- 6701*** **Laboratory Animal Diseases.** Prerequisite: 5315 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.
- 6811** **Differential Diagnosis.** Prerequisite: fourth-year standing in the College of Veterinary Medicine. The differential diagnosis of diseases of domestic animals.
- 6910*** **Seminar.** 1-2 credits, maximum 6. Prerequisite: graduate standing in biological sciences. Literature and research problems in veterinary pathology.
- 6920*** **Diagnostic Pathology.** 1-4 credits, maximum 20. Prerequisite: graduate standing in the College of Veterinary Medicine or written 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, species and preparations individually and are required to formulate their own diagnosis.
- 6930*** **Laboratory Animal Pathology.** 1-2 credits, maximum 2. Prerequisites: 6701 or written consent of Department head. Etiology and pathogenesis of spontaneous and experimentally induced diseases of common used species of laboratory animals.
- 6933*** **Neuropathology.** Prerequisites: 5425, graduate standing and written 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.
- 6943*** **Advanced Oncology.** Prerequisite: 5315. Neoplastic diseases of animals with emphasis on morphologic characterization, etiology, metastatic propensities and mechanisms and comparative relationships among different animal species.
- 6950*** **Advanced Systemic Pathology.** 3-4 credits, maximum 18. Prerequisites: 5425, graduate standing or written consent of Department head. Total credit not to exceed 6 for the M. S. degree and 12 for the Ph.D. 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.
- 6963*** **Advanced Clinical Pathology.** Prerequisites: 5425, or equivalent, graduate standing, and written consent of Department head. Applied clinical biochemistry, organ function tests and related cytologic examination.
- 6973*** **Advanced Hematology.** Prerequisite: 5425, or equivalent, graduate standing, written consent of Department head. The etiology and pathogenesis of the diseases of the blood and bone marrow.

WILDLIFE (WILDL)

- 2513 (N)Introduction to Wildlife Conservation.** Prerequisites: BISC 1114 or 1303. The profession of wildlife conservation; the interdisciplinary nature of wildlife conservation is emphasized by lectures, guest speakers, films, and slide presentations.
- 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)Field 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* **Wildlife Management.** Prerequisite: 3513. Biological basis for the management of wildlife populations and habitats, with emphasis on current management problems.
- 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, evaluation of social systems, ontogeny of horns and antlers, and habitat relationships. Population models.
- 5563* **Woodland Wildlife Ecology.** Lab 3. Prerequisites: 4513 or BISC 3034. Vertebrate species diversity in the world's woodland and forested biomes. Changes imposed by land clearing and development and their effects upon wildlife diversity and populations. Options for wildlife conservation, from strict nature reserves to integrating wildlife habitat management into land use practices. Field trip required.
- 5583* **Wetland Wildlife Ecology.** Lab 3. Prerequisite: 4513 or consent of instructor. Ecology of various types of wetlands with emphasis on the management problems for waterfowl and furbearers.
- 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 (ZOO)

- 3104 **Invertebrate Zoology.** Lab 4. Prerequisite: BISC 1603. Morphology, physiology, reproduction and ecology of major invertebrate groups.
- 3205 **Vertebrate Morphology.** Lab 6. Prerequisite: BISC 1603. 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 films and speakers. Critiques written on several selected presentations.
- 3604* **Vertebrate Natural History.** Lab 6. Prerequisite: BISC 1603. 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 undertake 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: BISC 1603. Classification, evolution, distribution, identification, life histories, and morphological, ecological and behavioral adaptations 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)Limnology.** 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 Masters 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 History 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.
- 5543*** **Principles of Ecotoxicology.** Prerequisites: BIOCH 3653 and consent of instructor. Integration of major processes involved with transport, exposure and response of biological systems to xenobiotics.
- 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.

INDEX

A

- Abbreviations of course titles, 3-A
- Academic Regulations, 35
- Accounting, 117, 5-A
- Accreditation, 9
- Activities, campus, 28
- Administration
 - Administrative Services & Business Education, 118
 - General, 99-A
 - Higher Education, 132
 - University, 5
- Admission, 12
- Adult Education
 - Occupational, 134, 159-A
- Advertising-Public Relations, 92, 6-A
- Aerospace/Mechanical Engineering, 163, 144-A
- Aeronautical Technology, 7-A
- Aerospace Studies (Air Force), 98, 7-A
- Agricultural
 - Communications, 50
 - Economics, 51, 8-A
 - Education, 52, 11-A
 - Engineering, 53, 13-A
- Agriculture, College of, 47
 - see also specific subjects*
 - Agriculture, General, 55, 15-A
 - Mechanized, 53, 150-A
- Agronomy, 56, 15-A
- Animal Science, 57, 19-A
- Anthropology, 106, 22-A
- Application, admission, 16
- Applied Behavioral Studies, 129, 23-A
- Architecture, 155, 29-A
- Art, 77, 31-A
- Arts and Sciences, College of, 65, 33-A
 - see also specific subject*
- Astronomy, 34-A
- Athletics, 35-A
- Auditing, 22, 41
- Aviation Education, 135, 35-A

B

- Bachelor of University Studies, 10
- Behavioral Studies in Education, Applied, 129, 23-A
- Biochemistry, 58, 36-A
- Biological Science, 111, 37-A
- Botany, 78, 39-A
- Broadcasting, 92, 130-A
- Business Administration, College of, 113
 - see also specific subjects*
- Business Education, 118, 41-A
- Business Law, **43-A**

C

- Calendar, University, 6
- Chemical Engineering, 157, 43-A
- Chemistry, 81, 46-A
- Child Development/Family Relations, 177, 88-A
- Chinese, 48-A
- Civil Engineering, 158, 49-A
- Clothing, Textiles & Merchandising, 175, 54-A
- College of
 - Agriculture, 47
 - Arts and Sciences, 65
 - Business Administration, 113
 - Education, 127
 - Engineering, 147
 - Graduate, 190
 - Home Economics, 173
 - Veterinary Medicine, 185
- Colvin Physical Education Center, 29
- Communications, 130-A
- Community Services, 179
- Computer Engineering, 159
- Computer Programming Technology, 193
- Computer Systems/Management Science, 123
- Computing and Information Sciences, 82, 56-A
- Construction Management Technology, 166, 59-A
- Consumer Resources, 180, 120-A
- Corrections, 71
- Correspondence courses
 - costs, 19
- Costs
 - auditing, 19
 - extension courses, 19
 - facilities and special services, 19
 - general fees (non-residents), 18
 - general fees, (residents), 18
 - graduate assistants, 21
 - graduation fee, 19
 - special fee, 19
 - staff members, 21
 - veterinary medicine, 18
- Counseling Services
 - academic, 26
- Course listings, 1-A
- Credit
 - graduate, seniors, 11
 - transfer, 13, 16
- Criminal Justice Administration, 71
- Curriculum and Instruction Education, 131, 60-A

D

- Degrees
 - Agriculture, **48**

Arts & Sciences, 66
Business, 114
Education, 128
Engineering, Technology and
Architecture, 148
Home Economics, 174
listing, 33
Technical Institute, 192
Dental Hygiene, 71
Dentistry, Pre, 69
Distributive Education, 136, 65-A
Drafting and Design
Industrial, 192
Mechanical, 149-A

E

Ecology, Wildlife, 110, 199-A
Economics, 120, 66-A
Education, College of, 127
see also specific subjects
Educational Administration and Higher
Education, 132, 71-A
Electrical and Computer Engineering, 159,
73-A
Electrical Power Technology, 167, 77-A
Electronics
Engineering Technology, 167, 78-A
Employment, *see Financial Assistance*
Engineering
College of, 147
Pre-engineering program, 149
Science, 80-A
Technology, 164
Industrial Drafting, 193
Instrumentation Technology, 192
English
Department of, 83, 81-A
Enrolling, Procedure, 16
faculty, staff, 22
former students, 17
freshmen, 17
transfer students, 17
Entomology, 59, 86-A
Environmental Sciences, 87-A
Executive Secretarial Administration, 119
Expenses, *see Costs*
Extension courses
costs, 19

F

Facilities and services, campus, 22
Family Relations/Child Development, 177,
88-A
Fashion Merchandising, 176
Fees, *see Costs*
Finance, 121, 91-A
Financial Assistance
employment, 26

grants, 25
loans, 25
scholarships, 25
work-study, 26

Fire Protection and Safety Technology,
168, 92-A

Food, Nutrition and Institution
Administration, 178, 93-A

Foreign Languages and Literatures, 84,
95-A

see also specific subjects

Forestry, 60, 96-A

Former students
enrollment, 17

Fraternities/Sororities, 23

French, 98-A

Freshman
enrollment, 17
non-resident, 14
Oklahoma resident, 13

G

General Administration, 99-A
General Engineering, 161, 100-A
General Technology, 168, 100-A
Genetics, 101-A
Geography, 85, 101-A
Geology, 86, 104-A
German, 107-A
Graduate, College of, 190
Greek, 108-A
Grants, *see Financial Assistance*

H

Health, 89, 108-A
Health Services, 24
Health, Physical Education and Leisure,
87, 109-A
Higher Education/Education Administration,
132, 71-A
History, 91, 110-A
Home Economics
College of, 173
Education and Community
Services, 179, 114-A
Home Economics and Mass
Communications, 179
Honors program, 10
Horticulture, 61, 117-A
Hospital, *see Health*
Hotel & Restaurant Administration, 181,
118-A
Housing, campus
application, 16
fraternities and sororities, 23
married student, 23
single student, 22

Housing, Interior Design and Consumer Studies, 180, 120-A

Humanities, 123-A

Industrial Arts Education, 137, 124-A

see also specific subjects

Industrial Engineering and Management, 162, 125-A

Instrument Technology, 193

Interior Design, 180

Italian, 130-A

J

Japanese, 130-A

Journalism, 92, 130-A

L

Landscape Architecture/Horticulture, 61, 117-A

Latin, 132-A

Leisure Sciences, 87, 133-A

Library, University, 27

Library Science, 71, 135-A

Loans, *see Financial Assistance*

M

Major fields, *see specific colleges*

Management, 122, 123, 136-A

Management Science & Computer Systems, 123

Manufacturing Technology, 169, 138-A

Marketing, 124, 139-A

Married Student Housing, 23

Mass Communications, 92, 140-A

Mathematics, 96, 140-A

Mechanical/Aerospace Engineering, 163, 144-A

Mechanical Design Technology, 169, 149-A

Mechanical Power Technology, 170, 149-A

Mechanized Agriculture, 53, 150-A

Medical Technology, 79, 151-A

Microbiology, 78, 152-A

Military Science, 97, 153-A

Military Service

fee refund policy, 21

scholarships, 97

Military Studies, Department of, 97

Air Force, 98

Army, 99

ROTC, 99

Music, 100, 154-A

N

Natural Science, 159-A

non-residents of Oklahoma

costs, 18

freshmen, 14

transfers, 15

Nursing

Nurse Science Technology, 193

pre, 71

O

Occupational/Adult Education, 134, 159-A

Occupational Therapy, 71

Office Management, 161-A

Oklahoma City Technical Institute, 34, 192

Oklahoma, *see Residents*

Optometry, 71

Organizational Administration, 118, 123

Organizations, campus, 28

Osteopathy, pre, 69

P

Pathology

Plant, 63

Speech, 107, 188-A

Veterinary, 198-A

Personnel Management, 123

Petroleum Technology, 162-A

Pharmacy, 71

Philosophy, 101, 162-A

Physical Education, 90, 164-A

Physical Therapy, 71

Physics, 102, 165-A

Physiological Sciences, 111, 168-A

Placement Services, 27

Plant Pathology, 63, 170-A

Police Science, 193

Political Science, 103, 171-A

Pre-professional programs

degree, 69

non-degree, 71

Pre-social work 70

Privacy, Student Rights, 32

Programming, Computer Technology, 193

Psychology, 104, 175-A

Public Relations, 94

R

Radiation and Nuclear Technology, 179-A

Radio/TV/Film, 95, 180-A

Readmission, 15

Refund, withdrawal policy, 20

Regents

for Higher Education, State, 4

for Oklahoma State University, Board of, 4

Resolution on Disruption of the

Educational Process, 30

Registration

dates, 6

Regulations, academic, 35
Traffic, 44
Religious Studies, 105, 181-A
Requirements, *see Enrollment*
Residence requirements, 43
Residence status, 12
Residents
costs, 18
freshman, 13
high school seniors, 13
special admission, 14
transfers, 13
Restaurant Administration and Hotel, 181,
118-A
ROTC, 99
Russian, 182-A

S
Scholarships, *see Financial Assistance*
Science, *see specific subjects*
Secretarial Executive Administration, 119
Social Sciences, 106, 183-A
Social Work, pre-professional, 70
Sociology, 106, 183-A
Sororities/Fraternities, 23
Spanish, 186-A
Special
Admission, 14
fees, *see Costs*
services, 19, 22
students, 14
Speech Communication, 107, 187-A
Speech & Language Pathology &
Audiology, 107, 188-A
Statistics, 108, 190-A
Systems Design & Computer Services, 138

T
Teacher Education Programs, 139
Technical
Education, 138, 192-A
Institute, 193
Writing, 83, 193
see also specific subjects
Technology, Division of Engineering, 164
Theatre, 109, 192-A
Trade and Industrial Education, 137, 193-A
Traffic Regulations, 44
Transfers, 14-16, 17
see specific Colleges

U
University, 195-A

V
Veterinary Medicine
College of, 185
Costs, 18
Medicine and Surgery, 195-A
Parasitology, Microbiology and Public
Health, 197-A
Pathology, 198-A
Pre, 49

W
Wildlife, ecology, 110, 199-A
Withdrawal
from school, 37
refund policy, 20
Writing Technology, 193

Z
Zoology, 110, 200-A