The University of Tulsa

2000-2002 Graduate Bulletin

2000 Academic Calendar

Fall Term 2000

August 18, Friday, 9:00 a.m.	Residence Halls Open
August 21, Monday, 8:00 a.m.	Classes Begin
September 4, Monday	Labor Day Holiday
November 20, Monday	Thanksgiving Break Begins
November 27, Monday	Classes Resume
December 4, Monday	Last Day of Classes
December 5-6, Tuesday-Wednesday	Dead Period
December 7-8, 11-14	Final Examinations
December 16, Saturday	December Commencement
December 18, Monday, 12:00 noon	Residence Halls Close

Spring Term 2001

January 5, Friday, 9:00 a.m.	Residence Halls Open
January 8, Monday, 8:00 a.m.	Classes Begin
January 15, Monday	Martin Luther King Day (no classes)
March 5-9, Monday-Friday	Spring Break
March 12, Monday	Classes Resume
April 23, Monday	Last Day of Classes
April 24-25, Tuesday-Wednesday	Dead Period
April 26-27, 30, May 1-3	Final Examinations
May 5, Saturday	Commencement
May 7, Monday, 12:00 noon	Residence Halls Close

2001 Academic Calendar

Fall Term 2001

August 17, Friday, 9:00 a.m.	Residence Halls Open
August 20, Monday, 8:00 a.m.	Classes Begin
September 3, Monday	Labor Day Holiday
November 19, Monday	Thanksgiving Break Begins
November 26, Monday	Classes Resume
December 3, Monday	Last Day of Classes
December 4-5, Tuesday-Wednesday	Dead Period
December 6-7, 10-13	Final Examinations
December 15, Saturday	December Commencement
December 17, Monday, 12:00 noon	Residence Halls Close

Spring Term 2002

January 11, Friday, 9:00 a.m.	Residence Halls Open
January 14, Monday, 8:00 a.m.	Classes Begin
January 21, Monday	Martin Luther King Day (no classes)
March 11-15, Monday-Friday	Spring Break
March 18, Monday	Classes Resume
April 29, Monday	Last Day of Classes
April 30-May 1, Tuesday-Wednesday	Dead Period
May 2-3, 6-9	Final Examinations
May 11, Saturday	Commencement
May 13, Monday, 12:00 noon	Residence Halls Close

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Accreditation

The University of Tulsa is a fully accredited doctoral-degree-granting institution and is on the approved lists of the North Central Association of Colleges and Secondary Schools, the National Council for the Accreditation of Teacher Education, and the Oklahoma State Regents for Higher Education. The university is also an Institutional Associate of the American Association of Community and Junior Colleges. The various colleges and professional schools are accredited by their own professional agencies as well.

The College of Arts and Sciences is a member of the American Association of Colleges for Teacher Education. Programs for the preparation of teachers and school service personnel are accredited by the Oklahoma State Board of Education and by the National Council for the Accreditation of Teacher Education.

The School of Music is a member of the National Association of Schools of Music. The curriculum in deaf education is accredited by the Council on Education of the Deaf, and the master's program in speech-language pathology is accredited by the American Speech-Language Pathology and Audiology Association. The Ph.D. program in clinical psychology is accredited by the American Psychological Association.

The College of Business Administration is a member of the American Assembly of Collegiate Schools of Business. The School of Nursing is approved by the Oklahoma Board of Nurse Registration and Nursing Education and is accredited by the National League for Nursing. The athletic training program is accredited by the Committee for the Accreditation of Allied Health Programs, which is a subcommittee of the American Medical Association.

The College of Engineering and Natural Sciences is an institutional member of the American Society for Engineering Education. The curricula in chemical engineering, electrical engineering, engineering physics, mechanical engineering, and petroleum engineering are accredited by the Accreditation Board for Engineering and Technology. The B.S. in computer science is accredited by the Computer Science Accreditation Commission (CSAC) of the Computing Sciences Accreditation Board (CSAB), a specialized accrediting body recognized by the Council for Higher Education Accreditation (CHEA), and the chemistry curriculum is approved by the American Chemical Society.

The College of Law courses are approved by the American Bar Association and the Association of American Law Schools.

Any current or prospective student may obtain or review a copy of the university's accreditation Self-Study Report to the North Central Association of Colleges and Secondary Schools in the Reserve Room of McFarlin Library.

University Administration

Board of Trustees

The University of Tulsa's Board of Trustees consists of 32 active members and 16 emeritus members. Members hold office for a term of two or three years and election of approximately one-third of the total membership is held each year. With certain exceptions, no trustee except the president can serve more than two consecutive terms, but a trustee who has served two consecutive terms is eligible for reelection after one year off. The president of the Alumni Board serves during the one-year term of that office. Both active and honorary trustees are elected by a majority vote of the Board of Trustees, which determines the terms, conditions, and qualifications of membership.

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University of Tulsa Mission

The University of Tulsa is a
private, independent, doctoral-degree-granting institution
whose mission reflects these core values:
excellence in scholarship, dedication to free inquiry,
integrity of character, and commitment to humanity.

The university achieves its mission by
educating men and women of diverse backgrounds and cultures to

- become literate in the sciences, humanities, and arts;
- think critically, and write and speak clearly;
- succeed in their professions and careers;
- behave ethically in all aspects of their lives;
- welcome the responsibility of citizenship and service in a changing world; and
- acquire the skills and appetite for lifelong learning.

About The University of Tulsa

As a comprehensive, doctoral-degree-granting institution with a covenant relationship to the Presbyterian Church (USA), The University of Tulsa provides undergraduate, graduate, and professional education of the highest quality in the arts, humanities, sciences, business, education, engineering, law, nursing, and applied health sciences, and participates in NCAA Division IA. Its current undergraduate enrollment is about 2,900, with about 1,300 students in its graduate programs and law.

The university campus lies two miles east of downtown Tulsa, a handsome, vigorous, southwestern city in a metropolitan area of over half a million people, set among the hills and lakes of northeastern Oklahoma's "Green Country." From the beginning, Tulsa's founders—who developed a thriving economy based on petroleum, aerospace technology, telecommunications, and health care—invested in nationally noted museums, outstanding performing arts groups, and a system of parks and recreational facilities for citizens of all ages. The city's remarkable cultural, technological, and economic resources nourish the university's mission and enrich its life, just as the university, in turn, enriches the city.

The university's mission is further nurtured and supported by

- exceptional faculty, who draw students into the pursuit of knowledge, introducing them to the pleasures and responsibilities of the life of the mind in a challenging world—and who include in their numbers the 1998-99 Carnegie Foundation Professor of the Year for all U.S. doctoral and research universities, a national Carnegie Foundation Pew Scholar, a Carnegie Foundation Professor of the Year for Oklahoma, a member of the National Academy of Engineering, and four Fellows of the Institute for Advanced Study.
- a humanities-based general curriculum that stimulates scientific, social, and artistic inquiry while stressing competence in oral and written communication;
- graduate, professional, and research programs that foster advanced theoretical development, promote professional preparation, enhance the quality of the faculty, and extend the university's international reach;
- substantial library resources and information technology that support research and classroom learning;
- a residential campus that fosters a sense of community and integrates curricular and extracurricular life; and
- abundant opportunities for students to undertake community service, internships, and study abroad; to participate in substantive research, often as early as the freshman year; and to study and reflect in ways that foster intellectual, spiritual, and moral growth.

In its rich urban environment, The University of Tulsa offers a diversity of learning experiences, a balance between career preparation and liberal education, teaching, and research, and endeavors to instill in its students an understanding that stature as an individual and value as a member of society depend upon continual learning.

History of The University of Tulsa

The University of Tulsa—a private, non-sectarian institution that is formally related to the Presbyterian Church (USA) by a mutually articulated covenant with the Synod of the Sun—has its roots in the Presbyterian School for Indian Girls, a small boarding school in Muskogee, Indian Territory, that was founded in 1882. In 1894, at the request of the Synod of Indian Territory, the Board of Home Missions of the Presbyterian Church elevated the academy's status and chartered it as Henry Kendall College, a name that honored the first general secretary of the Home Missions Board. The first classes in the new college were held on September 12, 1894.

In the years following, financial difficulties prompted school officials to ask the Synod of Indian Territory to assume control, sell the school's land, and seek a new location. Successfully courted by the business and professional community of Tulsa, which was booming after the discovery of oil at Glenpool, Henry Kendall College moved to Tulsa in 1907, the year of Oklahoma's statehood.

Several years later, a new college, to be named after oilman Robert M. McFarlin, was proposed for the city. Aware that Tulsa was not large enough to support two competing colleges, the Henry Kendall College trustees proposed that the contemplated McFarlin College and Kendall College affiliate under the common name "The University of Tulsa." A charter for the university was approved on November 9, 1920. In 1926, the articles of incorporation were amended to create its modern structure as an independent school corporation governed by a self-perpetuating board of trustees.

In 1928, the School of Petroleum Engineering opened and soon earned international recognition for its curriculum and faculty. The College of Business Administration was established in 1935. In 1943, the downtown law school, previously affiliated only loosely, became part of the university. In 1966, James A. Chapman died and bequeathed the university $34 million in endowment. In the 1970s, the Dimensions for a New Decade campaign raised an additional $43 million. By the end of February 2000, the university had endowment funds and funds held in trust of $702,117,000. The university currently comprises the Henry Kendall College of Arts and Sciences, the College of Business Administration, the College of Engineering and Natural Sciences, the College of Law, the Graduate School, and the Division of Continuing Education.

After the 1970s, the character of the university changed. Although the programs in engineering and geosciences continued to bring the institution international renown, carefully selected graduate programs were added in other fields; the College of Law, the College of Business Administration, and the Henry Kendall College of Arts and Sciences were strengthened; the number of students living on campus significantly increased; and the student body—which currently hails from 44 states, three U.S. territories, and 68 foreign countries—became increasingly diverse.

During the 1980s, the university established an innovative humanities-based general curriculum—called the Tulsa Curriculum—that emphasizes the development of core skills in writing, mathematics, and foreign languages; established 10 endowed chairs for faculty; increased faculty diversity; enhanced its support for excellent

teaching and research; defined its academic programs with greater rigor and clarity; and began recruiting highly qualified students nationwide. The library was strengthened by accelerated development of the rare book and manuscript collections, which regularly draw international scholars and archival materials to the university, expanding the university's reputation as the home of one of the leading special collections libraries in the country and bringing international acclaim. These trends have continued into the present, advancing the university's reputation for excellence.

As the university continues into its second century, it has just officially completed the most ambitious capital campaign in its history, the New Century Campaign. Construction of the new Donald W. Reynolds Center—a $28 million, 138,000-square-foot multi-use facility with an 8,000-seat arena—was completed in 1999, with major funding in the form of a $14.75 million grant from the Reynolds Foundation. Also, construction on a $7.5 million Mabee Legal Information Center for the College of Law was completed in January 2000. Both of these facilities are heavily used by both the university and larger communities.

In addition, the university is continuing to maintain and strengthen its academic standards by internationalizing its programs, developing substantive undergraduate research opportunities, and seeking distinction in several critical fields, including environmental studies and research—the better to equip its students for life in a rapidly changing world. Also, elevating the university's regional accolades for excellence to national prominence is a primary focus of the present administration. As a mark of this success, since 1995, TU students have won nine National Science Foundation Awards, three Truman Scholarships, three Fulbright Grants, two British Marshall Scholarships (the first of which was the first awarded in Oklahoma in 27 years), and 19 Goldwater Scholarships.

The Graduate School

Graduate education at The University of Tulsa is based upon the principles that no objective lies deeper in a university's tradition than the nurture of scholarship, and that graduate education represents the highest reaches of university endeavor.

The Board of Trustees authorized graduate study leading to the master's degree in 1933. The first master's degree was granted in 1935. The Board of Trustees approved a curriculum leading to the Doctor of Education degree in 1951.

A Doctor of Philosophy program was authorized by the Board of Trustees in 1963; Ph.D. curricula in petroleum engineering, chemical engineering, English, and earth sciences (geosciences) were inaugurated and given preliminary accreditation by North Central Association in 1966, with full accreditation in 1972. The industrial organizational psychology doctoral program was inaugurated in 1983, followed in 1985 by the Ph.D. program in mechanical engineering. In 1987 the doctoral programs in biological sciences and computer science were approved by the Graduate Council; and, in 1988, the Ph.D. in counseling psychology program (initiated in 1985) underwent a name change to clinical psychology.

The Graduate School supervises all graduate work offered by the university except that of the College of Law (College of Law information is published in a separate bulletin). The Graduate School sets standards for admission to graduate standing and recommends to the Board of Trustees for degrees those students who have completed work required for graduation.

The general policies and regulations of the Graduate School are set and enforced by the Graduate Council and the Dean of Research and Graduate Studies, subject to approval by the university administration. The Dean is chair of the Council, which consists of graduate faculty members elected from each college, the deans of the colleges offering graduate work, and the President of the Graduate Student Association. Council faculty members must hold at least the academic rank of associate professor.

Functions of the Graduate Council include:

- Development of policies and procedures for the Graduate School and the recommendation of these policies and procedures to the university administration.
- Establishment of regulations for the administration of policies and procedures.
- Examination and approval, or rejection, of new programs and curricula proposed for the Graduate School.
- Development of criteria for membership in the graduate faculty.
- General concern for the Graduate School's welfare and the quality of work offered.
- Recommendation to the Dean of Research and Graduate Studies concerning the disposition of cases filed by a student or faculty involving charges of academic misconduct involving graduate students, or perceived academic impropriety arising from an action taken by faculty. (See Petition Committee of the Graduate Council for details, page 23.)
- Hearing of graduate student petitions that request departure from established

Graduate School policies and a resultant recommendation to the Dean of Research and Graduate Studies. (See Petition Committee of the Graduate Council for details, page 23.)

Degrees

Master of Arts. Specializing in anthropology, art, clinical psychology, education, English language and literature, history, and industrial/organizational psychology.

Master of Science. Specializing in biological science, chemistry, computer science, finance, geosciences (geology, geophysics), math/science education, applied mathematics, and speech/language pathology.

Master of Science in Engineering. Specializing in chemical engineering, electrical engineering, mechanical engineering, and petroleum engineering.

Master of Engineering. Specializing in chemical engineering, electrical engineering, mechanical engineering, and petroleum engineering.

Master of Engineering and Technology Management. Offered through the College of Engineering and Natural Sciences in cooperation with the College of Business Administration.

Master of Accounting and Information Systems

Master of Business Administration

Master of Finance

Master of Taxation

Master of Teaching Arts. Offered through the School of Education in cooperation with individual disciplines in art and secondary education specialties.

Master of Fine Arts. A 60-credit-hour program specializing in art.

Doctor of Philosophy. Specializing in biological science, clinical psychology, computer science, engineering (chemical, mechanical, and petroleum), English language and literature, geosciences, and industrial/organizational psychology.

The university also offers joint programs between the Graduate School and the College of Law leading to a Juris Doctor/Master of Arts (specializing in anthropology, clinical psychology, English language and literature, history, or industrial/organizational psychology), Juris Doctor/Master of Business Administration, Juris Doctor/Master of Accounting and Information Systems, Juris Doctor/Master of Taxation, and Juris Doctor/Master of Science (specializing in biological science and geosciences).

Admission

The majority of graduate programs at the university are, by purpose and design, not large. The number of students admitted each year is restricted to those with high qualifications.

An applicant must hold a baccalaureate degree from a college or university approved by a recognized accrediting agency. Applicants whose academic work has been superior are admitted upon approval by the major program administration and the Dean of Research and Graduate Studies. Such applicants, having selected a major field of study, must meet requirements set by the major program and the Graduate School.

A grade point average of at least 3.0 on a 4.0 scale in the undergraduate major is generally required, but requirements may vary between programs and may be higher than 3.0. Fitness of character may also be considered.

Each student must satisfy course prerequisites for the graduate program before being officially admitted to the degree program. The major program advisor and the Dean of Research and Graduate Studies may approve conditional admission, but a student is usually required to remove all such deficiencies before beginning the course of study leading to a graduate degree.

Applicants for admission to most graduate programs must take the Graduate Record Examination General Tests. Applicants for admission to graduate programs in the College of Business Administration must take the Graduate Management Admission Test.

Tests such as the Miller Analogies Test or the Subject Tests of the Graduate Record Examination may be required at the discretion of specific programs.

Information regarding times and places where the tests are given is available from the Educational Testing Service, Rosedale Road, Princeton, NJ 08541; (609) 921-9000; FAX: 609-734-5410; or *www.ets.org*.

An undergraduate student with a distinguished academic record may enroll in graduate work in the final year before graduation. Such action must be approved by the major advisor and the Dean of Research and Graduate Studies and is governed by individual qualifications and course loads. Enrollment is through the student's regular college, but the graduate course number must be used and application for admission must be made to, and approved by, the Graduate School.

International Applicants

International applicants must attain First Class in examinations taken during their undergraduate tenure at a four-year baccalaureate institution. Transcripts sent to the Graduate School must be accompanied by a certified English translation, the rank in the applicant's graduating class, and a clear explanation of the grading system used at the undergraduate institution. The University of Tulsa does not typically offer first-year international students financial aid; therefore, a letter of financial support must accompany the application for admission to the Graduate School.

Applicants for whom English is not the first language must take the Test of English as a Foreign Language (TOEFL) by arrangement with the Educational Testing Service, Rosedale Road, Princeton, NJ 08541, U.S.A.; (609) 921-9000; FAX: 609-734-5410; or *www.ets.org.* The University of Tulsa will not accept Institutional TOEFL scores to satisfy English proficiency requirements, with the exception of its own Institutional TOEFL. If, however, the student has received his or her degree from a university in which English is the primary language of instruction, the TOEFL may

be waived, upon petition, at the discretion of the Graduate School.

The minimum TOEFL score accepted by The University of Tulsa for international applicants is 213 for programs offered through the College of Engineering and Natural Sciences (except in engineering and technology management) and 232 for engineering and technology management and all other programs.

All international graduate students must check in with the International Student Services Office upon first arriving on campus, and prior to enrolling for each semester. For the fall and spring semesters, international students must obtain a Health Insurance Verification form from the International Student Services Office confirming their insurance coverage. This form must be presented to the Graduate School before enrollment can be completed. Failure to meet routinely with the International Student Services office may adversely affect an international student's visa status.

Special Student Status

It is possible to apply to the Graduate School as a special student. Admission to the Graduate School as a special student is outside any graduate program; it is understood that enrollment as a special student does not lead to a graduate degree. Students are admitted to this category for general course work or transfer purposes. Special students are required to meet the regular admission standards of the Graduate School.

If the special student applies and is officially admitted to a degree program, six hours of course work taken as a special student may be applied toward a master's degree and up to 12 hours of course work taken as a special student may be applied toward a doctoral degree.

Graduate students in education, not needing institutional endorsement, who are seeking fewer than eight semester hours of graduate credit for specified certification requirements of the Oklahoma State Department of Education, may also be admitted as special students.

General Admission Procedures

All students seeking admission to the Graduate School must follow these steps:

- Make application on a form provided by the Graduate School or electronically on the electronic application provided at the Graduate School website: *www.utulsa.edu.*
- Submit a nonrefundable processing fee of $30 with each application.
- Submit official transcripts of all college work. (Transcripts submitted with an application become property of the university.)
- Submit all required standardized test scores at time of application.
- Submit three letters of recommendation.
- Fitness of character may also be considered.
- In the case of international students, submit a letter of financial support at time of application.

Normally, two weeks are required to process an application after all materials have been received in the Graduate School Office. However, in the case of international students requiring visas, at least two months should be allowed.

Applications and transcripts will be held on file, and admission will be valid for one

calendar year. Unless the Graduate School Office is instructed otherwise, application credentials will be destroyed if enrollment is not completed within one calendar year.

Matriculation

Exceptions to the following policies are rare and are granted only on a case-by-case basis and upon recommendation of the program administration and with the approval of the Dean of Research and Graduate Studies.

Full-Time and Part-Time Status

To be considered academically full-time, a graduate student should be enrolled in at least nine hours during a regular semester (fall and spring semesters). Enrollment in one to eight hours is acceptable for full-time status for two sequential regular semesters in a master's program or four sequential regular semesters in a doctoral program when the student was enrolled in at least nine hours per semester for the prior two sequential regular semesters. Failure to complete the degree in a timely manner, within the two regular semesters for a master's student or four semesters for a doctoral student, will disqualify the student for further full-time status until the student has enrolled in at least nine credits per semester for two sequential regular semesters.

A student may enroll in 12 hours during a regular semester and eight hours during a summer term. However, students with full-time jobs are normally limited to a maximum of six semester hours during fall and spring semesters.

Enrollment in one to eight credit hours other than as described above constitutes part-time enrollment.

Graduate students who are not United States residents and are attending the university on a student visa must be full-time students as required by federal regulations.

Enrollment

Graduate enrollment for the summer and fall terms usually begins in late March. Spring term enrollment begins in early November. Enrollment cards for all degree-seeking students should be obtained from, and completed with the assistance of, the appropriate graduate program advisor. The card should then be presented to the Graduate School Office for final approval. Special (non-degree-seeking) students should obtain their enrollment cards in the Graduate School Office. Special students must secure the signature of the appropriate instructor for each graduate course in which they wish to enroll.

Enrollment after the first week of classes during a regular semester involves a $20.00 late enrollment fee.

A student must be enrolled to make use of university resources (e.g., library or faculty time) during a fall or spring semester. No student may attend classes after the first class session, take qualifying exams, comprehensive exams, or graduate that semester unless properly enrolled. Any graduate student who has enrolled in the required number of hours for a degree but has not finished all requirements must enroll in

Graduate Residency (see below).

The last day of the semester is the last day of final exams unless indicated otherwise by the instructor.

Graduate Residency (7961)

When the student has enrolled in the required number of hours for the degree but has not finished all requirements for the degree, he or she enrolls in Graduate Residency (7961). This requirement is particularly applicable but not restricted to the semester in which the student completes work for the degree.

If a student is not enrolled in course work but wishes to make use of university resources (e.g., library or faculty time), or to complete other academic milestones required by the program or Graduate School (e.g., take a qualifying examination or comprehensive examination, have an oral defense of the thesis or dissertation), or to be considered for graduation during that term or during a given semester, the student must be enrolled in Graduate Residency (7961).

Undergraduate Courses for Graduate Credit

In some programs, undergraduate courses, designated in this bulletin by 6000-level course numbers, may be taken for graduate credit, with the approval of the program advisor. Students enrolled in these courses for graduate credit will be given assignments beyond those required for undergraduate students in the same course.

The faculty responsible for the program must submit a written justification for any master's degree program containing more than 40 percent of its course work hours (excluding the removal of deficiencies) in 6000-level courses. Such justification must be approved by the Dean of Research and Graduate Studies.

Undergraduate courses taken for graduate credit must be 6000-level courses approved for registration. Graduate tuition must be paid for such courses.

Auditing

A student may elect to audit a course and will have all the privileges of students taking the course for credit, except taking the final examination or receiving credit for the course.

An auditor may elect to take a course for credit at any time within the first three weeks of a regular semester if the course instructor and the Dean of Research and Graduate Studies give their permission. A student originally enrolled in a course for credit may elect to change his or her status to that of auditor at any time within the first three weeks of a regular semester only if he or she is passing the course at the time the change in status is requested and the consent of the course instructor in secured. The schedule for auditing courses during a summer term should be obtained from the Records Office.

Withdrawal

Total withdrawal for any given term requires a standard procedure originated through the Graduate School Office. Students withdrawing prior to the start of the seventh

week of a regular semester are entitled to a partial refund of tuition calculated from the date on which application to withdraw is received in the university's business office. Mere nonattendance of classes does not constitute official withdrawal.

Withdrawal from a course after the start of the fourth week and up to and including the twelfth week of a regular semester will be considered a partial enrollment for which a grade of W (withdrew) or WF (withdrew failing) will be recorded. The grade to be given will be indicative of the student's accomplishment in the course up to the date of withdrawal.

Withdrawals are not permitted after the end of the twelfth week of a regular semester. The schedule for withdrawal from courses during a summer term should be obtained from the Records Office. Formal withdrawal shall constitute a forfeiture of any and all rights to a subsequent make-up of incompletes.

Students may be withdrawn from a class or from the university for habitual behavior that prevents the student, or other students, from fulfilling the purposes implied by registration in the university. A grade of W (withdrew) or WF (withdrew failing) will be entered for the course or courses in which the student was registered.

Transfer Credit

Transfer credit is limited to six hours at the master's level and 12 hours at the doctoral level. The major advisor is responsible for determining the applicability of transfer work to the student's program. Any such graduate credit must have been earned at an accredited graduate school and completed within the six-year statute of limitations. Transfer credit will not be granted for any course work with a grade below B. Credit for transfer work will be recommended by the major advisor to the Graduate School only after the student has completed the same number of credit hours at The University of Tulsa with at least a 3.0 grade-point average. Transfer Credit Forms are available in the Graduate School Office. Course work used to satisfy requirements for one graduate degree may not be used to meet the requirements for a second graduate degree.

All transfer credit is subject to final approval by the Dean of Research and Graduate Studies.

Scholarship

Grades

An overall scholastic average of 3.0 is required in all graduate work taken at The University of Tulsa. All course work taken for graduate credit is computed in the average, including the initial grade in a course that is repeated. Grades earned in the College of Law are not computed in the graduate grade-point average.

No graduate credit is earned for a course in which the student received a grade below a C.

Thesis and dissertation enrollments are evaluated on a pass-fail basis. An I (Incomplete) is assigned at the end of each semester when the thesis or dissertation is

in progress. The thesis or dissertation supervisor will submit a grade change form when the student has either ceased work on the research or completed all requirements for graduation.

No graduate credit will be given for work receiving a pass/fail grade, with the exception of thesis, dissertation, certain master's reports, certain College of Law courses, and certain internship work.

Incompletes

An I grade indicates that some portion of the student's work is lacking, for an acceptable reason, at the time grades are reported. It is the responsibility of the student to fulfill the requirements for the course within a maximum of one calendar year from the date on which the course was originally to have been completed. If the student is unable to do so because of circumstances beyond his or her control, the student may petition the instructor of the course and the Dean of Research and Graduate Studies for an extension of time.

When the instructor grants an incomplete, a Record of Incomplete form must be completed and filed in the Graduate School Office. This form, to be signed by the instructor and by the student, should specify what must be done to remove the incomplete and give a deadline for completion of the unfinished work. The faculty may give a maximum of one calendar year for completion of the work or specify less than one calendar year on the contract. Following the expiration of the contract deadline or one calendar year, if earlier deadline is not specified, a symbol (IZ) will be added to the transcript indicating that the course is no longer valid and the incomplete may not be removed.

These regulations do not apply to theses or dissertations in which completion of the course work is not usually required at the end of the semester. Thesis and dissertation enrollments are evaluated on a pass-fail basis. An I (Incomplete) is assigned at the end of each semester when the thesis or dissertation is in progress. The thesis or dissertation supervisor will submit a grade change form when the student has ceased work on the research or has completed all requirements for graduation.

Academic Standing

Statute of Limitations

The work for a degree must be completed within six years. This policy holds even if a student was absent or not enrolled for several semesters. A student who allows the time limit to expire and is subsequently readmitted must also meet the new requirements for the degree as stipulated in the program at the time of readmission. Graduate work more than six years old must be validated for currency in the discipline by examination or other means of evaluation at the discretion of the major program. When all work toward the degree is out-of-date, it is possible to validate six of the out-of-date hours to be applied toward future work on the degree. All petitions for extension must

be recommended by the student's advisor and approved by the Dean of Research and Graduate Studies.

A more stringent statute of limitations may be imposed under the particular requirements of individual programs.

Leave of Absence

A leave of absence will be considered for up to one academic year for medical or other extenuating circumstances upon submission of documents to the Dean of Research and Graduate Studies. The Graduate School will notify the student if the Dean approves the requested leave. Students should seek clarification from the Dean as to how this affects their academic status as a full-time or part-time student. However, the six-year statute of limitations regarding course credit is still in effect. The student should check with the Financial Aid Office regarding the effect of a leave on loan obligations. Any financial support currently being provided to the student may or may not be available upon the student's return.

Probation and Dismissal

Students who have not maintained a 3.0 average in graduate courses at the end of any semester or session will be placed on probation. Upon approval of the Dean of Research and Graduate Studies, a student on probation may be allowed up to nine additional hours to achieve the required 3.0 average. Only courses taken at The University of Tulsa will be used to determine the grade-point average for the purpose of removing probation. If the average is not improved to 3.0 after the additional hours, and within one semester of enrollment for full-time students or three terms for part-time students, the student will be dismissed from the graduate program. Exceptions for additional hours beyond the 9 hours to achieve the required 3.0 average, are granted on a case-by-case basis upon recommendation of the major program's administration and with the approval of the Dean of Research and Graduate Studies.

If a student in one of the joint programs is placed on probation or dismissed by either the College of Law or the Graduate School, that action shall pertain only to the student's status within the college taking that action. The student may opt to continue pursuing studies within the other college. In such cases, the student will be obliged to satisfy the normal requirements of the college selected, which may include credit for some work done in the other college, as determined by the Dean of the College of Law or the Dean of Research and Graduate Studies.

If a student has not made satisfactory progress toward the degree program because of incompletes in course work, the student may be placed on probation and further enrollment may be affected until the work is submitted for the incomplete courses, grades are submitted and the student's academic progress is evaluated.

A student may be dismissed from the Graduate School for reasons other than poor grades, even if he or she is in good academic standing. This includes but is not limited to falsification of application materials, failure to satisfy stipulations imposed upon admission to the program, failure to maintain the standards of academic, ethical, or professional integrity expected in a particular discipline or program, and failure to satisfy other program or Graduate School requirements in timely fashion according to established policies.

Application for Degree and Graduation

Application for a degree should be filed in the Graduate School Office when a student enrolls for the final semester of the degree program. To graduate and receive a diploma, the student must be enrolled the semester of graduation, all academic degree requirements must be completed, all incompletes must be removed from the student's record, and all indebtedness to the university must be satisfied. If a requirement for the degree is completion of a thesis or dissertation, the thesis or dissertation should be deposited with the library by April 15 for completion in May, by December 1 for the fall semester, or by the last day of classes for summer graduation. The master's and Doctor of Philosophy degrees are conferred at the first commencement exercises after completion of all graduation requirements. Each candidate is expected to attend the ceremonies unless excused by the Dean of Research and Graduate Studies.

Enrolled students who complete all degree requirements and deposit the final drafts of their thesis or dissertation in the library after April 15 or December 1 but before the respective May or December commencement may graduate that semester upon review and approval of the Dean of Research and Graduate Studies. In such cases, students who wish to participate in commencement exercises must petition their advisor and the Dean of Research and Graduate Studies in writing by April 15 (for spring) or December 1 (for fall), although the petition may come too late for their names to appear in that semester's commencement program. The petition represents an exception to policy and will be considered only under extraordinary circumstances.

May Commencement Policy

Deserving non-thesis graduate students who have only six credits remaining to complete all the requirements for their degree by the end of the summer session will be permitted to take part in May graduation ceremonies; this includes having their names printed in the commencement program. However, the student must petition both the advisor and the Graduate School in writing. Please call the Graduate School for information about what the petition must include and when it is due. Exceptions will be considered, but only under extraordinary circumstances.

Master's Degree Requirements

The following are minimum requirements only, and any program may have additional requirements. Students are responsible for compliance with all Graduate School requirements as set forth in this bulletin.

Residence

Candidates for most master's degrees at The University of Tulsa must complete a minimum of 30 semester hours of graduate study. Not more than six semester hours of approved graduate work completed in residence elsewhere may be accepted for credit toward the degree.

All graduate students must be enrolled during the final semester of completion of degree requirements. (See Graduate Residency, page 16.)

Thesis

Many programs require a candidate for the master's degree to submit a thesis presenting the results of scholarly investigation of a topic connected with the field of major study. In the case of creative work such as art and writing, the requirement may be satisfied by a creative production of acceptable quality. No fewer than two or more than six semester hours may be earned by the thesis or creative production.

A thesis committee, composed of three members of the graduate faculty, must be recommended by the program administration to the Dean of Research and Graduate Studies for approval. At least one member of the committee shall be from outside the major program or discipline or, with the Dean's approval, from outside the university. The purpose of the committee is to provide advice and guidance concerning the student's research. The establishment of the thesis committee should occur early in the student's research endeavor in order to maximize the benefit from the committee to the student.

Candidates must follow the guidelines for preparing a thesis set forth in The Preparation of the Master's Thesis and Doctoral Dissertation, available in the Graduate School Office. The thesis shall be presented before final typing to the thesis committee in preparation for the thesis defense or oral examination.

The Graduate School Office should receive a request to set the date, time and place of the oral examination at least two weeks prior to the oral examination to allow time to process the appropriate paperwork in preparation for the student's completion.

The committee will examine the thesis and report to the chair supervising the research or creative work. Theses are graded on a pass-fail basis.

Students graduating at the end of the spring semester must complete their oral examinations and deposit the final drafts of their theses in the library by April 15. The deadline for students graduating at the end of the fall is December 1, and the summer deadline is the last day of summer classes. Students who deposit the final draft of their thesis in the library after April 15 or December 1 but before the respective May or December commencement may graduate that semester upon review and approval of the Dean of Research and Graduate Studies, although their petitions to participate may come too late for their names to appear in that semester's commencement program.

An abstract of not more than 150 words shall be prepared by the candidate, one copy of which is to be bound with the thesis, and additional copies are to be filed with the librarian and the Graduate School Office.

After the thesis binding fee is paid, three copies must be deposited at the library for binding (two for the library and one for the major program).

Some programs offer curricula not requiring a thesis. These are discussed in the appropriate sections on specific program requirements.

Comprehensive Examination or Qualifying Examination

Candidates may be required by the major program to pass an oral or written compre-

hensive examination in the major and minor fields in addition to the regular course examinations.

Master of Fine Arts Degree

The Master of Fine Arts degree is a 60-hour program offered only through the School of Art. See requirements in art for specific information.

Doctoral Degree Requirements

The following are minimum requirements only; any program may have additional requirements. Students are responsible for compliance with all Graduate School requirements as set forth in this bulletin.

Information regarding comprehensive exams, dissertation committee structure, and other specific requirements may be found under Biological Science, Chemical Engineering, Clinical Psychology, Computer Science, English Language and Literature, Geosciences, Industrial/Organizational Psychology, Mechanical Engineering, and Petroleum Engineering.

Any exception to the doctoral degree requirements must be approved by the major program administration and the Dean of Research and Graduate Studies.

Residence

Candidates for doctoral degrees must complete a minimum of 72 semester hours of graduate study. Some doctoral programs require a minimum of 90 hours (60 hours beyond the master's degree). At least two consecutive semesters in residence at The University of Tulsa as a full-time student are required. Not more than 12 hours of approved graduate work completed in residence elsewhere may be accepted for credit toward the degree.

Comprehensive Examination or Qualifying Examination

Candidates may be required by the major program to pass an oral or written comprehensive examination in the major and minor fields in addition to the regular course examinations.

Candidacy

A student who has been admitted to a doctoral degree program is not a candidate for a doctoral degree until he or she has passed a qualifying examination, filed an application for admission to candidacy, and the application has been approved by the program advisor and the Dean of Research and Graduate Studies.

Dissertation

A dissertation committee, composed of graduate faculty for the purpose of providing advice and guidance concerning the student's research, must be recommended by the program administration to the Dean of Research and Graduate Studies for approval.

The establishment of the dissertation committee should occur early enough in the student's research endeavor to give him or her the full benefit of the committee's counsel.

Candidates must follow the guidelines for preparing a dissertation set forth in The Preparation of the Master's Thesis and Doctoral Dissertation, available in the Graduate School Office. The dissertation shall be presented before final typing to the dissertation committee.

The Graduate School Office should receive a request to set the date, time and place of the oral examination at least two weeks prior to the oral examination or the approval of the dissertation by the committee.

The committee will examine the dissertation and report to the chair supervising the research or creative work. Dissertations are graded on a pass-fail basis.

Students graduating at the end of the spring semester must complete their oral examinations and deposit the final drafts of their dissertation in the library by April 15. The deadline for students graduating at the end of the fall semester is December 1, and the deadline for summer graduation is the last day of summer classes. Students who deposit the final draft of their dissertation in the library after April 15 or December 1 but before the respective May or December commencement may graduate that semester upon review and approval of the Dean of Research and Graduate Studies. If this is the case, the student might have missed the deadline for having their name printed in the respective commencement program.

All dissertations must be microfilmed and an abstract published in Dissertation Abstracts. Microfilming costs must be paid by the candidates unless a signed contract for commercial publication of the entire dissertation can be produced.

An abstract of not more than 350 words shall be prepared by the candidate, one copy of which is to be bound with the dissertation, and additional copies are to be filed with the librarian and the Graduate School Office. After the dissertation binding fee is paid, three copies must be deposited at the library for binding (two for the library and one for the major program).

The Committee for Petitions of the Graduate Council

The Committee for Petitions of the Graduate Council considers petitions submitted in writing by any person who believes that he or she was treated improperly on a graduate academic matter, but only after attempts have been made to resolve the problems by discussions with relevant faculty members, the Graduate Program Advisor, the Chair of the Department, and the Dean of Research and Graduate Studies. Only academic issues involving procedures and affecting status in the graduate program are considered. The Committee makes recommendations to the Dean regarding the disposition of:

- student petitions requesting departure from established Graduate School policies,
- petitions involving charges of academic misconduct involving graduate students

(these cases may be brought by the student or by the faculty member involved),

- petitions involving a perceived academic impropriety arising from an action taken by an individual instructor, a department, or a committee charged to administer academic policies of a particular department or college.

Committee membership includes at least one graduate faculty member from each college offering graduate study. The Dean of Research and Graduate Studies designates the chair; the committee elects the vice-chair, who presides in the absence of the chair and also in cases in which the petition being considered originates in the chairís college. When a committee member is from the department where the petition originates, that member participates in the deliberations regarding the petition, but neither chairs the committee nor votes on the disposition of the petition. Three or more committee members constitute a quorum; and a majority of three committee members is needed to sustain a charge. A tie vote indicates that the charge was not proven and is therefore rejected.

The committee elects a secretary who keeps minutes of all meetings. Written records of the proceedings are preserved for three years, along with any written statements of evidence presented. A copy of the written record is available to the petitioner upon request. Costs incurred in producing the copy are the responsibility of the petitioner. The petitioner has the right to see contrary evidence submitted to the committee and to write a rebuttal.

The person bringing the petition may appear before the committee, but only at the committee's invitation, and the committee may also invite other concerned parties to attend. The petition is available to anyone against whom allegations are made so that those individuals may have the opportunity to respond.

The committee conveys its findings and recommendations in writing to the Dean of Research and Graduate Studies. The petitioner and any accused person may see the final report and may write a response to be kept with the final report.

Any appeals concerning the outcome of the petition may be addressed to the Provost of The University of Tulsa and must be submitted within one month after the petitioner or accused person has been notified of the outcome. For further details concerning jurisdiction, procedures, and confidentiality issues concerning The Committee for Petitions of the Graduate Council, call the Graduate School Office.

Special Services and Programs Available to Graduate Students

Competitive Research Grants and Awards

The Graduate School and the Office of Research and Sponsored Programs offer several programs in which students may compete for awards. The purpose of the programs is to encourage students in their research endeavors and in the presentation of their scholarly works in a professional forum. These programs aid students with their research expenses (Student Research Grant Program) and assist with expenses associ-

ated with their attending professional meetings to present their scholarly research (Chapman Graduate Scholar Presentation Award). For details, inquire at the Graduate School Office or the Office of Research and Sponsored Programs.

Annual Student Research Colloquium

The students, in conjunction with the Graduate School, organize an Annual Student Research Colloquium. This is held during the spring semester to give students additional public speaking experience and to encourage their research endeavors. The students'presentations are judged according to criteria that are commonly used for judging at scholarly professional meetings. The winners are announced and cash awards are presented at a Student Research Colloquium Awards Banquet.

Graduate Student Association

The Graduate Student Association helps organize the Annual Student Research Colloquium as well as other campus functions. The student members elect the association's president, who conducts the organization's meetings and also serves as a student member on the Graduate Council.

TU Graduate Review: TUGR

The TUGR, an electronic publication, is dedicated to providing graduate students with experience in publishing and editing and serves as a forum for scholarly essays, abstracts, fiction, and poetry. The journal also maintains a database that allows graduate students, regardless of whether or not they have published in TUGR, to publicize their accomplishments, other publications, works in progress, awards, and other achievements of note. Because the academic and professional world to which students aspire becomes more competitive every day, TUGR provides TU graduate students with an outlet for scholarly publication beyond discipline specific professional journals, and hence, the opportunity to enhance their marketability. The website address is HYPERLINK *http://www.utulsa.edu.tugr.html* or *http://www.utulsa.edu/tugr*

Life Skills Workshop Series

This series provides TU graduate students with skills outside their disciplines that will build their professional competencies and maximize their options to succeed in their careers and lives. In addition to career development skills, the series also deals with issues related to stress, juggling of career and one's personal life, ethical decisions, etc. The Graduate School recognizes the unique pressures that graduate students encounter during their academic studies. Each workshop, seminar, or panel discussion focuses on an issue that relates to the student's academic career and beyond. For details about workshop dates, topics, and locations, call the Graduate School Office.

The Center for Student Academic Support

Students with disabilities should advise the Center for Student Academic Support of their needs in order to facilitate their rights under the Americans with Disabilities Act. The center is located in Holmes Student Center, Room 59. All students are encouraged to familiarize themselves with and take advantage of services provided by the center, such as tutoring, academic counseling, and developing study skills. The cen-

ter also provides confidential consultations for any student with academic concerns as well as for students with disabilities.

Career Services

The Office of Career Services provides a comprehensive set of services to assist students and alumni in the development of career plans and specific strategies leading to the desired employment goal. This office specializes in career planning, career counseling and assessment, internships, job fairs and career days, employment and recruitment, and offers a Graduate School admission workshop. For further information contact the office at *resume@utulsa.edu* or call 918-631-2549.

Financial Assistance
Fellowships and Teaching and Research Assistantships

The university offers a number of different fellowships and assistantships to full-time graduate students. Students must apply for the teaching and research assistantships; awards are made upon the recommendation of the applicant's discipline. Awards that are competitive outside a specific degree program are initiated by student self-nomination and are determined by the administration. Stipends vary according to the amount of work required and the experience of the student. No assistantship or combination of assistantships for a given student may exceed 20 hours of duties per week. Tuition scholarship awards of up to nine credit hours remission of tuition per semester will be based on academic achievement.

Students awarded financial assistance must be enrolled in at least nine but not more than 12 hours of graduate work during a regular semester (fall and spring). The enrollment requirement during summer is at least one hour, but not more than six hours for financial assistance during the summer session. Special permission is required to deviate from these hours except for two sequential regular semesters in a master's program or four sequential regular semesters in a doctoral program when the student was enrolled in at least nine hours per semester for the prior two sequential regular semesters. Students must also maintain a 3.0 grade point average, be in good academic standing, and be on-track with their degree programs; hence, students on probation are not eligible for consideration.

The University of Tulsa maintains that a full-time graduate student receiving a graduate assistantship has a full-time commitment. Any employment in addition to the assistantship is specifically prohibited. Any violation of this policy may result in the immediate termination of the assistantship. Any request for an exception to this policy must be submitted in writing to the Graduate Program Advisor and the assistantship supervisor and must receive their approval and that of the Dean of Research and Graduate Studies. Employment beyond the 20 hours associated with assistantships may place either the student's academic performance or that individual's performance on the assistantship at risk, and may therefore jeopardize the continuation of the student in good academic standing. The Dean will consider only requests for exceptions

that are related to the employment's benefit to the student's career development or to instances of severe financial need.

Application and reference forms are available from the office of the Graduate School. Application deadline is February 1, and recipients will be announced in early April. Reapplication is not automatic. Recipients of an assistantship must reapply in order to be considered in subsequent years.

Types of Assistance

The stipends in this section are typical of stipends awarded to graduate students at The University of Tulsa, but may vary by college or department.

Discipline Assistantships. Limited to baccalaureate graduates pursuing master's degrees. Stipend: $5,175 (2000-2001 academic year) for two semesters and remission of tuition for nine hours per semester. Work load: 15 hours per week in studentís major discipline in non-teaching areas such as laboratory, research, or related work.

Teaching/Research/Administrative Office Assistantships. Open to students pursuing master's or doctoral degrees. Stipend: $6,525 for two semesters and remission of tuition for nine hours per semester for a baccalaureate graduate pursuing a master's program within the Colleges of Arts and Sciences or Business Administration; $7,200 for two semesters and remission of tuition for nine hours per semester for a baccalaureate graduate pursuing a master's program within the College of Engineering and Natural Sciences; $7,875 for two semesters and remission of tuition for nine hours per semester for a master's graduate pursuing a doctoral program within the College of Arts and Sciences; $8,550 for two semesters and remission of tuition for nine hours per semester for a master's graduate pursuing a doctoral program within the College of Engineering and Natural Sciences. Workload: Teaching two courses or the equivalent in research activities or administrative office activities for approximately 20 hours per week.

Research Assistantships. Stipend, tuition remission, and workload vary. Salary levels range from $7.00 to $20.00 per hour, depending upon experience and qualifications.

Graduate Fellowships in Publications. These include positions as editorial assistants to the editors of the *James Joyce Quarterly* and *Tulsa Studies in Women's Literature*. These positions, not typically awarded to first semester students, are available only through the English Department and are designated for English graduate students. Recipients must carry at least nine hours of course work per semester. Stipend: $8,200 to $9,000 for students with M.A. degrees, $7,000 for those working toward the M.A., and tuition scholarship for nine hours each semester.

Ben Henneke Research Fellowship. This award honors the university's first Trustees Professor of Humanities and President Emeritus, Ben Graf Henneke. The applicant must be a citizen of the United States and either be seeking full-time enrollment or be enrolled full-time in a master's degree program within the Arts and Humanities (anthropology, art, education, English language and literature, history, or psychology). For 2000-2001, the award carried a 9- or 12-month stipend of $1,000 per month and nine credits of tuition each for the fall and spring semesters, as

well as six credits of summer tuition when appropriate, a maximum award of $24,000. Application deadline is January 15; applications are available from the Graduate School Office.

Foster Brooks Parriott Graduate Scholarships. A number of these scholarships, established in memory of Foster Brooks Parriott by the Parriott family, are awarded annually on the basis of scholastic achievement and need. The award is for up to 24 credit hours of tuition for the year. Application deadline is January 15; applications are available from the Graduate School Office.

Wilfred Woobank Graduate Assistantships. The applicant must be a citizen of the United States and either be seeking full-time enrollment or be enrolled full-time in a graduate degree program within the College of Engineering and Natural Sciences. The awards may be designated for one year or may be awarded for up to three years of study for the masterís or four years for the doctoral degree. For 2000-2001, the stipends ranged from $1,100 per month for a 9-month stipend to $1,400 per month for a 12-month stipend and include 18-19 hours of tuition scholarship. There is a 10-hour per week service component to the Wilfred Woobank Assistantship, intended to foster interaction between the scholar and the department. Application deadline is January 15; applications are available from the Graduate School Office.

John S. Zink Fellowship for Students with Physical Disabilities. This endowed fellowship of The University of Tulsa is available to aid TU students with physical disabilities, and is given to students in any graduate program. Fellowship amounts are variable and awarded on the basis of need. To qualify, you must be admitted to The University of Tulsa, in good academic standing, qualify for services provided by The Center for Student Academic Support, and be registered to receive those services. Application deadline is January 15; application forms are available from the Graduate School Office.

Other Scholarships. Certain corporations, businesses, and individuals offer a variety of graduate scholarships. These may include full or partial payment of tuition, fees, or books. Recipients are often chosen only from among applicants interested in fields prescribed by the donors. Information on these awards may be obtained from the Graduate School Office or from the discipline in which the student plans to study.

Loan Funds. Inquiries regarding loans should be made to the Office of Student Financial Services. (See pages 45-46.)

Air Force ROTC the The University of Tulsa. By agreement with the United States Air Force, eligible full-time students at The University of Tulsa, including graduate students, may participate in AFROTC, be awarded scholarships of up to $7,500 per semester, and receive an officer’s commission in the Air Force upon graduation. They are commissioned through the AFROTC program at OSU-Tulsa but remain students at TU and graduate from TU.

For further information, see page 212 of this bulletin. (Note: AFROTC scholarships are not administered by The University of Tulsa.)

Libraries and Other Academic Resources

Libraries

The library homepage is at *http://www.lib.utulsa.edu*, and offices for library staff are located in McFarlin Library.

A variety of library instruction programs strengthen the information literacy skills of members of the university community, especially those of undergraduates. These programs, some of which are offered through the Writing Program, build the competence of information seekers to use materials in both traditional (print, microform, and sound recordings) and automated formats (CD-ROM, on-line searches, and access to local and remote databases). The library today can locate information from any part of the world and deliver it efficiently to users through interlibrary loan, FAX, or electronic systems.

A major component of the libraries' automated services is the INNOPAC on-line catalog which supports internal processing services (circulation, acquisitions, serials, and cataloging). This late-generation software controls a database of more than 500,000 records and is available from more than 85 terminals and personal computers in the libraries. The software can also be accessed directly from residence hall rooms and campus offices. Anyone can access the catalog via the Internet from anywhere in the world.

Library users can also access a broad array of national databases, including OCLC (which contains more than 27 million cataloging records from more than 17,000 libraries) and RLIN (the databases of the Research Libraries Group, Inc., whose 250 members together hold a large proportion of the nation's major research collections). The Internet is accessed through the campus backbone network.

McFarlin Library, the central facility of the system, is open more than 95 hours each week. Open stacks provide easy access to materials. One main service point supports access to print and a growing collection of electronic resources. An automated interlibrary loan service, bolstered by courier service between major Oklahoma libraries, is available to all of the university's students, faculty, and staff. The Federal Document Depository collection, which consists of 480,000 items issued by Congressional and judicial and executive departments, includes a complete file of U.S. census reports. The document unit also supports the growing body of information issued in electronic format by the government.

More than 110,000 rare books and 3,500 linear feet of literary and historical manuscripts are shelved in Special Collections. These growing collections, focused on American, British, and Irish literature of the late 19th and 20th centuries and on Native American history and law, have achieved an international reputation in the scholarly community. Scholars from around the world visit them annually. They support teaching and research across many academic departments and are routinely used in undergraduate instruction. Building on existing strengths, collections designed to support the study of post-1950 Commonwealth and women's literature, the cultural impact of the Vietnam War, and computer-assisted graphic design are under active development.

The Sidney Born Technical Library, an integral part of McFarlin Library, contains an outstanding energy collection, notably in petroleum. It serves the College of Engineering and Natural Sciences with more than 300,000 items pertaining to engineering and physical sciences. In addition, the Petroleum Abstracts Document Delivery Service, housed in the library, maintains an extensive collection of articles, papers, patents, and reports related to the more than 620,000 items cited in the university's weekly publication, Petroleum Abstracts Bulletin.

The Mabee Legal Information Center (MLIC) in the College of Law opened on January 17, 2000. The existing law library was completely renovated, and two new floors were constructed to produce this state-of-the-art facility. Library collection space has nearly doubled, seating capacity has been increased to accommodate over 100 percent of the student body, expanded technologies have been introduced, and additional facilities for law school programs have been added.

The MLIC holds more than 279,000 volumes, featuring a sold basic legal collection and specialized collections in energy and environmental law and Native American Law. An extensive collection of materials on microfiche includes U.S. Supreme Court Records and Briefs, Congressional Information Service publications, Native American Reference Collection, and United Nations Documents and Publications (Readex Law Library Collection and Human Rights segments). All MLIC users have access to a vast number of law related electronic resources in either web based or CD-ROM formats. (Law students, faculty, and staff also have access to LEXIS and WESTLAW.) The MLIC has an electronic classroom, 259 electronically wired carrels and tables, and computer labs.

Although its primary constituency is the law faculty and students and members of the local bar, the MLIC is also increasingly a campus-wide resource for interdisciplinary programs created jointly by the College of Law and other colleges and departments. All faculty members and students of the university have full access to the MLIC.

Computing and Information Resources (CIR)

The CIR homepage is at *http://www.cir.utulsa.edu*. Offices for Computing and Information Resources staff are located in Zink Hall and in McFarlin Library.

All students, faculty, and staff members automatically receive an access account at The University of Tulsa. This account is used for access to e-mail and university enterprise computing servers and may be required to access other resources across campus. All students living in residence halls or in University Square Apartments and all faculty and staff are able to connect to a robust university fiber optic Intranet, to the commodity Internet and to Internet2. The university maintains centralized Unix and NT-based academic and administrative servers in Zink Hall that host the enterprise e-mail server, statistical packages, a variety of development environments, database management systems, a variety of web services, tools to support instructional technology and distance education, and other academic software. Administrative information services at the university, including web-based information access, are maintained on site and licensed from Datatel, which is exclusively focused on higher education information technology.

The main student computer laboratory, used to access numerous digital instructional and research materials, is located in McFarlin Library. This lab is available on a 24-hour basis during the week and on a reduced schedule on weekends. All colleges have numerous computer laboratories and high technology classrooms to support contemporary teaching and learning strategies.

All students living on campus, faculty, and staff have telephone service, including voice mail. On the Plaza Level of McFarlin Library, the Campus Computer Store, where personnel have significant expertise in using the web to locate hardware and software from university vendors. A Cyber Café is located on the main level of McFarlin Library, where students may surf the web and read email. A help desk, located in McFarlin Library, provides assistance by answering numerous routine user questions and routes calls to other appropriate individuals for response to less routine user questions. Each semester, CIR offers hands-on training classes to students, faculty, and staff, covering a variety of topics from basic word processing to designing a web page.

The College of Law

The university's College of Law is a graduate-level college offering a curriculum leading to the juris doctor degree. The College of Law and the Graduate School offer 10 joint J.D./master's degrees. Selected graduate and undergraduate students not enrolled in joint degree programs may be permitted to take law courses, and selected law students may take courses through the Graduate School. The College of Law, which enrolls about 600 students, maintains a 279,000-volume legal information center, has two legal clinics, three law journals, and offers seven certificate programs.

The involvement of the College of Law in the life of the university is exemplified by the number of its students who have received their undergraduate education at the university, by the number of joint graduate-law degree programs it offers, and by the availability of its legal information center to other students and faculty. In addition, the College of Law offers a number of lectures, special programs, and conferences that are open to the entire university community. College of Law programs and admission requirements are detailed in the separate College of Law Bulletin.

National Energy and Environmental Law and Policy Institute

This institute, which operates within the College of Law, provides one of the nation's most innovative law programs. Its major goals are to serve as a center for long-term research into the development of energy and environmental law and policy in the United States. The Institute serves as a forum for continuing discussion of the nation's energy and environmental law and policy through symposiums and other programs featuring nationally and internationally noted experts.

Office of Research

Faculty, students, and staff at The University of Tulsa engage in a wide variety of research activities, participating in both externally-funded and university-funded research. Faculty from every discipline are active in research. The Office of Research

assists in the development of proposals, provides information on program guidelines and procedures, and helps identify sources of support. The Office of Research also administers federal grants and contracts, and funds faculty and student research grants as well as Faculty Summer Development Fellowships. Sources of external funding include private foundations, business and industry, and such national and state agencies as the National Science Foundation, Department of Energy, Environmental Protection Agency, Office of Naval Research, National Institutes of Health, U.S. Information Agency, National Aeronautics and Space Administration, Oklahoma Center for the Advancement of Science and Technology, Oklahoma Regents for Higher Education, Oklahoma Foundation for the Humanities, and Oklahoma Alliance for Public Policy Research.

Another significant federally supported program is in teacher preparation. As the recipient of one of three national awards funded by the National Science Foundation, The University of Tulsa is the lead institution working with eight other universities in the Oklahoma Teacher Education Collaborative, which addresses the concerns of teacher preparation, recruitment, pre-service training, and the early years of teaching science and mathematics.

The University of Tulsa administers the Integrated Petroleum Environmental Consortia (IPEC) with the University of Oklahoma, Oklahoma State University, and the University of Arkansas. The objective of the consortia is to study low cost technology for waste minimization and environmental remediation in exploration and production (E&P), refining, transportation, and end use of petroleum.

As a strong, viable partner in collaboration with industry, the university currently administers consortia or joint industry projects in the following: fluid flow, drilling, artificial lift, erosion/corrosion, paraffin deposition prediction, reservoir exploitation, reservoir properties, horizontal well completion, separation technology, coiled tubing mechanics, and distributed parallel processing. An exemplary model of faculty participation in statewide collaboration is through the Experimental Program to Stimulate Competitive Research (EPSCoR) awarded by the National Science Foundation to the state of Oklahoma. The University of Tulsa is involved with three centers: Oklahoma Biotechnology Network, Center for Photonic and Electronic Materials and Devices, and Instrumentation and Characterization of the Environmental Research Facility.

Anthropological research projects explore prehistoric sites in Southern Jordan. Current biological science research projects include systematic studies, endocrine regulation, intestinal immunology, and the origins of philogeny of green plants. Psychological studies are being conducted in leadership and team performance. Research in geosciences involves studies of deep subsurface environments, the ocean floors, as well as the seismic and sedimentologic characterization of subsurface sandstone reservoirs.

Research in chemical engineering includes renewal of soil ecosystems, biodegradation of gas condensate hydrocarbons, indoor air quality, and the study of liquid-liquid-vapor equilibrium systems. Research in mechanical engineering includes the study of gas lift valves, multiphase flow loop data analysis, sand probes evaluation, and fatigue resistance. Electrical engineering research includes telemedicine systems, test methods for submersible pump cable, and control of stepper motors. Projects in

mathematical and computer sciences involve data base security, and detecting and resolving interoperability problems.

The Tulsa Undergraduate Research Challenge (TURC) was founded to involve engineering and science scholars—freshmen, sophomores, and area high school students—in tackling major projects that serve the community and shatter any notion that students in their late teens and early twenties cannot conduct significant research. The program now includes students in the humanities, social sciences, and business administration as well. Under the aegis of TURC and with individual mentoring from University of Tulsa faculty members, the students not only learn how to conduct research but also gain skills required to compete for national scholarships. Since 1995, 19 TU undergraduates have received Barry M. Goldwater Scholarships.

Division of Continuing Education

The Division of Continuing Education serves as the academic outreach unit for the university, and its programs often represent each of the universityís academic colleges. Through the division, the university serves a world-wide market through non-credit public and customized in-company seminars, workshops, short courses, conferences and certificate programs each year for approximately 7,000 participants. Most of these are post-graduate level professional development programs in business, engineering, and law. Many meet the mandatory continuing education requirements of professional licensing and certification boards. Also, through the Division's Unabridged Education program, individuals in the Tulsa community may attend selected courses for personal enrichment at a greatly reduced cost.

Continuing Education also administers the university's Legal Assistant Program, a graduate level course of study, which full-time students can complete in five months. The part-time program, which is offered in the evening, requires approximately one year for completion. For additional information about these and other programs, call (918) 631-2937.

Financial Information

Tuition, Fees, Housing and Dining

Tuition and Fees

Figures in this section are for the Fall 2000 semester and are subject to change without notice at the beginning of any semester or summer term.

Application fee, paid once and nonrefundable $30.00
Tuition per semester hour (including audit courses, Fall 2000 . . . . . .$512.00
Dissertation and Thesis Fees:
  Binding per copy $6.15
  Microfilming (for doctoral candidates) $50.00
  Copyright $35.00
International Student Services fees:
  Fall semester, nonrefundable $100.00
  Spring semester, nonrefundable $100.00
  Summer term, nonrefundable $50.00
Student Association Fee-Full time $40.00
Student Association Fee-Part time . . . . . .$3.00 per hour
Student Services Fee-one time charge for first time enrollees $200.00

Special Fees

Art laboratory supply fees, nonrefundable, will vary by course 15.00-50.00
Towel fee per semester for students in HPER 3.00
Chemistry laboratory fee, nonrefundable 10.00

Hospitalization insurance, required of all international students on temporary visas. Applications for health insurance coverage must be filed with the Director of International Student Services. International students are required to participate in the University International Student Group Health Insurance Program, or provide proof of equivalent insurance coverage. Proof of insurance must be submitted to the director of International Student Services. Rates are estimated, based on 1999-2000.

	Plan 1 (U.S. Students only)	**Plan 2** (U.S. orInternational Students)
Single student - annual rate	$371.00	$408.00
Family Plan - annual rate (spouse) (includes maternity)	1233.00	1356.00
Family Plan - annual rate Children	819.00	901.00
Student, spouse, and children	2421.00	2663.00

Professional liability insurance, for students in communication disorders courses, per year 17.50
Placement fee 5.00
Parking permits, required of all students, faculty, and staff (part-time, full-time, day, and evening) who park motor vehicles on University property:
Automobiles - per year 30.00
Motorcycles and mopeds - per year 10.00
ID card replacement 5.00

Payment of Accounts

It is each University of Tulsa student's responsibility to ensure that all educational expenses are paid during the semester in which they are incurred. If financial aid does not cover all of your expenses, you may either pay the balance in full or participate in the university's Monthly Payment Plan. Please call the University of Tulsa Business Office (918-631-2600) for information regarding the monthly payment plan. A nominal fee will be assessed to establish a monthly payment plan.

Payment of current semester charges or payment arrangements must be made by 5:00 p.m. on the first day of classes. Payment arrangements may include the monthly payment plan, pending financial aid, or a combination. Payments not made when due will be subject to a finance charge of 1.5% per month.

If the account remains unpaid, the university reserves the right to suspend or withdraw students from classes; withhold grades, transcripts, and diplomas; deny future enrollments; and require that the student move from student housing.

The university accepts Visa, MasterCard, or Discover credit cards.

Refunds

If a student withdraws from courses at the university, he or she may receive reduction of tuition based upon the following schedule. The reduction shall be calculated from the date on which application for withdrawal is processed. The university shall follow federally mandated refund schedules as they apply. Non-attendance of classes does not constitute an official withdrawal or drop.

Refund Schedule-Continuing Students

First day of classes	100%
Day 2 through end of first week	90%
Second and third week	50%
Fourth through seventh week	25%
Remainder of semester	0%

*Refund schedule is subject to change.

Financial aid recipients receiving refunds will have their refunds returned to the proper aid accounts as determined by the Student Financial Services Office pursuant to Federal guidelines. The prescribed order of refund distribution is to FFEL programs, Federal Perkins Loan program, Federal Pell Grant Program, and to other Student Financial Aid Programs.

Housing and Dining Services

The university maintains the following residential facilities that are open to both graduate and undergraduate students: Lottie Jane Mabee Hall for approximately 231 women, John Mabee Hall for about 244 men, Twin Towers Residence Hall for about 366 women and men in suites, LaFortune Hall for 128 students in suites (undergoing renovation), and more than 300 nearby apartment units for upper class undergraduate students and graduate, law, married, and nontraditional students.

Each residence hall room has computer network access, phone and voice-mail, and expanded basic cable connection (these services are also available in the University Square Apartments). The halls feature designated study lounges and recreational/social areas, which include video games, exercise equipment, and television. Each residence hall provides laundry and vending areas. A reception desk is staffed in each hall to provide information and check out recreational equipment to residents.

Live-in professional residence directors and graduate assistants work with student hall governments and staff to schedule programs and activities each semester and are available for general information, counseling, and referral assistance. The Residence Hall Association (RHA) is hall government's umbrella legislative body and represents student views to the administration, develops policy recommendations, and plans educational and social programs for all residents.

Dining facilities for residential students are provided in the Twin Towers. Meal plans are required for all residents. Food service agreements are available to all students, even for those not residing in university housing.

Application/Policy Information

Students living in the residence halls, sororities, or apartments are subject to the terms and conditions of the Residence Living Handbook, Apartment Guidebook, and the Housing and Dining Services agreement. The residence hall/dining application/license extends for the entire academic year. If you sign an application/license, you must use agreed upon services for that academic year unless you either graduate during the year or the university requires you to leave for reasons described in the agreement. The same rules apply to the food service portion of agreement.

The housing agreement permits residence from the opening date of housing for the semester to 24 hours after withdrawal from the university or to the published closing date of the housing system for each semester. Residence between academic semesters and during the summer term is not covered by the basic agreement. For residence halls and apartments, a $200.00 one-time deposit must accompany each application as a reservation fee. In accordance with student recommendations, this total fee ($200.00) remains on deposit for four years or until a student leaves housing system, eliminating the need for additional housing deposits in future years. One hundred fifty dollars ($150.00) of this serves as an application fee that is not refundable under any circumstances if cancellation occurs prior to occupancy.

The housing/dining reservation fee is refundable in whole or in part to the applicant if there are no damages or cleaning assessments necessary when the student

leaves the system. The apartment deposit is forfeited entirely if the applicant cancels the agreement prior to actual occupancy.

Refunds are not available on housing or food service application/licenses. In extreme cases you may apply to the Housing and Dining Services Office for an exception to the no-refund policy.

All appeals must be submitted in writing with appropriate documentation. The university may suspend participation in dining programs or remove students from housing for failure to pay charges when due or if disciplinary problems arise.

Food service agreements provide a variety of options, as described below and tremendous flexibility for student schedules. The dining service agreement provides food from the published beginning date of the dining program (usually just before the beginning of undergraduate classes) to the last day of exams for the semester. The agreement does not include meals during the summer term, holidays, or vacation periods.

Applications and additional information on housing and dining services may be obtained from the Office of Housing and Dining Services in Twin Towers Hall, (918) 631-2514. Following is the recommended cost schedule for the residence halls and dining for the 2000-01 academic year.

2000-01 Housing Costs

(Prices are subject to change without notice. The first column in each case refers to the semester cost, and the second to the cost for the academic year.)

Twin Towers rates per person. Each student will be assessed a $15 per semester non-refundable Residence Hall Association fee.

Double Room	$1,350.00	$2,700.00
Single Room	$1,750.00	$3,500.00
Double Room as Single (space permitting)	$2,120.00	$4,240.00

John Mabee and Lottie Jane Mabee Hall rates per person.* Each student will be assessed a $15 per semester non-refundable Residence Hall Association fee.

*Residents of suites occupied doubly will be charged the single room rate per person. Residents occupying a suite privately will be charged $2,225 per semester.

Double Room	$1,355.00	$2,710.00
Single Room	$1,755.00	$3,510.00
Double Room as Single (space permitting)	$2,175.00	$4,350.00

LaFortune Hall rates per person. Each student will be assessed a $15.00 per semester, non- refundable Residence Hall Association fee.

Double Room	1,255.00	2,510.00
Single Room	1,475.00	2,950.00
Double Room as Single (space permitting)	1,645.00	3,290.00

Apartment Housing. Apartments are available for upper class undergraduate students and a limited number of returning graduate, law, married, and nontraditional students. Apartment offerings for 2000-01 include 150 recently constructed, all electric, market quality one- and two-bedroom units (University Square). Other units feature ceiling fans, high security steel doors, and dead bolt locks in most locations. Utility arrangements vary, with water, sewer, and trash collection included in the rent. Rates vary by complex, depending upon amenities. (Rent payments are due the first of each semester and are payable at the Business Office in McClure Hall. The approximate lease period is August 16, 2000–May 4, 2001. Annual arrangements are available. Charges are for the entire application/license period selected and are assessed by semester. Prices are subject to change without notice.)

University Square Apartment Costs. Rental prices range from one-bedrooms at $2553.00 to two-bedroom at $3392.00 a semester. For non-family members rent charges increase if the number of occupants exceeds the number of bedrooms. Students are responsible for electric utility costs through Public Service Company. Telephone service is arranged through the university and included in the semester rental rate.

2000-01 Costs for Other Apartments. On E. 10th Street, between Delaware and Skelly Stadium; between 5th Place and South Gary Place and Harvard;

	Semester
Efficiencies (all locations)	1280.00
1 Bedroom	1827.00
2 Bedroom	2216.00
1 Bedroom (bills paid)	1974.00

Tenants are responsible for the electrical utility service in all units except those at 1011 S. College and 1015 S. College, where all utilities are furnished. Telephone service through Southwestern Bell is the responsibility of the resident. Expanded basic television cable service is also included in the rent. Premium services are available through Cox Cable.

All university apartment residents (junior class level and above) agree to contract for a debit card program, dedicated to dining only, in the amount of $100 per semester.

Dining Options*

Transferability allows students to dine in the Allen Chapman Activity Center, as well as the Twin Towers Dining Hall.

	Semester	Academic Year
19 Meals per week (includes transferability)	$1,360.00	$2,720.00
15 Meals per week (includes transferability)	$1,300.00	$2,600.00
10 Meals per week (includes transferability)	$1,250.00	$2,500.00
19 Meals per week (without transferability)	$1,125.00	$2,250.00
15 Meals per week (without transferability)	$1,075.00	$2,150.00
10 Meals per week (without transferability)	$990.00	$1,980.00
Combination (10 meals without+$300 dining points/semester)	$1,290.00	$2,580.00

Recommended Plan: 19 meals per week, without transferability, plus $500.00 per semester on the Hurricane Gold ID Account. (“Hurricane Gold” dollars can be used for meals or snacks outside of regular meal hours, books, vending machines, copiers, laundry machines, late night snacks, etc.)

*Meal plans are required for all residence hall students.

“Hurricane Gold” Account Dining and Extra Convenience. All students may wish to consider using the declining balance debit card feature (Hurricane Gold Account) of the campus identification/service one card to complement dining arrangements and for convenience and safety in transacting other campus business. Placing money on deposit with the university activates the account. Each time the card is used (in the bookstore, at snack or dining locations, in vending or laundry machines, copiers, etc.) the sale is deducted. Any remaining balance is refundable at year-end or withdrawal from the university. Commuter students are welcome in all student-dining areas on a cash or debit card basis. Faculty and staff may also deposit funds to their Hurricane Gold accounts to be used in any campus dining facility or wherever Hurricane Gold is accepted. Hurricane Gold is not limited to traditional meal plan “transferability” hours and can be used any time a facility is open.

Hurricane Gold is easy to buy. Simply prepay $25 or more on your account at the ID/Parking Center, located in Twin Towers Hall, the Dining Services Office, located in the administrative offices on the second floor of Allen Chapman Activity Center, or the Business Office in McClure Hall. Smaller dollar increments can be added to your account through the (DART) automated terminal in McFarlin Library, John Rogers, and Allen Chapman Activity Center. Purchases will be deducted from this amount as they are made upon the presentation of your ID card. When you reach your Gold limit, purchase more. (See Identification Cards and Hurricane Gold account policies, page 51, for additional information on related policies.)

Catering. Dining Services handles all on-campus catering for faculty, staff, students, and guests and can provide a wide variety of menus and ideas for receptions, meals, or special organizational functions. Call the office well in advance to assure the greatest possible flexibility in meeting the program requirements.

Summer Term Housing and Dining

Housing locations and rates for summer term sessions will be determined and published during the spring semester. Payment in full is due prior to check-in, and charges are calculated until an individual officially checks out and turns in appropriate keys. Specific meal plans are not offered during the summer due to student class and work schedule demands. Students are encouraged to open Hurricane Gold accounts to use at their convenience in facilities operating during the summer months.

Student Financial Services

General Information

To make high quality private higher education accessible to all qualified students, The University of Tulsa offers financial assistance in the form of scholarships, grants, loans, and part-time employment.

Financial Need Determination

The Office of Student Financial Services uses the need analysis from the Free Application For Federal Student Aid (FAFSA) to determine financial need. Students must submit the FAFSA directly to the processor. All information contained in these credentials is held in strict confidence. Also, financial records are protected in accordance with the Family Education Rights and Privacy Act of 1974, as amended. Financial need represents the difference between the cost of attending the university and the amount that the student and the student's family are expected to contribute toward the educational costs. The Student Financial Services Office carefully considers the size of the family and its income, resources, and obligations in making an assessment of the family's contribution.

The factors considered in determining the types and amounts of aid received by an applicant are: (1) the availability of funds; (2) the student's analyzed financial need; and (3) the student's classification and record of academic performance. Applicants desiring first consideration should submit their applications as soon after January 1 as possible to assure timely consideration.

Financial Aid Packaging

Packages of aid may consist of a combination of scholarship, grant, loan, and employment. This aid packaging concept enables the University to make more funds available to a larger number of applicants. The FAFSA form along with the University of Tulsa Financial Aid Application are required for consideration for scholarship, grant, loan, and part-time employment opportunities. Recipients of aid must reapply each year to be considered for continuation in the following year. Timely submission of the FAFSA and all information requested is required to receive the largest award possible. Scholarship recipients will receive renewals based on the criteria of the particular award.

The University of Tulsa reserves the right to reduce or rescind award packages if federal allocations to the university are insufficient to cover expenditures.

Academic Requirements

All students who receive financial assistance must demonstrate the ability to do satisfactory college work. High academic performance is usually required for scholarship consideration.

There are minimum academic course-load requirements for the various types of financial assistance available through the Office of Student Financial Services. To be

considered for financial aid, a graduate student must be enrolled at least half-time (5 credit hours) for each fall and spring semester during the degree program. The only exception is the last fall and spring semester prior to completion of a master's degree or during the last four semesters (last two fall and last two spring semesters) before completion of a doctoral degree. A graduate student must be enrolled in a minimum of 3 credit hours for the summer to be considered eligible for financial aid. Enrollment in audit classes does not count toward eligibility for financial assistance.

Students receiving financial aid who reduce their course loads below the required minimums after enrollment must inform the Office of Student Financial Services, which may cancel awards at any time if students fail to maintain satisfactory academic progress or minimum course-load requirements.

Transient students and those who attend summer term only are ineligible for financial aid. All aid recipients must be admitted as regular students pursuing a degree program.

Eligibility for continued financial assistance depends upon maintaining satisfactory academic progress and good standing. Students who do not meet satisfactory progress and good-standing criteria are not eligible for financial assistance for the next academic period. If extenuating circumstances interfere or prevent students from meeting these requirements, they should consult the Office of Student Financial Services immediately.

Satisfactory Progress Requirements

Satisfactory academic progress is defined as the reasonable progression toward the successful completion of degree requirements. It involves the annual review, during the summer, of the number of hours successfully completed in a program and the cumulative grade point average earned by a financial aid recipient while attending The University of Tulsa. In accordance with federal regulation, the four components of The University of Tulsa policy are described below.

I. Satisfactory Completion of Semester Hours. Transcripts are reviewed once yearly. Each student is required to pass a minimum of 75% of their credit hours enrolled during the preceding fall and spring semesters at the university (rounded to the next higher number). The number of hours required is based on the number of hours for which a student initially received financial assistance at the beginning of each fall and spring semester (prior to the refund period). Drops and withdrawals from classes will count toward the accumulated deficient hours for a student.

II. Grade Point Average Requirement. Each student must meet a cumulative grade point average standard to remain eligible for assistance.

	Cumulative GPA\ Required
Graduate	3.00
Law	2.00

III. Deficient Hours Accumulated. To complete a degree plan in the specified number of hours allowed, a student cannot accumulate a significant number of Is (incomplete), Fs (failing grade), Ws (withdrawal) or WFs (withdrawal failing). Therefore, each student is allowed a maximum number of deficiencies in pursuit of a specific degree:

	Maximum Numberof Deficient Hours
Graduate	15
Law	30

IV. Maximum Number of Hours Allowed to Complete a Degree. Each student enrolled in a degree program is eligible for financial assistance for a maximum number of hours specific to the completion of the degree.

		Maximum Hours Allowed to Complete
Graduate	(Master's)	40
	(Ph.D.)	80
Law		120

Students not meeting the hour and GPA requirements (components I and II) are automatically placed on a one-semester financial aid probation. Students may be placed on financial aid probation only once during their academic career at TU. A student who is denied assistance based on the satisfactory academic progress policy may submit a written appeal to the Office of Student Financial Services. The appeal should address mitigating or extenuating circumstances that have affected the student's academic performance (e.g., severe physical injury or mental trauma). The appeal and any supporting documentation must be received by the Office of Student Financial Services within two weeks of the date of the suspension notification letter. Action taken on a financial aid appeal is final. Written notification is sent to the student within two weeks of the receipt of the appeal by the Office of Student Financial Services. Students whose appeals are approved will receive a one-time waiver of the requirements, placed on financial aid probation and given the ensuing semester to make up deficiencies and meet the necessary satisfactory academic progress requirements.

Special Circumstances

Summer Course Work. Summer credits earned either at TU or transferable from another institution into the student's program may be used to meet the credit hours earned requirement. Grades do not transfer.

Transfer Students. Students transferring into TU will have all credits accepted into their program used to position them in the satisfactory academic progress components. Grades do not transfer.

Other Information

Financial Aid Disbursements. Financial aid is disbursed through the university's Business Office at the beginning of each semester. An information bulletin is sent

with each award notice indicating the exact disbursement procedure for each aid program.

Employment Projections. Information regarding employment projections can be reviewed through the Office of Career and Personal Development. Various local employment information and beginning salary levels for University of Tulsa graduates are also available at the Office of Career and Personal Development.

Campus Security Report. Information regarding campus security policies and campus crime statistics is available through the Campus Security Office.

Completion and Graduation Rates. Information concerning the completion and graduation rates is available through the undergraduate Office of Admissions. Also available is the completion rate for athletic students.

Study Abroad. Financial aid is available for Study Abroad programs. Please contact the Office of Student Financial Services for more information.

Drug and Alcohol Abuse Prevention. Information concerning prevention of drug and alcohol abuse is available through the office of the Dean of Students.

Refund Policy. The refund and repayment policy for students receiving Title IV federal funds is listed in this catalog as well as being available from the Office of Student Financial Services. Sample refund/repayment examples are available for review through the office also.

Verification. Students selected for verification by the federal government of their information on the FAFSA must complete a verification worksheet along with submitting the required federal tax returns and W-2 forms. Additional documentation may also be required. To complete verification all tax returns and forms required on the incomplete notice letter must be received and be complete. A valid EFC (FAFSA processed and accepted) must be received within this time limit.

Students eligible for campus-based programs and Federal Stafford loans must complete verification prior to the last day of enrollment. In addition, a valid EFC must be received by TU before the last day of enrollment. Federal Stafford loan applications must be certified by the Office of Student Financial Services before the last day of enrollment each academic period to receive loan funds.

TU does not disburse awards for students who are selected for verification until the process is complete. If you have questions concerning verification and the required documents, contact the Office of Student Financial Services

Failing to complete verification by the deadlines will result in loss of any eligibility for Federal Aid funds.

Application Procedure

Students must be admitted to the university before final consideration for financial aid is possible. However, applications for admission and financial aid may be submitted and processed simultaneously. Students applying for financial assistance through the Office of Student Financial Services are required to submit:

- The Free Application For Federal Student Aid (FAFSA) or the Renewal Free Application for Federal Student Aid if a continuing student.
- The TU Financial Aid Application.
- An Affidavit of Independence for students age 24 and under requesting consideration as a student financially independent of their parents.

Students may obtain the FAFSAfrom the TU Office of Student Financial Services, or their local college financial aid office.

For Best Consideration

Applications are available in December for the following academic year. The FAFSA should be completed by the first week in February and mailed to the processor. The FAFSA is used as the university's application for consideration of most sources of financial assistance. It is designed to be your financial aid application for the OTAG program, Federal Perkins Loan, Federal Work-Study program, and documentation of eligibility for any federal loan program. Detailed instructions are included with the FAFSA. Once your FAFSA is processed, you will be sent a Student Aid Report.

You must apply annually for financial assistance. Each year the university sets a priority date for timely submission of all forms to receive full consideration for all assistance available. The priority date for continuing students is June 1. New students to the university have a priority date of April 1.

After you initially apply using the FAFSA, the next year you will be sent a Renewal Free Application For Federal Student Aid if you meet certain conditions. The Renewal FAFSAwill be mailed in December to the address listed on your previous FAFSA. It will allow you to answer fewer questions if information that you reported the previous year is still correct. Either the FAFSA or the Renewal FAFSA can be used to apply for financial assistance.

Grants

Oklahoma Tuition Aid Grant (OTAG)

Awards. Size of award determined by the Oklahoma State Regents for Higher Education. Range is from $50 to $1,000 per year.

Eligibility. Determined on the basis of need analysis by the Oklahoma State Regents. Student must be a legal resident of Oklahoma according to the State Regents' policy. Apply by March 1 for best consideration.

Application procedure. Complete the FAFSA and give the U.S. Department of Education permission to send the information from the FAFSA to the state agency.

Loans

Federal Perkins Loan

Awards. Made on a limited basis to graduate students of up to $6,000 per year. (Priority is given to undergraduate applicants.)

Eligibility. Determined on the basis of need analysis by the Office of Student Financial Services.

Application procedure. Complete the FAFSA and provide your drivers license number (if any).

Other information. The interest rate is 5 percent simple interest, beginning nine months after the student ceases to be at least a half-time student. There is no interest

while the student is enrolled at least half time. Repayment begins nine months after the student ceases to be enrolled at least half-time and the minimum monthly payment is $40. The loan must be repaid within 10 years from the date payments begin.

Federal Family Education Loan Programs

Federal Stafford Loan

Subsidized and Unsubsidized

Awards. Loan amounts may not exceed reasonable college costs, less other scholarship, loan, and gift assistance. Expected family contribution is also used in determining eligibility for the subsidized Stafford Loan. A processing fee will be deducted from the loan proceeds.

Eligibility. Subsidized Stafford is determined on the basis of need analysis by the Office of Student Financial Services.

Application procedure. Complete the FAFSA. Return the Loan Request Form included with your TU Award Notification. A loan application will be mailed to you for references and for your signature on the Master Promissory Note and should be forwarded to the lender selected. Once a Master Promissory Note is signed, subsequent loan applications will not be necessary. The loan request form will still be needed to indicated the loan amount the student is requesting.

Other information:

- The federal government pays the interest on a subsidized Stafford loan while you are in school or in deferment. Borrowers are responsible for the interest during in school and deferment periods on an unsubsidized Stafford loan. The lender may allow the interest to accumulate until the deferment ends, but the interest will be added to the principal.
- The current interest rate is variable and capped at 8.25%. Borrowers with outstanding 7%, 8%, 8/10%, 9% and variable capped at 9% loans will borrow any new loans at the current rate.
- Repayment for 7% borrowers begins nine months after the student ceases to be at least a half-time student.
- Repayment for all other interest rates begins six months after ceasing to be enrolled in the required course load. Minimum payments are typically $50 per month.
- The entire loan must be repaid within 10 years after repayment begins. If the borrower’s first Stafford loan was disbursed on or after July 1, 1993, the borrower has the option of repaying the loan using a standard, graduated or income-sensitive repayment plan.

Employment

Federal Work-Study Program (FWS)

Awards. Size is determined by need analysis. Range is normally from $700 to $2,300 per year.

Eligibility. Determined on the basis of need analysis done by the Office of Student Financial Services.

Application procedure. Complete the FAFSA.

Other information:

Students are employed in academic or administrative offices on campus. Additional off-campus positions are available in community service agencies. Each year the off-campus agencies contract with the university to hire FWS students. The listing of agencies is available in the Office of Student Financial Services. Additionally, the Office of Student Financial Services maintains the available positions on the World Wide Web at *http://www.utulsa.edu/Financial/Employment.*

Part-time Work for Students Not Receiving Aid

The Office of Housing and the Office of Dining Services often have part-time work available to students not on the Federal Work-Study Program. Apply at Housing & Dining Services. Other departments such as the libraries, KWGS radio station and Allen Chapman Activity Center may have work available to students. Check the listings for Institutional Positions on the World Wide Web at:

http://www.utulsa.edu/Financial/Employment.

Information regarding federal financial aid programs is accurate at the time of publication, but subject to congressional change without notice. All federal aid programs require U.S. citizenship or permanent resident status. Scholarship policies are reviewed annually and are subject to change from year to year.

Assistantships, Fellowships, and Scholarships

Assistantships and Fellowships

Graduate financial assistance awards are made upon the recommendation of the applicant's discipline. Stipends vary according to the amount of work required and the experience of the student. Accompanying tuition scholarships of up to nine graduate credit hours per semester are based on academic achievement. See pages 26–28 of this bulletin for information on these awards. It is important to notify the Student Financial Services office when you receive an assistantship or fellowship. This could affect the amount of Federal aid a student is eligible to receive.

Scholarships

The Office of Student Financial Services, the individual programs offering graduate work, and the Graduate School have information on a limited number of scholarships for which graduate students may be eligible. Upon receipt of any scholarship funding, please contact the Student Financial Services Office to inquire about the affect of the scholarship on the Federal aid package.

Student, Academic, and Support Services

All students are encouraged to make full use of the academic resources of the university and to seek advice on specific academic issues in areas of particular interest to them.

Center for Student Academic Support. The center serves as an initial reference point for students who need academic assistance, tutoring, and other kinds of help. Faculty members are encouraged to send students with such problems directly to the center, where their situations are evaluated and appropriate assistance is given. Center personnel are trained to detect and deal with problems that place students at risk. They also coordinate campus tutoring efforts and act as a liaison with other student services, both academic and personal, on students'behalf. The center is the central location for students with disabilities who are seeking appropriate accommodations.

Speech, Language, and Hearing Testing and Therapy. The university's programs in Communication Disorders provide formal speech, language, and hearing testing and therapy services for all persons. There is a fee for these services. A free screening clinic is available on Fridays, by appointment, to determine if a significant communication problem exists. Although these screenings do not include detailed diagnostic or therapy services, they do include appropriate counseling, recommendations, and referrals.

Advising for Careers and Personal Development

Career Services. Located in the Holmes Student Center, this office provides services for all students and alumni of the university. A major goal is to help all students gain the information and skills needed to select a career and conduct a job search that will lead to desirable employment. The office assists each individual in developing a career plan and specific strategies that will lead to his or her employment goal.

Providing access to information through its active website, Career Services maintains information on internships and other pre-professional work experiences; hosts career fairs that provide information on potential employers; maintains job vacancy information from a variety of sources; arranges campus interviews with prospective employers; and maintains credential files. Students are encouraged to meet with staff members and begin the career planning process as soon as they arrive on campus.

Counseling and Psychological Services. Helping students cope optimally with tensions that arise amid the changes and transitions of university life is the special concern of the Counseling and Psychological Services Center, located in the Alexander Health Center. The center also helps faculty and staff function more effectively in their roles. Services for students, faculty, and staff include psychological counseling, assessment, psychoeducational programs, and consultation. Confidentiality is protected by psychologist-client privilege. Appointments may be made in person or by telephone (631-2200) Monday through Friday between the hours of 8:00 a.m.-5:00

p.m. (8:00 a.m.-9:00 p.m. on Tuesdays). Provisions are also made for anyone requesting counseling immediately.

Office of Student Affairs. Throughout the year, Student Affairs provides programs that enhance academic endeavors, counsels individual students regarding their problems, offers guidance and direction to student organizations, and provides a variety of extracurricular and co-curricular activities that broaden the student's educational experiences. Specific programs, services, and activities include Interfraternity Council, Panhellenic Council, Student Association, Student Activities, Leadership Education, and Multicultural Student Programs. This office also handles student disciplinary matters, investigates complaints of sexual harassment or sexual assault, administers the alcohol policy, houses the ombudspersons, coordinates parents'weekend, coordinates commencement activities, and educates the campus community on student policies and procedures.

Multicultural Student Programs. This office provides individual counseling and support for African, Asian, Hispanic, and Native American students; advises student organizations related to these cultural groups; encourages involvement of students in these groups in all aspects of university life; and provides cross-cultural activities to promote understanding among students of all racial and ethnic groups. Multicultural Student Programs include academic study groups, peer mentoring, and a wide variety of celebrations, seminars, and activities that focus on African, Asian, Hispanic, and Native American cultures.

International Student Services. The needs of students who are citizens of other countries are the concern of International Student Services located in Westby Hall. The office coordinates undergraduate admission, issues government and immigration documents, counsels students on academic and personal matters, and offers various programming activities throughout the year. The office also assists international members of the faculty. All University of Tulsa students and faculty who are not U.S. citizens are required to register with this office.

All international graduate students must register with this office upon first arriving on campus. For the fall and spring semesters, international students must obtain a Proof of Health Insurance form from the International Student Services Office confirming their insurance coverage. This form must be presented in the Graduate School before enrollment can be completed. Failure to meet routinely with the International Student Services office may adversely affect visa status.

English Institute for International Students. The English Institute offers an intensive course in writing, speaking, and understanding the English language for international students and community residents. The institute's primary objective is to provide international students with a sufficient command of English to function on a level comparable to that of their U.S. classmates.

Some international students who do not present a satisfactory TOEFL (Test of English as a Foreign Language) score for admission to Graduate School, may be referred to the English Institute for International Students (EIIS) for course work in English. Upon completing the recommended courses and receiving a satisfactory

score on their level testing, the applicant may request reevaluation for admission to a graduate program. In the case of borderline students, admitted conditionally for an improved TOEFL score, successful completion course work at EIIS and a satisfactory score on level testing, may satisfy the TOEFL requirement.

Residence Directors. In the residence halls, professionally trained residence directors work with student hall governments and staff to schedule programs and activities each semester and are also available for counseling and referral assistance.

Student Services

Health Services. The Alexander Student Health Center provides care and treatment of minor illnesses and minor emergencies. The center is open Monday through Friday, 8:00 a.m.-5:00 p.m., and is staffed by registered nurses. A physician is available for three to four hours daily, Monday through Friday. A women's clinic, staffed by a licensed physician assistant, is available one afternoon a week. Students wishing to see the physician or physician assistant need to make an appointment. During vacation periods and summer school, clinic hours vary.

All currently enrolled students are entitled to use the Student Health Center. To receive services, the student must complete a health history, which is kept on file, and present a valid student I.D. All medical records are kept confidential. Most services are charged to the student's account and include such items as prescription and some non-prescription medications dispensed at the center, and laboratory procedures. Fees for which the student is directly responsible include referrals to physicians, hospital costs, prescription medications not dispensed at the center, and x-rays or other diagnostic testing.

Counseling and Psychological Services are also available at the Alexander Student Health Center.

Student Health and Renter's Insurance. A health insurance program is available to students. Participation is voluntary. The university has granted an insurance carrier the privilege of advertising its program among students via brochures. Students not receiving this brochure by mail may secure it from Alexander Health Center or International Student Services.

Participants should study the policy carefully. Because it is designed specifically for college students, some of the coverage and benefits may not be similar to those offered under regular family insurance programs. Although participation in the plan offered through the university is voluntary, health insurance is required of all international students, who must either present written evidence of their own coverage or enroll in the program described above.

Renter's insurance is recommended for all students living in on-campus or other away-from-home accommodations. In many cases, parents'homeowner policies will cover expenses related to dependents' expenses in external locations. However, it is always wise to conduct an insurance review to assure that one has the appropriate amount of coverage.

Services for People with Disabilities. Information concerning special services and

facilities for students and student employees with disabilities in need of accommodation may be obtained by students from the Center for Student Academic Support, Holmes Student Center. Students can also receive a copy of the 504/ADA Policy for Students with Disabilities by calling 918-631-2334.

Identification Cards and "Hurricane Gold" Account Policies. The ID/Parking Center in Twin Towers issues identification cards to all students and university employees. The cards are required for admission to and checking books out of the libraries, entry to residence halls, labs, and selected classrooms, and for identification at campus business offices and campus activities. Whenever students are on university property or at university events, they must carry their TU Student Identification Cards and be prepared to present them to university officials to verify their identity. For many reasons, ID cards should not be lent to anyone at any time. Disciplinary action will be taken against a student fraudulently using another's card and against the owner who permits fraudulent use of his or her card.

The debit account feature of the Hurricane Gold student ID card allows students to use their cards for purchases at all dining locations, at the bookstore, in vending and laundry machines, and in copiers. More applications for the use of Hurricane Gold are being added each semester. This debit feature reduces the need to carry or keep cash on hand. Hurricane Gold can be purchased by simply prepaying an amount ($25 or more) on your account at the ID/Parking Center in Twin Towers Hall; in the Dining Services Office in the administrative offices of the Allen Chapman Activity Center; or in the Business Office in McClure Hall. Smaller dollar increments can be added to your account through the (DART) automated terminal in McFarlin Library, John Rogers, and Allen Chapman Activity Center.

Purchases will be deducted from your account each time you present your ID card. When you reach your Gold limit, you may purchase more. Hurricane Gold is not a credit card or a checking account but a non-interest-bearing convenience account. Banking regulations and university policy prohibit cash withdrawal during the academic year, but remaining balances are fully refundable at the end of the spring semester. Any request for withdrawal of funds must be presented in writing.

If you lose your ID card, especially when there is money in your Hurricane Gold account, notify the ID/Parking Center immediately. You will be responsible for all transactions made by you or by anyone else who uses your card, even if lost. However, to minimize loss, a $20 per day spending limit has been established via the computer for all vending locations. The ID/Parking Center can instantly change the account number to protect the account from excessive unauthorized use and will also issue you a replacement ID card, for which there is a charge.

Loss of an ID after normal business hours can be reported to any Hurricane Gold location with a cash registeróe.g., the Hut or Twin Towers Cafeteria-which can "lock-out" use of your missing card. Then, when the ID/Parking Center reopens, the account number can be changed and the account reactivated. If this is not convenient, leave a message on the voice mail (Audix) at the ID/Parking Center. Invalidation of the card will occur on the morning of the next business day. The University of Tulsa is not responsible for cash balances of lost cards. The charge for replacement cards is $10.

If you have money in your Hurricane Gold account at the end of the academic term, it will be carried over into the upcoming academic term's balance. Or, if you prefer, you may request a refund of any balance remaining in your account at the end of the academic year.

Activity Card. The TU ID card is used for admission to all athletic events and Student Association-sponsored programs. All enrolled undergraduate and graduate students (except faculty and staff) are entitled to one free admission and one-half price admission to each athletic event. With a TU ID, specific athletic tickets may be picked up at the TU Ticket Office, Business Office in McClure Hall (except for the first football game in the fall), or the administrative office of the Allen Chapman Activity Center. Faculty and staff may use their ID cards to purchase up to four half-price tickets for each athletic event.

Parking Permits. All students, staff, and faculty members must register motor vehicles that are to be parked on university parking lots. Parking permits and copies of parking regulations should be obtained from the ID/Parking Center in Twin Towers Hall. Parking permits are required for residents of university apartments, who can obtain them from the ID/Parking Center after obtaining an authorization form from the Apartment/Property Manager's Office in the University Square Apartments.

Special Opportunities and Facilities

The Fine and Performing Arts

Students who wish to act, to make music, to create and exhibit art work, to write and publish fiction, poetry, and plays, have many opportunities to do so, regardless of whether or not they major in one of the arts. Through the Tulsa Curriculum as well as through other campus activities and programs described below, students are given the opportunity to experience the arts as creators, performers, and observers.

The Division of Fine and Performing Arts comprises the School of Art, the School of Music, and the Department of Theatre. Each unit offers degree programs that lead to professional careers in the arts and to the appreciation and understanding of the fine and performing arts. Internships and apprentice programs are available with arts organizations in the Tulsa community. Within the division, students have the opportunity to engage in interdepartmental and interdisciplinary studies through degree programs such as film studies and arts management. Students are encouraged to discuss these options with their advisors and to take part in the rich variety of arts activities on campus.

Visual Arts. The multi-purpose Alexandre Hogue Gallery, housed in Phillips Hall and run by the School of Art, serves as the chief focal point for the university's engagement with the visual arts. Used year-round for the exhibition of arts, crafts, performance art, and special events, the gallery also offers exhibitions of historical, global, and multicultural significance. It is also the site of the annual Gussman Student Art Exhibition, the National Scholastic Art Awards Competition and numerous shows by prominent artists, and can be comfortably used for poetry readings and chamber music performances.

The gallery program is combined with the School of Art's Visiting Artists Program, which brings to campus both established and emerging artists to talk about their work, give workshops, and work with students in the studios. Visiting critics and art historians add a scholarly dimension to this program. The Alexandre Hogue Gallery is open every day except Saturday and Sunday without charge.

Literary Arts. The university offers creative writing instruction through the Department of English and occasional opportunities for all students to publish their work in a student-edited journal or literary supplement. The university also publishes *Nimrod: International Journal*, described on page 56, which publishes writers from all over the world but is also open to competitive submissions from graduate and undergraduate students. Writer-in-residence A.G. Mojtabai and Russian poet Yevgeny Yevtushenko teach and encourage new students of fiction, nonfiction, and poetry. They also offer expertise in the legal complexities of publishing, film rights, and media coverage. Mojtabai, whose most recent works are the novel *Called Out* and *Soon:Tales from Hospice*, a collection of short stories, has been preceded as writer-in-residence by such distinguished novelists as Paul Scott and David Plante. Also, the J.

Donald Feagin Distinguished Visiting Artist program annually brings to the campus guest artists in the humanities, including in Spring 2000 five poets for a course in "Living Poets," including David Lehman and Colleen McElroy.

The University of Tulsa Theatre. Each season, the University of Tulsa Theatre presents several plays from the classical, modern, and contemporary repertoire, including productions of the musical theatre program described below. The theatre is consistently chosen to represent the state of Oklahoma in regional American College Theatre Festival competitions. Recent productions have included Euripides' *Hecuba*, *Les Liaisons Dangereuses*, *Much Ado about Nothing*, *Arcadia*, and *Dancing at Lughnasa*. Visiting artists have included such notables as Edward Albee, Hal Prince, Jose Quintero, Anthony Zerbe, and Carole Shelley, as well as numerous guest designers and acting teachers.

Auditions, open to all university students, are announced in the student newspaper and on the bulletin boards in the Allen Chapman Activity Center. There are also opportunities in costumes, scenery, lighting, and special effects. Call or visit the theatre office in Kendall Hall for more information.

Musical Theatre. A major collaborative undertaking of the School of Music and the Department of Theatre, the Musical Theatre program offers an active production season that includes staging of musicals such as *Guys and Dolls*, *Falsettos*, *Chicago*, *Hair*, and *Into the Woods*, operas such as *Die Fledermaus*, and operettas such as *The Vagabond King*. Productions are sometimes given both on and off campus. Roles are filled by audition, and qualified students are invited to participate as performers or stage technicians. For more information, call or visit the theatre office in Kendall Hall.

Vocal Ensembles. The *TU Chorale* is open to qualified students in the university by audition. Auditions are held at the beginning of the fall semester, and students are expected to participate for the full academic year. Presenting music from both the classical and popular traditions, the chorale tours for recruitment purposes and performs both on campus and for various civic/cultural organizations. For further information, inquire at the School of Music Choral Office.

The *University Chorus* is open to all members of the university community with limited prerequisites and a vocal hearing. The largest of the university's vocal groups, the chorus performs large orchestral/choral works with the Tulsa Philharmonic Orchestra and other instrumental ensembles at least twice each year. Students may receive one credit hour for membership. Inquire about joining at the School of Music Choral Office.

InTUition is a vocal ensemble made up of eight to twelve singers. Its repertoire features music in many different styles, including blues, standards, Latin, contemporary jazz, and some classical. The group performs actively during the year. InTUition is open by audition to all interested students at the university. One credit hour may be earned each semester. For further information, inquire at the School of Music Choral Office.

Orchestra. The Symphony Orchestra is open to all students by audition and required of all string majors. It presents several concerts each year on campus and throughout the community.

Bands. The *TU Wind Ensemble*, made up of the most outstanding wind and percussion students on campus, performs music written for ensembles of 10 to 45 players. Flexible instrumentation and player rotation provide members with a variety of solo and ensemble experiences.

The *Symphonic Band*, numbering approximately 50 musicians from all colleges of the university, presents on-campus concerts each year and draws its repertoire from both contemporary and traditional band literature.

The *Sound of the Golden Hurricane* marching band is a 130-piece drum corps style marching band that mirrors the Madison Scouts, with a large percussion line on the field and a large "percussion pit" on the sideline. The band performs at halftime during football games.

The *TU Sports Bands*—two bands of 30-40 members each-alternate with each other in providing entertaining music at all home basketball games, and also travel with the team to tournaments, including the annual WAC Tournament in Las Vegas.

Jazz Ensembles. The *Big Band* focuses on big band styles, reading skills, composition, interpretation, and performance. All practical doublings are stressed, particularly in woodwinds. The band performs music by traditional and contemporary composers and arrangers and encourages original writing by band members. The goal is to build a style indigenous to this band and its members.

The *Club Date Combo* exposes instrumentalists and vocalists to popular tunes and the ways they are traditionally played in a club date context. Students are encouraged to learn and interpret standards, ballads, and contemporary jazz tunes.

The *Writers'Combo* performs original jazz compositions, exploring as many different styles as possible in ensemble, improvisation, and composition.

In the *Jazz Guitar Ensemble*, students are instructed in chord voicing, soloing in various styles, sight and prepared reading, and small ensemble playing.

Religious Life

The university encourages the full, diverse expression of religious life. Acting on behalf of the university and its educational mission, the Office of University Chaplain provides for and supports the expression of the life of faith on campus: planning, implementing, and sponsoring religiously oriented programs; providing counseling and pastoral care; serving as a liaison with other religious groups; leading ecumenical and interfaith services of worship; and assisting the campus community in nurturing a caring and respectful environment for diverse expressions of the life of faith.

Sharp Memorial Chapel, home to the non-sectarian ministries of the University Chaplain, stands at the head of the "U," sharing the plaza with McFarlin Library, Kendall Hall, and Tyrrell Hall. Its location at the center of the campus is a fitting metaphor for the university's religious life and a reminder of the historic covenantal

ties the university maintains with the Presbyterian Church (U.S.A.).

A number of campus ministries provide programs of outreach and nurture for their respective constituencies at the university. Each of these ministries adds its distinctive identity and voice to the university's interfaith conversation and religious life. For further information, call the Office of the Chaplain.

Publications, Radio, and Television

Collegian. The student newspaper, the *Collegian*, is in its 87th year of continuous publication. The paper, which is published on Tuesday during fall and spring semesters, has received numerous national and state awards for overall newspaper excellence and individual writing. Salaried positions on the paper for editor, business manager, writers, and layout and paste-up staff are available. Call the *Collegian* Office for information.

Nimrod: International Journal. In the tradition of the influential "little" magazines that first published Virginia Woolf, T.S. Eliot, and James Joyce, Nimrod publishes excellent writing, including competitive work by graduate and undergraduate students. Published twice yearly, the journal sponsors the national *Nimrod*/Hardman Awards competition in fiction and poetry. Thematic issues, one each year, have featured Arabic, Chinese, East Indian, Native American, and Russian writers, the Arctic Circle, The City, and Islands in the Sea and of the Mind.

KWGS. Radio station NPR@89.5 KWGS-FM, housed in Kendall Hall, is northeastern Oklahoma's National Public Radio affiliate. Administered by five professional staff members, the station offers students opportunities to experience broadcasting in actual work settings. Affiliation with National Public Radio, Public Radio International, and the British Broadcasting Corporation provides opportunities for students to have their work aired by public radio's interconnect system of more than 600 stations. Students throughout the university who are interested in the production, engineering, and management aspects of broadcasting are encouraged to audition and apply for employment at KWGS in Kendall Hall, Room 160. For more information, e-mail *fm89@kwgs.org* or visit the NPR@89.5 website at *www.kwgs.org*.

The Underground, a radio service broadcasting to all campus dorms, is sponsored by KWGS. Student programmed, operated, and managed, this campus service provides students with opportunities to be "on-the-air" with music of their own choosing. Interaction with personalities from local stations allows opportunities to learn from the best, network with the broadcast community, and intern at Tulsa's radio and television facilities. Some of TU's hottest rock concerts are sponsored by The Underground. Contact the subterraneans in their studios located beneath Chapman Hall or visit them on the web at *www.utulsa.edu/underground*.

TUTV. One television studio, two control rooms, a video editing room, and a TV classroom are located in Kendall Hall. Students from any major can do extracurricu-

lar work to produce TUTV: a weekly half-hour information and entertainment program about the university. Students are the on-camera talent and also operate all of the equipment. In addition, the studio and facilities are used for classes in video production taught each semester. Occasionally other campus-related videos are produced.

Athletic and Recreational Programs

Recreational and Intramural Sports. All facilities (Mabee Gymnasium, Harwell Field, tennis and racquetball courts, free weight room fitness center, swimming pool, and dance room) are available for informal use by students, faculty, and staff during certain hours each day. A complete schedule of open recreational hours is available in the Recreational Sports Office, which also provides programming in intramural sports, fitness, club sports, and informal recreation. For information on specific programs call the Recreational Sports Office in Mabee Gymnasium.

Intercollegiate Athletics. The university's NCAA IA athletic program competes in the Western Athletic Conference. The university's basketball, football, women's golf, men's golf, women's soccer, men's soccer, and tennis teams have all been nationally ranked during the 1990s, and the university's basketball team reached the Elite Eight in the 2000 NCAA Basketball Tournament.

The university offers scholarships in 18 intercollegiate sports and encourages walk-on participation. Men's sports include basketball, cross country, football, golf, indoor track, outdoor track, soccer, and tennis. Women's sports include basketball, crew, cross country, golf, indoor track, outdoor track, soccer, softball, tennis, and volleyball.

The athletic program encourages both the athletic and academic development of student athletes and provides a unique and effective academic advisory and tutorial system for educational success.

Student Government

Student Association. All full- and part-time undergraduate and graduate students are members of the Student Association (SA), The University of Tulsa's student government. The Student Association promotes and provides intellectual, social, and cultural opportunities for the entire campus community. In addition, acting as a catalyst for change within the university, the student government strives to represent the needs of the entire student body. Services include, but are not limited to, programming, support for other student organizations, and legal services.

The Student Association consists of three branches: legislative, executive, and judicial. Full details on the structure and activities of the Student Association can be found in the current Student Handbook, published and distributed annually by the Office of Student Affairs, as well as in the Student Activities office located in Allen Chapman Activity Center.

Residence Hall Association (RHA). All students living in university residence halls are members of the Residence Hall Association (RHA), whose goal is the improvement of the quality of student life. RHA sponsors social, educational and community service activities for students living in the halls and on a campus-wide basis. RHAacts as a liaison between the residents and the administration, and serves as the legislative government overseeing residence halls. Each hall elects representatives to serve on the legislative board, and executive officers are elected in an “all hall” election each spring to serve the following academic year.

Student Rights, Freedoms, and Responsibilities

The University of Tulsa maintains a statement of rights, freedoms, and responsibilities, which sets forth general guidelines suggested for members of the university community. The document outlines university policy in the following areas: freedom of academic inquiry, freedom of expression, freedom of association, right to privacy, off-campus freedom, student self-government, right of students to participate in university government and the decision-making process, and standards in disciplinary proceedings. More detailed information concerning any of these areas may be obtained from the Student Affairs Office, Holmes Student Center, and the current *Student Handbook*.

Family Educational Rights and Privacy Act (FERPA)

The Congress of the United States enacted into law the Family Educational Rights and Privacy Act on August 21, 1974. This act sets out requirements of educational institutions designed to protect the privacy of students and their records.

The act governs access to educational records maintained by educational institutions and the release of information contained in such records.

The Federal regulations resulting from the original Act have been modified, and the final regulations appear in the Federal Register, Issue May 9, 1980, Vol. 45, No. 92. The University of Tulsa policy that was written to comply with the act is on file in the Student Affairs Office, Holmes Student Center, and is printed in the current Student Handbook.

The act addresses the following areas of student rights:

- The right to inspect and review information contained in education records.
- The right to challenge the contents of their education records.
- The right to a hearing if the outcome of the challenge is unsatisfactory.
- The right to submit an explanatory statement for inclusion in the education record if the outcome of the hearing is unsatisfactory.
- The right to prevent disclosure, with certain exceptions, of personally identifiable information.
- The right to secure a copy of the institutional policy, which includes the location of all education records.
- The right to file complaints with the Department of Education concerning alleged failures by institutions to comply with the Act. Written complaints should be directed to The Family Educational Rights and Privacy Act Office (FERPA), Department of Education, Room 4074, Switzer Building, Washington, D.C. 20202.

General Standard of Conduct

In keeping with the ideals and standards of higher education and the mission of The University of Tulsa, students are expected to treat one another and other members of the university community with mutual respect, dignity, honor, and trust.

Specifically, students are expected to respect order, fairness, morality, and the rights of others; obey the laws of the land and the regulations, rules, and policies of the university; and conduct their activities with high regard for the ideals of higher education, which include personal honor, academic honesty, and intellectual freedom.

Behavior that runs contrary to these expectations provides sufficient cause for the university to initiate disciplinary proceedings, as specified in the current Student Handbook.

The full text of the General Standard of Conduct as well as the rules and regulations governing student life and policies governing such issues as drug and alcohol use, sexual harassment, and sexual assault can be found in the current *Student Handbook*. A summary statement on academic honesty appears below.

Academic Honesty

In keeping with the intellectual ideals, standards for community, and educational mission of the university, students are expected to adhere to all academic policies. Cheating on examinations, plagiarism, and other forms of academic dishonesty violate both individual honor and the life of the community, and may subject students to penalties ranging from failing grades to dismissal.

Academic misconduct also includes unauthorized or inappropriate use of university computers, vandalism of data files or equipment, use of computer resources for personal reasons unrelated to the academic and research activities of the university, plagiarism, violation of proprietary agreements, theft, or tampering with the programs and data of other users.

Specific policies exist in the various colleges in addition to the overall university policies published in this bulletin and other campus policy guides.

Programs in the Henry Kendall College of Arts and Sciences

Anthropology

Chair
George H. Odell

Professors
Garrick A. Bailey
Donald O. Henry
Lamont C. Lindstrom
George H. Odell
Michael E. Whalen

Associate Professor
Peter G. Stromberg

Assistant Professor
Richard Grounds

The M.A. program in anthropology provides students with the necessary theoretical and technical background for pursuing professional careers or continuing graduate studies at the doctoral level. Concentrated course work is offered in archaeology, cultural anthropology (including ethnohistory and symbolic analysis), Native American studies, and museum anthropology. The program emphasizes development of analytical and writing skills in all areas of course work.

Admission. Candidates for admission to the graduate program in anthropology must either hold a bachelor's degree in anthropology or archaeology or hold a bachelor's degree in another subject with significant course work in anthropology or another social science. Candidates without this background may apply to receive conditional admission to the graduate program. Applicants for admission should have a minimum grade point average of 3.0. Applicants with GPAs of less than 3.0 may be admitted on probation at the discretion of the faculty. Applicants must submit scores from the General Tests of the Graduate Record Examination.

General Requirements. For students who write theses, the program entails 30 hours, including six hours of thesis work. The non-thesis option entails 36 hours of course work. Candidates who select this option must complete the specified 24 hours of course work plus an additional 12 hours of classes selected in consultation with the graduate advisor.

All graduate students are also expected to develop field research skills through participation in the department's ongoing research programs. There is no formal language requirement for the M.A. degree. Students, however, will consult with their advisors regarding the development of pertinent linguistic and/or computer skills necessary for thesis research and analysis. Students are reminded that most Ph.D. programs and many research positions require proficiency in one or more foreign languages.

Students focus on one of four tracks: archaeology, cultural anthropology, museum anthropology, and Native American studies.

Archaeology Track

Thirty hours required (including 6 hours thesis) for thesis option; no more than 12 of

these hours may be taken at the 6000 level. (Students pursuing this option are required to present a thesis proposal, approved by a faculty member, to the graduate advisor). Thirty-six hours for non-thesis option; no more than 15 of these hours may be taken at the 6000 level.

Core Courses . . . . . .6 hours
Anth 7103, Archaeological Theory
Anth 7113, Design and Administration of Archaeological Research
Methods Courses . . . . . .9 hours
Anth 7203, Ceramic Analysis
Anth 7213, Analysis of Lithic Artifacts
Anth 7233, Quantitative Analysis in Anthropology
Topical and Regional Courses . . . . . .9 hours
Selected from: Topics in Prehistory (Anth 6503-6593)
Regional Studies in Prehistory (Anth 6703-6793)
Paleoenvironmental Reconstructions (Anth 7243).
The Social Life of Things (Anth 6623)

Tutorials (Independent Research): Offer specialized training and information not provided in regularly scheduled courses. With consent of advisor they may be taken in lieu of topical and regional courses (Anth 7991-3).

Thesis (Anth 7983-6) . . . . . .6 hours
The topic is expected to involve field or laboratory research.

Cultural Anthropology Track

Thirty hours required (including 6 hours thesis) for thesis option; no more than 12 of these hours may be taken at the 6000 level. (Students pursuing this option are required to present a thesis proposal, approved by a faculty member, to the graduate advisor). Thirty-six hours for non-thesis option; no more than 15 of these hours may be taken at the 6000 level.

Core Courses . . . . . .6 hours
Anth 6263, Contemporary Anthropological Problems
Anth 7123, History of Anthropological Theory
Methods Courses . . . . . .6 hours
Anth 7233, Quantitative Analysis in Anthropology
Anth 6403, Qualitative Research Methods
Topical and Regional Courses . . . . . .12 hours
(At least 6 hours must be taken at the 7000 level)
Selected from: Topics in Cultural Anthropology (Anth 6603-6693)
Regional Studies in Cultural Anthropology (Anth 6813-6893)
Techniques of Ethnohistoric Data Collection (Anth 7253)
Politics of Cultural Representation (Anth 6023)
History and Theory of Museum Anthropology (Anth 7133)
Other available 7000-level courses in anthropology

Tutorials (Independent Research): Offer specialized training and information not provided in regularly scheduled courses. With consent of advisor they may be taken in lieu of topical and regional courses (Anth 7991-3).

Thesis (Anth 7983-6) . . . . . .6 hours
The topic is expected to involve field research.

Museum Anthropology Track

Thirty hours required (including 6 hours thesis) for thesis option; no more than 12 of these hours may be taken at the 6000 level. (Students pursuing this option are required to present a thesis proposal, approved by a faculty member, to the graduate advisor). Thirty-six hours for non-thesis option; no more than 15 of these hours may be taken at the 6000 level.

Core Courses . . . . . .6 hours
Anth 7123, History of Anthropological Theory
Anth 7133, History and Theory of Museum Anthropology
Methods Courses . . . . . .6 hours
Anth 6413, Introduction to Museum Work
Anth 6013, Methods and Techniques in Museum Anthropology
Topical and Regional Courses . . . . . .12 hours
(At least 6 hours must be taken at the 7000 level)
Selected from: Topics in Cultural Anthropology (Anth 6603-6693)
Regional Studies in Cultural Anthropology (Anth 6813-6893)
Issues in Native American Preservation (Anth 6313)
Topics in Prehistory (Anth 6503-6593)
Regional Studies in Prehistory (Anth 6703-6793)
The Social Life of Things (Anth 6623)
Politics of Cultural Representation (Anth 6023)
Ceramic Analysis (Anth 7203)
Analysis of Lithic Artifacts (Anth 7213)
Techniques of Ethnohistoric Data Collection (Anth 7253)

Other courses may be taken outside the Anthropology Department in an area of relevance for the student, such as photography, graphic design, computer graphics, or art history.

Tutorials (Independent Research) Offer specialized training and information not provided in regularly scheduled courses. With consent of advisor they may be taken in lieu of topical and regional courses (Anth 7991-3).

Thesis or M.A. Project (Anth 7983-6) . . . . . .6 hours
The M.A. project will consist of an exhibition, collection study, catalog, community related research or other appropriate activity developed in consultation with the student's advisor and committee.

Native American Studies Track

Thirty hours required (including 6 hours thesis) for thesis option; no more than 12 of

these hours may be taken at the 6000 level. (Students pursuing this option are required to present a thesis proposal, approved by a faculty member, to the graduate advisor). Thirty six hours for non-thesis option; no more than 15 of these hours may be taken at the 6000 level.

Core Courses . . . . . 6 hours
Anth 6263, Contemporary Anthropological Problems
Anth 7123, History of Anthropology Theory
Methods Courses . . . . . .6 hours
Anth 7253, Techniques of Ethnohistoric Data Collection
Anth 6403, Qualitative Research Methods
Topical and Regional Courses . . . . . .12 hours
(At least 6 hours must be taken at the 7000 level)
Selected from: Topics in Cultural Anthropology (Anth 6603-6693)
Regional Studies in Cultural Anthropology (Anth 6813-6893)
Issues in Native American Preservation (Anth 6313)
Topics in Prehistory (Anth 6503-6593)
Regional Studies in Prehistory (Anth 6703-6793)
Politics of Cultural Representation (Anth 6023)
History and Theory of Museum Anthropology (Anth 7133)
Quantitative Analysis in Anthropology (Anthropology 7233)
Other available 7000-level courses in anthropology

Approved undergraduate courses (6000 level) may also be taken, such as: North American Indians, Native American Religious Traditions, Native American Art and Architecture, New World Prehistory, Cherokee language. Additional courses from law, art, English and history are also available.

Tutorials (Independent Research) Offer specialized training and information not provided in regularly scheduled courses. With consent of advisor they may be taken in lieu of topical and regional courses (Anth 7991-3).

Thesis (Anth 7983-6) . . . . . .6 hours
The topic is expected to involve field research.

Anthropology

7133
History and Theory of Museum Anthropology
From critical, historical, and practical perspectives, this course introduces museum anthropology and the theoretical problems that have engaged the field. The relationship between museum anthropology and anthropology as a whole is explored, with special attention to ethical and theoretical issues distinct to museum-based anthropology

7103
Seminar in Archaeological Theory: Archaeology as Anthropology
Examines the development of archaeological theory in regard to the larger body of general anthropological theory. Emphasis on current theoretical orientations within the discipline including: systems theory, classification schema, ethno-archaeology, processual archaeology, and cultural ecology.

7113
Seminar in the Design and Administration of Archaeological Research
Introduces the procedures of conducting archaeological research. Discussions focus on the development of research designs, methods of obtaining research funding, and the administration of a research project.

7123
History of Anthropological Theory
Anthropological thought from the 19th century through the present is surveyed, concentrating on the major evolutionary, historical, psychological, functional, and structural orientations of European and American anthropologists. Prerequisite: 15 hours of anthropology or permission of instructor.

7203
Ceramic Analysis
Presents several approaches to the study of ceramics: identification of clays and tempering materials; determination of vessel size, shape, and form from fragmentary remains; and design element analysis strategies. Provides tools for both the functional and chronological aspects of ceramic analysis.

7213
Analysis of Lithic Artifacts
Examines various procedures employed in the analysis of chipped stone artifacts. Specific topics include morphological typologies, lithic technologies, functional attributes, and raw material characteristics.

7233
Quantitative Analysis in Anthropology
Instruction in the use of computer and statistical analyses for the solution of anthropological problems. Emphasis on the fundamentals of computer usage and the application of relevant statistics to anthropological data.

7243
Paleoenvironmental Reconstructions
Techniques used in collecting, analyzing, and interpreting paleoenvironmental evidence, focusing on the integration of geomorphological, palynological, and zooarchaeological studies as a means of reconstructing past environments.

7253
Techniques of Ethnohistoric Data Collection and Analysis
An introduction to the approaches employed in studying sociocultural systems through archaeological and documentary evidence.

7961
Residency
(See page 16.)

7983-6 (3-6 hours)
Thesis

7991-3 (1-3 hours)
Independent Research

Approved Undergraduate Courses

Undergraduate courses may be taken for graduate credit with the approval of the program advisor. A student enrolling in these courses will be assigned work beyond that required of undergraduate students.

6013
Methods and Techniques in Museum Anthropology
Methods distinctive to anthropological work in museums and other repositories are examined. Topics include collections-based research in archaeology and ethnology, collecting, cataloguing, and conserving cultural objects, developing exhibitions, and undertaking community collaborations.

6023
The Politics of Cultural Representation
Foregrounds issues of cultural representation for indigenous peoples by highlighting perspectives, interests, and voices from traditional communities within colonial contexts of physical destruction, cultural assault, power differences, nationalism, and clashing world views. Examines representations in public discourse, including news media, Hollywood films, museum exhibits, and scholarly and popular writing.

6263
Contemporary Anthropological Problems
Examines current issues in anthropology with particular emphasis on recent theoretical devel-

opments in cultural anthropology and archaeology, including student presentations on selected theoretical problems.

6313
Issues in Native American Preservation
Addresses the linguistic and human crisis of language loss in Native American communities as an intellectual and theoretical problem while also providing some opportunity for practical involvement in Native language preservation projects.

6403
Qualitative Research Methods
An introduction to qualitative methods of research and analysis such as in-depth interviewing, participant observation, focus groups and discourse analysis. Students will design and implement a qualitative research project.

6413
Introduction to Museum Work
Introduces students to museums as organizations and examines career opportunities across the range of museum disciplines, with particular focus on art, history, and anthropology settings. Museum mission statements, staffing, governance, collections, exhibitions, conservation, registration, community relations, fundraising and other issues central to museum work are examined.

6503-6593
Topics in Prehistory
Explores particular theoretical and methodological problem areas in archaeology. Semester topics may include the origins of food production, approaches to prehistoric demography, the rise of civilizations, prehistoric cultural ecology, multi-disciplinary research techniques, and others depending on the interests of the faculty. May be repeated for credit when topics vary. Prerequisite: Anth 2053.

6603-6693
Topics in Cultural Anthropology
Explores a traditional area of inquiry in anthropology. Topics include, but are not limited to, culture materialism, economic anthropology, culture and personality, political anthropology, culture change, acculturation, and symbolic anthropology. May be repeated for credit when topics vary. Prerequisite: Anth 2043.

6703-6793
Regional Studies in Prehistory
Human cultural development analyzed in selected areas of the world, including the peopling of an area, early and developed hunting cultures, domestication of plants and animals, development of village life, elaboration of society, technological development, and the origin of states. Semester topics alternate among geographical areas such as North America, South America, Europe, the Near East, Sub-Saharan Africa, and others, depending on research interests of faculty. May be repeated for credit when areas vary. Prerequisite: Anth 2053.

6813-6893
Regional Studies in Cultural Anthropology
Intensive studies of the historic cultural development of societies in a specific geographic or cultural area. These courses survey the economy, technology, social organization, and political organization of native societies of such regions and periodically include the areas of Mesoamerica, South America, Africa, Oceania, and Europe. May be repeated for credit when topics vary. Prerequisite: Anth 2043.

School of Art

Director
Stephen C. Sumner

Professors
Virgil D. Lampton
Stephen C. Sumner
Chuck B. Tomlins

Associate Professors
M. Glenn Godsey
Thomas E. Martin
Chuck B. Tomlins

Assistant Professors
Whitney Forsyth
Keith Holz
Michelle Martin

Applied Associate Professor
Teresa Valero

Applied Assistant Professor
Mark Lewis

The graduate program in art offers curricula leading to the Master of Teaching Arts, Master of Arts, and Master of Fine Art degrees, with emphases in ceramics, drawing, painting, photography, printmaking, sculpture, and graphic design (M.A. only). The M.T.A. degree is recommended for individuals who are committed to teaching art at the primary and secondary levels. The M.A. degree in art denotes extensive work beyond the bachelor's degree. The M.F.A. degree is considered the professional terminal degree in studio art and is recommended for those individuals seeking professional careers or teaching at the university or college level.

Admission. Students must have a baccalaureate degree from an accredited college or university. The applicant's transcript must be equivalent to the curriculum requirements of the art program and any undergraduate deficiencies must be removed. The applicant is required to take the Graduate Record Examination General Tests and submit the test scores to the Graduate School along with the other application materials. A slide portfolio of the applicant's most recent work must be approved by the Art Graduate Admittance Committee and will remain on file in the graduate advisor's office.

General Requirements. The time limitation for completion of the M.T.A., M.A., or M.F.A. degree is six years. Should the candidate hold an M.A. degree before embarking on the M.F.A. program, the completion requirement is limited to four years. Students seeking candidacy for the M.F.A. degree must complete a residency requirement consisting of no less than nine semester hours in one semester at The University of Tulsa.

Transfer credit of up to six semester hours is allowed for the M.T.A. or M.A. degree and 12 semester hours for the M.F.A., at the discretion of the art program's graduate faculty. The graduate faculty may extend full credit for hours earned in an M.A. degree toward requirements for the M.F.A. A limited number of works are generally donated to the university's permanent collection. These works will be utilized on a temporary loan basis to the campus community.

Master of Teaching Arts

The M.T.A. curriculum consists of at least 36 hours of graduate study, evenly divided between professional education and studio art.

Education and Art Education . . . . . .8 hours
Art History . . . . . .3 hours
Major (Art Studio) . . . . . .9 hours
Electives (Art Studio) . . . . . .6 hours

Candidates will present projects from their major areas of concentration consisting of a specified number of works, to be determined by the master's project director. The project must adequately display the proficiency of each candidate in that field.

Also see M.T.A. requirements in the Education section.

Master of Arts

The Master of Arts curriculum consists of at least 36 hours of graduate study as follows:

Studio Art . . . . . .18 hours
Art History Seminar . . . . . .3 hours
Art History . . . . . .3 hours
Electives . . . . . .6 hours
Master's Thesis Project . . . . . 6 hours

Studio work must include a minimum of three credit hours with at least three different professors. Elective hours, with the approval of the graduate advisor, may be met with courses within or outside the art program. All students undergo a review by the graduate faculty after their first year.

The Master's Thesis Project. The student will select a graduate professor in his or her major area to be director of the master's project and chair of the project committee. The master's project is defined by the student in consultation with the major professor and consists of a body of work that displays the student's mastery of the discipline.

Candidates are required to write a brief statement concerning the master's project. The project committee, chaired by the student's major professor, will conduct an oral examination at which time the student will defend and discuss his or her master's project. The evaluation committee consists of three professors, one of whom should be from a discipline outside the studio art area.

Master of Fine Arts

The M.F.A. curriculum consists of 60 hours of graduate study as follows:

First 30 credit hours:
Studio . . . . . .18 hours
Art History Seminar . . . . . .3 hours
Art History . . . . . .3 hours
Electives . . . . . .6 hours

Studio work must include a minimum of three credit hours with at least three different professors. Elective hours, with the approval of the graduate advisor, may be met with courses within or outside the art program.

A written statement of the candidate's goals and expectations for the MFA degree is required and will be maintained in the candidate's file in the graduate advisor's office.

Last 30 credit hours:

Studio Art Seminar . . . . . .3 hours
Studio . . . . . .21 hours
MFA Thesis Project . . . . . .6 hours

The MFA Thesis Project. The student will select a graduate professor in his or her major area to be director of the thesis project and chair of the thesis committee. The thesis project will consist of a body of creative works in the student's media area of emphasis plus a written artist's statement. The format for visual presentation of the creative thesis project is professional quality 35mm slides and the written artist's statement. The evaluation committee consists of three professors, two from studio art, and one from a discipline outside the studio art area. The committee will conduct an oral examination, at which time the student will defend and discuss the work presented in his or her exhibition.

Candidates will present a solo or group exhibition or presentation at the university. Candidates for the M.F.A. degree are encouraged to participate in national or regional, competitive, or invitational exhibitions prior to their final oral examination. Candidates should consult with the graduate advisor concerning specific requirements for the completion of the degree.

Art

7002-9 (2-9 hours)
Life Drawing
Study of the human figure with emphasis on the visual relation in its attitudes and movements. Work with the living nude model with further application to special problems. Six hours conference and laboratory per week.

7022, 7032
Art Education
Theory, processes, and procedures for teaching art in elementary and secondary schools.

7042-9 (2-9 hours)
Painting
Creative problems in painting in any medium chosen by the student. Six hours conference and laboratory per week.

7062-9 (2-9 hours)
Printmaking
A concentrated study of selected printmaking processes. Creative thinking and technical proficiency are emphasized. Six hours conference and laboratory per week.

7172-9 (2-9 hours)
Photography
Creative problems, research and experimental exploration of photographic processes and materials. Six hours conferences and laboratory per week.

7132-9 (2-9 hours)
Sculpture
Research and experimental work with individual choice of problems in various sculptural media. Six hours conference and laboratory per week.

7152-9 (2-9 hours)
Ceramic Design
Research and experimental work with individual choice of problems in various ceramic materials. Six hours conference and laboratory work per week.

7973
Seminar
Selected topics, which change each semester.

7961
Residency
(See page 16.)

7981-6 (1-6 hours)
Research and Thesis

7991-9 (1-9 hours)
Independent Study

Art History

7961
Residency
(See page 16.)

7973
Seminar
Selected topics, which change each semester.

7991-4 (1-4 hours)
Independent Study

Approved Undergraduate Courses
The following undergraduate courses may be taken for graduate credit with the approval of the program advisor. A student enrolling in these courses will complete assignments in addition to those completed by undergraduate students in the course.

Art

6003
Life Drawing
Human form in a variety of media. Six hours lecture and laboratory per week. Prerequisites: Art 1103, 1113, 2023.

6013
Sculpture Studio
Various sculptural media, including ceramics, stone, plastics, cast and welded metal alloys. Semester course emphasis is indicated in the respective fall/spring schedule of courses. Prerequisites: Art 1103, 1113, 2023, 2103, or permission of instructor.

6033
Watercolor Studio
Creative problems in watercolor painting, with emphasis on composition, color, form and space. Basic and advanced techniques will be addressed as needed. Prerequisites: Art 1103, 1113, 2023, or permission of instructor.

6053
Drawing: Advanced Studio
Stresses individual explorations of the language of drawing. In-class projects investigate a wide range of media and attitudes toward drawing. Prerequisites: Art 1103, 1113, 2023, or permission of instructor.

6063
Printmaking Studio
Intermediate level work in intaglio, lithography, monotype, or relief. Emphasis on printmaking as an extension of drawing.

6072-3 (2-3 hours)
Crafts
Basic art media, tools, materials, and methods. Individual expression, effective use of materials, and design are stressed. Open to elementary, secondary, art education, education, recreation, and special education majors. Four hours lecture and laboratory per week.

6133
Creative Arts for Elementary Teachers
ART-Basic fundamentals of art methods, art history, and philosophy to enable the elementary teacher to build a broad, diversified program of art experiences in basic content areas. MUSIC-Basic skills activities, materials, methods, and philosophy of music for the elementary classroom teacher.

6223
Early Childhood Elementary Art Education
Theory, processes, and procedures for teaching early childhood elementary art education. Two

hours lecture and two hours methods laboratory per week. Prerequisite: Admission to the teacher education program.

6243
Graphic Communication I
Introduction to graphic design as a medium of communication. Techniques of pre-print production, with typographic, photographic, and illustrative elements within the conceptual framework of communication design. The exercises utilize the school's technical facilities such as computers, photostat, page/layout, drawing and photography programs to complete all art work.

6253
Graphic Communication II
Elements and principles of design graphics for print media. Advanced design problem solving through investigation and stimulation of student's personal graphic design ethic. Prerequisite: Art 3243, 1103,1113, 2023, or permission of instructor.

6263
Computer Graphics
Problems involving computer techniques and the visual vocabulary of digital paint/draw programs. Students learn on the Macintosh IIcx computer with the help of a video image grabber and digital image scanners. Printing and drawing assignments encourage inventive thinking and familiarize the student with the Macintosh graphic format. Prerequisite: Art 1103, 1113, or permission of instructor.

6273
Typography and Graphic Production
Introduction to the historical, formal, and applied aspects of typography, the design process, and production practices of conceptualization, layout, copy and execution. Copy fitting and specification of type as well as the analysis and synthesis of form, pattern, and texture in text and display settings. Prerequisite: Art 3243 or permission of instructor.

6293
Packaging Design
Creating package designs and building models without expensive materials or a heavily equipped workshop. Activities stress common design studio problems and practices. Assignments investigate packaging in three-dimensional forms including advertising and promotional systems that involve students in analyzing problems and finding solutions. Prerequisite: Art 3243 or permission of instructor.

6412-6 (2-6 hours)
Sculpture Studio
Advanced problems in three dimensions with emphasis on expanded explorations and materials and technical applications. Semester course emphasis is indicated in the respective fall/spring schedule of courses.

6422
Design Studio
Advanced problems in design emphasizing individual projects. Prerequisite: permission of instructor.

6432-6 (2-6 hours)
Painting Studio
Advanced creative problems in painting, with emphasis on the composition and functions of color in achieving form and space. Six hours lecture and laboratory per week.

6443
Illustration
Problems involving the techniques and visual vocabulary of contemporary illustration. Some assignments are comparable in specifications and deadlines to those of a working illustrator. Others stretch these limitations to encourage inventive thinking. Six hours lecture and laboratory per week. Prerequisites: Art 2023, senior standing, and permission of instructor.

6452-6 (2-6 hours)
Photography Studio
Advanced creative problems emphasizing individual investigation of various photographic techniques and materials. Readings required. Prerequisite: Art 1103, 1113, 2023, 2153, or permission of instructor.

6462-6 (2-6 hours)
Printmaking Studio
Printmaking utilizing advanced techniques and concepts (photo-methods, color printing, series

and edition work) in the areas of relief, intaglio, lithography, or monotype on individual problems.

6482-6 (2-6 hours)
Ceramic Studio
Advanced problems in the use of clay as a medium of expression. Explorations include advanced glaze chemistry and research at various temperature ranges.

6543
Advertising Design
Professional selling strategies using print media. Principles and techniques of presenting copy writing and layout for a variety of products and services, with attention to newspaper and magazine campaigns, outdoor advertising, and direct mail. Prerequisite: Art 3242 or permission of instructor.

6903
Internship
On-the-job training in a professional environment. The senior, on the recommendation of his or her advisor, may earn two to six hours credit. By arrangement only. Prerequisite: Permission of instructor.

Art History

6423
Art Since 1945
An exploration of various modes of thought, expression, and practice in art from 1945 to the present. Slide lecture and discussion.

6053
Medieval Art
An examination of the transformation of late Roman motifs and symbolism in early Christian art, then focuses on migration art and Anglo-Irish book illumination, the Carolingian and Ottonian revivals and concludes with Romanesque and Gothic art. Media discussed include architecture, sculpture, book illumination, stained glass and metalwork. Slide lecture and discussion.

6093
American Art
The development of American painting, sculpture, and architecture from colonial times to the mid-20th century, including an examination of American artists'reliance on and independence from European artistic traditions. Slide lecture and discussion.

6113
Egyptian and Ancient Near Eastern Art
An examination of continuity and change in the artistic traditions, including architecture, sculpture and painting, of Egypt and the ancient Near East. Slide lecture and discussion.

6123
Modern Sculpture
Traces the development of modern sculpture in Europe and the United States, including the breakdown of the boundaries between sculpture, painting, and architecture, as well as changing concepts of the art object in the 20th century. Slide lecture and discussion.

6133
Greek and Roman Art
The development of Greek art from the Geometric period to the Hellenistic age, concentrating on the treatment of the human figure in sculpture and vase painting; architectural issues focus on the temple and city planning. The treatment of Roman art examines the manipulation of style for political purposes and unique Roman contributions to architecture and portraiture. Slide lecture and discussion.

6353
History of Prints
Printmaking from 1400 to the present. Analyzes the contribution of the print to the history of art and visual communication. Slide lecture and discussion.

6403
Baroque and Rococo Art
Concentrates on the establishment of the Baroque style in painting, sculpture and architecture in Italy, then follows the diffusion of this style throughout Europe and its transformation into the Rococo. Slide lecture and discussion.

6713
Italian Renaissance Art
Painting, sculpture, and architecture in Italy

from the innovations of Giotto in the 14th century to the death of Michelangelo in 1564. Emphasizes the intellectual and emotional meaning of perspective, the revival of antiquity, and the centrality of the sacred narrative in the dramatic, humanistic art of the Renaissance. Slide lecture and discussion.

6723
Northern Renaissance Art
Painting, sculpture, and printmaking of Northern Europe in the 15th and 16th centuries. In the Netherlands, focuses on Jan van Eyck, the development of the Eyckian tradition, and the complex iconographic language of Bosch and Bruegel; in Germany, focuses on Durer, Grunewald, and the Danube School. Slide lecture and discussion.

6733
17th-Century Dutch and Flemish Painting
Begins with Rubens and the establishment of Baroque art in the Netherlands. The particular qualities of Dutch artists' specialized interests in genre, portraiture and landscape are then studied, with emphasis on Hals, Rembrandt and Vermeer. Slide lecture and discussion.

6913
19th-Century European Art
Examines developments in European art from the French Revolution to the late 19th century. The focus is primarily on French painting, with comparisons to contemporary developments in Spain, Germany and England. Slide lecture and discussion.

6923
20th-Century Art
An exploration of the "isms" of modern art, including Cubism, Expressionism, Surrealism and Abstract Expressionism. The redefinition of art and the changing role of the artist are examined as well as concepts of the avant garde, and the relationship between form and content in 20th-century abstraction and realism. Slide lecture and discussion.

School of Education

Director
Dale M. Johnson

Professors
Warren L. Hipsher, Jr.
Dale M. Johnson

Associate Professors
Shirley N. Robards

Assistant Professor
Diane Beals
David Brown

The School of Education provides academic programs for qualified individuals seeking Oklahoma certification or the following degree programs through the Graduate School:

- Master of Arts with specializations in early childhood education, elementary education, secondary education, gifted education, and school counselor
- Master of Teaching Arts in art, biology, economics, English, history, mathematics, and music.

Graduate students may pursue Oklahoma certification as part of a degree program or as an independent certification-only plan. All programs are designed to meet the needs of both full- and part-time students. Six semester hours of transfer credit may be accepted. Students seeking teacher certification must meet all requirements for admission to the teacher education program. NOTE: Changes in state laws and regulations can result in changes in licensure/certification requirements.

Master's Programs

Admission. Applicants must have a baccalaureate degree and satisfy the general admission requirements of the Graduate School. A minimum undergraduate grade point average of 3.0 and a minimum combined score of 1,000 on the GRE verbal and quantitative or analytical sections normally are required for admission. Students who do not meet these standards may be considered for conditional or probationary admission. Students seeking admission should consult the designated program advisor in Education to determine deficiencies, courses, and time-frames. Programs must receive approval of the advisor and the Graduate Dean.

Master of Arts

The 33-semester-hours M.A. degree program consists of a required core and an area of specialization. A program of studies is planned with a designated advisor. Fifteen (15) semester hours are selected from the following professional core:

Educ 7003, Philosophy of Education
Educ 7123, Child and Adolescent Growth and Development, or course in applied psychology approved by advisor
Educ 7153, Techniques of Research and Evaluation
Educ 7163, Psychometric Theory and Practice, or Educ 7183, Statistical Methods for Research I
Educ 7973, Seminar: Applied Research in Education

Areas of Specialization

Research and Evaluation. The specialization in Research and Evaluation is designed to prepare graduates for entry level positions in educational research and evaluation or to pursue doctoral study in education research and evaluation.

Elementary Education. The M.A. degree program with specialization in elementary education is planned with a program advisor. Courses are selected from an approved list and are designed to enhance the teacher's expertise. Specialized elementary courses at the undergraduate level may be taken for graduate credit with the approval of the graduate dean and the advisor. These courses are listed in this section under the heading Approved Undergraduate Courses.

Certification as an elementary school teacher may be planned as a part of an M.A. degree program or as a certification only program for individuals holding a master's degree. Certification requirements include appropriate course work in professional education, an academic discipline, and elementary education. Both undergraduate and graduate courses apply toward certification only. See an elementary education advisor for specific requirements.

Secondary Education. The M.A. degree program with a specialization in secondary education is planned with a program advisor. Graduate study may include both professional education and a teaching field. Certification as a secondary school teacher may be planned as a part of the degree program.

Gifted Education. Students enrolled in the master of arts program may select a specialization in gifted education. These courses are designed to prepare teachers, consultants, and administrators for working with gifted and talented students. They include topics in identification, curriculum models, and instructional strategies for gifted and talented students.

School Counselor. Both certification as a school counselor and a master's degree can be acquired in a planned program. An individual must hold a valid teaching certificate and have two years of teaching/counseling experience to be eligible for school counseling certification. Individuals holding a master's degree may pursue school counselor certification as a post-master's, certification-only program. All graduates must pass the school counselor exam of the Certification Examinations for Oklahoma Educators.

Master of Teaching Arts

The M.T.A. is a 36-semester-hour degree program that provides the K-12 and secondary school teacher the opportunity to do graduate study in 18 semester hours of professional education and 18 semester hours in a teaching field. The approved teaching fields are art, music, English, history, biology, mathematics, and economics. Certification as a secondary school teacher may be planned as a part of the degree program. The 18 semester hours in professional education include 12 semester hours from the following core:

Educ 7003, Philosophy of Education

Educ 7123, Child and Adolescent Growth and Development, or a course in applied psychology approved by an advisor.

Educ 7153, Techniques of Research and Evaluation
Educ 7163, Psychometric Theory and Practice or Educ 7183, Statistical Methods for Research I

The M.T.A. is a cooperative program between the student's subject matter discipline and professional education. Students are jointly advised by a subject matter advisor and a professional education advisor.

Professional Education (Educ)

7003
Philosophy of Education
Selected contemporary problems in education as they relate to the philosophies of idealism, realism, pragmatism, behaviorism, and existentialism. Emphasis upon developing a better understanding of education in all of its ramifications.

7033
Fundamentals of Curriculum Development
Analysis of the selection and organization of subject matter, patterns of curriculum organization, and revision of curriculum in elementary and secondary schools.

7043
Introduction to Educational Technology
Survey of educational computing topics including functional hardware components, history of computing in education, trends and issues in educational technology, ethics, problem-solving with algorithms and heuristics, and evolving roles of teachers for the 21st century.

7053
Instructional Design and Curriculum Integration
Learning/instructional design, teaching strategies using technology and supervised final project. Approved project requires the participant to prepare an instructional component for relevant subject matter using computer capabilities based on sound instructional design principles. Students demonstrate competence in achieving congruence among learning objectives, teaching strategies including computer capabilities, and evaluation of student performance. Final projects are formally presented to teachers at local/state/regional professional meetings. Prerequisite: Educ 7063.

7103
Advanced Educational Psychology
A survey of educational psychology with emphasis upon the development of behavior, intelligence, learning, and problems of adjustment.

7123
Child and Adolescent Growth and Development
Contemporary issues, problems, and theories regarding human growth and development with emphasis on humanistic psychology.

7133
Legal Aspects Education
Considers litigation involving constitutional, statutory, administrative, and case law within the school context.

7153
Techniques of Research and Evaluation
Studies of the nature and functions of research and evaluation featuring characteristics of the most common types of investigation. Includes the study of operationalism, hypothesis formulation and testing, experimental and quasi-experimental design, data collection, theory development and verification, and applications of basic data analytic techniques.

7163
Psychometric Theory and Practice
Examines the theory of measurement as applied to development, use and interpretation of tests and inventories. Norm-referenced and criterion-referenced construction, interpretation, and assessment strategies including their use in evaluation.

7183
Statistical Methods for Research I
Study of descriptive statistics, probability, sampling theory, parameter estimation, and hypothesis testing. Investigation of chi-square, simple analysis of variance, t-test, bivariate correlation and regression techniques.

7263
Elementary School Language Arts Curriculum and Instruction
The nature and functioning of language, to develop skills based upon research in language arts, and to make application of major theoretical principles to the language arts curriculum in the elementary school.

7283
Statistical Methods for Research II
Extension of Educ 7183 including analysis of variance, multiple regression, multiple and partial correlation, analysis of covariance and some nonparametric methods. Prerequisite: completion of one elementary statistics class.

7383
Multivariate Methods for Research
Considers theoretical, computational, and interpretative issues of multivariate techniques using computer solutions. Topics include multiple analysis of variance (MANOVA) and covariance (MANCOVA), factor analysis, multiple discriminant analysis, regression, canonical correlation and other commonly encountered multivariate techniques. Prerequisite: completion of one or two statistics classes including ANOVA and multiple regression.

7473-9 (3-9 hours)
Internship in Teaching
Classroom teaching experience in area schools at early childhood, elementary, middle, or secondary levels as appropriate. Extensive preparation and revision of instructional plans and assessment materials is expected. Full-time assignment (30 hours per week) for one semester is required for nine hours credit with credit for part-time assignments prorated.

7912-3 (2-3 hours)
Research and Paper

7961
Residency
(See page 16.)

7971-3 (1-3 hours)
Seminar

7981-5 (1-5 hours)
Research and Thesis

7991-5 (1-5 hours)
Independent Study

Gifted Education (Educ)

7303
The Gifted, Talented, and Creative
Study of the developmental patterns, characteristics, and needs of the gifted, talented, and creative with emphasis on identification. Includes an overview of the history, current issues, and status of the field.

7313
Curriculum Implementation for the Gifted
Emphasizes the steps in differentiated program planning and curriculum implementation for the gifted through a combination of class work and field experience.

7323
Intervention Strategies for the Gifted
Designed to acquaint students with a variety of intervention models and strategies for the gifted and to familiarize them with journal articles, literature, and research in education and guidance of the gifted.

Early Childhood Education

7413
Early Childhood Theory and Practice
An overview of past and present trends in early childhood education, research on theory and practice, and evaluation of various program models. Emphasis given to program development in multicultural settings.

7423
Early Childhood Curriculum and Materials
Explores curriculum development and materi-

als selection for exemplary early childhood programs which may be implemented in a variety of settings.

School Counselor (Educ)

7513
Principles and Administration of Guidance
A basic guidance and counseling course emphasizing a systems and developmental approach to guidance and counseling for school age children and youth.

7523
Career Counseling and Guidance
Conceptual and functional tools for enhancing career development of children, youths, and adults.

7533
Group Procedures
Experimental course emphasizing the use of groups as a medium for self-learning, facilitation of self-awareness, and analysis of interpersonal phenomena. Readings and discussion in the areas of group functions, group processes, leadership styles and interventions, membership in groups, and current research in group guidance supplement the student's experiential learning.

7543
Developmental Guidance
Conceptual models and specific applications of elementary school and secondary school developmental guidance for both the counselor and the classroom.

7553
Theories and Techniques of Counseling
Current theories of counseling which have potential application in school and mental health environments. Provides the counselor trainee an extensive repertoire of counseling skills. Requires extensive participation in laboratory microcounseling activities.

7563
Intervention Strategies
Discussion and application of current intervention strategies for the variety of needs of the elementary school and secondary school pupil. Selected remedial, preventive, and developmental strategies are examined.

7583
School Counselor Internship
Field experiences in a school setting under the supervision of a certified school counselor and a university staff member. Students are expected to provide video/audio tape recordings, critiques, and case reports of interviews with clients and parents. Prerequisites: Educ 7533, 7553, and instructor permission.

Reading (Read)

7653
Methods of Teaching Reading in the Elementary School
Methods and materials used in teaching the developmental reading program in the elementary school, including reading readiness and emerging literacy in kindergarten and primary grades. Designed for the classroom teacher.

7663
Methods of Teaching Reading in the Secondary School
Methods and techniques for continuing the developmental reading program in the middle and secondary schools. Emphasis on reading in the various content areas.

7733
Theory of Diagnostic and Remedial Techniques in Reading
Fundamental theory underlying diagnostic and remedial procedures in reading.

7743
Diagnostic Testing of Reading Disabilities
Case-study approach to evaluating complex reading disabilities including primary and secondary learning deficits and individual test interpretation as it relates to reading. Includes practicum component.

7752-4 (2-4 hours)
Clinical Practicum in Diagnostic Testing of Reading Disabilities
Clinical Experience in diagnostic procedures in reading Case-study approach is used.

7762-4 (2-4 hours)
Clinical Practices in Reading I
Theory, techniques, and materials utilized in the correction of reading disabilities as well as developmental reading instruction on the elementary- middle school levels. A practicum course emphasizing diagnostic teaching.

7772-4 (2-4 hours)
Clinical Practices in Reading II
Theory, techniques, and materials utilized in the correction of reading disabilities as well as developmental reading instruction with adolescents, college students, and adults. A practicum course emphasizing diagnostic teaching.

7831-2 (1-2 hours)
Field Experience in Clinical Reading
Field experiences provided in the public schools under the direction of a reading clinician.

Approved Undergraduate Courses
The following undergraduate courses may be taken for graduate credit with approval of the program advisor. A student enrolling in these courses will complete assignments in addition to those completed by the undergraduate students in the courses.

Professional Education

6333
Child and Adolescent Development and Learning
The development of knowledge and practical application of the processes of human growth, life-span development, and learning; includes understanding individual differences among students, grouping procedures for learning, sequencing learning activities, classroom behavior patterns, and student self-awareness and self-concept.

6343
Measurement and Evaluation
Theory and practice of assessment and evaluation including standardized tests and teacher-made tests. Includes alternative assessment techniques and applications of educational technology.

6514
Teaching Methods for Middle and Secondary Schools
Combines general and specialized methods for middle school/junior high school and senior high school teachers. Includes planning instruction, instructional strategies, classroom management, integrating educational technology, and teaching reading and writing in subject areas. Includes 40 clock hours of field experience at two different levels. Prerequisite: Educ 3713 and admission to the Teacher Education Program.

Elementary Education

6103
Children's Literature
A survey of children's literature, including award winning literature in various genres. Emphasis on literature appropriate for culturally diverse classrooms.

6123
Literacy Assessment and Intervention
Emphasizes remedial reading, including diagnosis and assessment of reading problems and selection of teaching strategies for remedial reading in the classroom. Practicum includes application of course content with at-risk readers. Includes field experiences in culturally diverse settings.

6133
Creative Arts for Elementary Children
Fundamentals of art methods, art history, and philosophy to enable the elementary teacher to build a broad, diversified program of art experiences related to the basic content areas.

6303
Writing and Language Development for Elementary Children
How children learn to communicate through speaking, listening, writing, and reading. Includes mechanics and nature of writing, the process approach, modes of writing, and role of computers and technology in writing in the elementary classroom. Field experiences in culturally diverse settings.

6313
Reading for Elementary Children
Curriculum objectives, methods, and materials for teaching and development of reading skills in relation to childrenís language and thinking abilities. Emphasis on theories, skill development, and application of the reading process. Field experiences in culturally diverse settings.

6143
Social Studies for Elementary Children
Materials, activities, and strategies for teaching social studies concepts in grades one through six. Application of course content in field experiences with unit and lesson planning. Interdisciplinary curriculum planning, multicultural education, and educational technology applications.

6403
Education of the Exceptional Child
The educational implications of exceptional children and youths as they relate to regular educators and the normal educational environment. Understanding the psychological, sociological, educational, and philosophical aspects of each type of exceptionality is emphasized. Observation of educational services being provided by certified professionals is required.

6423
Science for Elementary Children
Understanding and developing positive attitudes toward science. Teaching scientific concepts using inquiry-based, concrete activities in the biological and physical sciences. Interdisciplinary curriculum planning and educational technology applications. Field experiences in culturally diverse settings.

6433
Mathematics for Elementary Children
Quantitative thinking, problem-solving, applied mathematics, and positive attitudes toward mathematics for learners in kindergarten through the intermediate grades using inquiry-based concrete activities. Interdisciplinary curriculum planning and educational technology applications. Field experiences in culturally diverse settings.

English Language and Literature

Chair
Holly A. Laird

Professors
Hermione de Almeida
George H. Gilpin
Joseph A. Kestner
Holly A. Laird
Gordon O. Taylor
James G. Watson

Associate Professor
Lars Engle

Assistant Professors
William J. Kupinse
Laura Stevens

Distinguished Visiting Professor
Yevgeny Yevtushenko

Writer-In-Residence
A. Grace Mojtabai

Master of Arts

The Faculty of English offers a flexible program leading to the M.A. degree, providing both opportunities for creative expression and professional preparation for teaching and for doctoral study and scholarly research. Course work is offered in the full range of subjects defined by our faculty's expertise and by our internationally renowned archival holdings of manuscripts and books in McFarlin Library. Specific clusters of study that carry the advantage of faculty depth and the potential for original research are these: (1) 20th-century literature—Modern and Contemporary British, Irish, and American literatures; (2) 19th-century literature—ante-bellum and post Civil War literature, British and European Romanticism, Victorian literature; (3) American studies, cultural and gender studies, African American literature, and women's literature. Seminars are also offered in Early Modern and 18th-century literature, in critical theory, in the pedagogy of composition, and in the creative writing of fiction and poetry. Each M.A. student works closely with the Director of Graduate Studies and the faculty to develop an area of emphasis suited to his/her particular interests and professional goals.

Admission. Applicants must hold a baccalaureate degree from an accredited college or university with at least 18 hours, or the equivalent, of undergraduate work in literature and language (exclusive of basic composition and basic foreign language courses). A strong undergraduate grade point average and acceptable scores on the General Tests of the Graduate Record Examination must be presented.

General Requirements. The M.A. program requires 36 hours of graduate-level course work, all of which is drawn from the full range of graduate offerings (7000- and 8000-level). The M.A. is a non-thesis program: in place of a thesis each student elects, in his/her final term, an independent research project, defined by the student in consultation with the graduate director and a member of the faculty. These projects are meant to build upon the student's individual interests and program of courses, and so range widely in subject and approach.

Doctor of Philosophy

The Ph.D. program in English is designed to develop knowledgeable scholars, critics, and teachers of English literature. Course work is offered and dissertations directed in the full range of subjects defined by our faculty's expertise and by our internationally renowned archival holdings of manuscripts and books in McFarlin Library. Specific clusters of study that carry the advantage of faculty depth and the potential for original research are: (1) 20th-century literature—Modern and Contemporary British, Irish, and American literatures; (2) 19th-century literature—ante-bellum and post Civil War literature, British and European Romanticism, Victorian literature;(3) American studies, cultural and gender studies, African American literature, and women's literature. Seminars are also offered in Early Modern and 18th-century literature, in critical theory, in the pedagogy of composition, and in the creative writing of fiction and poetry. The doctoral program is administered by the Director of Graduate Studies and the Graduate Program Committee. All members of the Faculty of English participate as instructors and on student committees.

Admission. Applicants must hold a master's degree in English or the equivalent from an accredited college or university and must present acceptable scores on the General Tests of the Graduate Record Examination.

Residence Requirements. The minimum period in which the Ph.D. degree can be earned is two full academic years of study. The student must spend at least two consecutive semesters in residence as a full-time student in work toward the doctorate.

Course Requirements. The doctoral program is designed as a four-year program for full-time students. It requires 36 hours of graduate-level course work (7000- and 8000-level) beyond the master's degree or its equivalent and 24 hours of directed study and dissertation research. Up to 15 hours is allowed for the dissertation.

To assure adequate breadth of preparation during the two years of Ph.D. course work, at least three courses in literary-historical periods prior to 1800 and three in periods after 1800 are required. As preparation for the Qualifying Examination, doctoral students additionally take at least two graduate courses in their primary field and at least one in each secondary field. Fields are described below under Ph.D. Qualifying Examination.

Language Requirements. Doctoral students are required to achieve a sound reading knowledge of one classical or modern language, as demonstrated by passing a translation test set by program faculty. Students must propose for approval the languages on which they intend to be examined. The standard is a capacity to translate accurately a representative critical or scholarly passage with some bearing on the student's field of interest. The requirement should be met as early as possible in a student's career and must be fulfilled prior to taking the qualifying examination.

Ph.D. Qualifying Examination. The qualifying examination is offered at the end of the fifth term of full-time study. It consists of one primary and two secondary fields chosen by the student in consultation with the graduate director and faculty advisors. The primary and one secondary field must be standard literary-historical periods; the third field is frequently critical theory and/or method but it may also be a third literary-historical period. To assure an intellectually and professionally coherent plan of

study, students are strongly encouraged to consider periods between which they can establish critical or historical connections.

Literary-Historical Periods. The following literary-historical periods or areas may be used as primary fields for the Qualifying Examination:

Renaissance
Restoration and 18th-Century British
19th-Century British
Romantic
Victorian
20th-Century British and Irish
Modern British, Irish, and American
Contemporary British
19th-Century American
20th-Century American
African American

Secondary fields may also be chosen from this list. Fields of study not included in this list may be requested as one of the two secondary fields by petition to the Director of Graduate Studies and the Graduate Program Committee.

Students should compile reading lists for each of the fields in consultation with faculty advisors. Students and their advisors may establish clear emphases in the chosen fields. The reading lists should not substantially overlap with each other.

Procedures. Early in the fourth (spring) semester, the student should submit a proposed list of fields along with evidence of sufficient course work in those fields to the graduate director, and, in consultation with the graduate director, select a supervisory committee consisting of three faculty members chosen on the basis of relevant expertise. At least one person, usually in the student's major field, must be a senior faculty member. The supervisory committee is formally responsible for defining the student's primary and secondary fields of study, for overseeing the qualifying preparation, and for compiling and grading the examination.

Examination. Qualifying examinations usually are given in early January. Grading is pass/fail. Competence in a primary field is understood to consist in mastery of recognized primary texts and current critical issues in the field. Competence in a secondary field consists in mastery of recognized primary texts and a broad knowledge of contexts and current critical issues in the field. Students passing the examination are invited to apply for candidacy and proceed directly to the preparation of a dissertation prospectus. Students failing one or two fields are offered one opportunity to repeat in the succeeding term. A student failing all three fields is considered ineligible to proceed in the program.

Prospectus and Dissertation. The prospectus is understood to be a substantial (chapter-length) piece of writing, accompanied by a bibliography, in which the tenability of a dissertation-thesis is shown through argument and through a convincing survey of relevant criticism and scholarship. The prospectus is prepared in consultation with the supervisory committee, the members of which are usually chosen by the student after the qualifying examination is passed. Students formally present the

prospectus to the Director and the Graduate Program Committee at a prospectus meeting and, upon formal approval, proceed to the writing of the dissertation. The Director and Graduate Program Committee, in consultation with the student, appoint the dissertation committee to supervise the writing of the dissertation. Upon completion, and final approval by this committee, the dissertation will be submitted to the Graduate School.

English

7023
Creative Writing Workshop
A workshop for those who wish to develop their skills as writers (and readers) of fiction and nonfiction prose.

7053
Theory I
Studies in the history of criticism from Plato through the 19th century.

7063
Theory II
Studies in 20th-century theory, with emphasis on a contemporary theory or theories.

7073
Feminist Theory
Studies in theory and criticism by feminist writers.

7083
The Classical Tradition
A study of the evolution of genres by examination of the works of Homer, the Greek dramatists, Vergil, Horace, Sappho, Ovid, Plato, Aristotle, Longinus, Apuleius, and Juvenal, with attention to the evolution of myth and its constructions.

7093
Middle English Literature
Major 14th-century and early 15th-century poetry and prose, including work by such writers as Chaucer, Langland, the Gawain poet, Gower, Margery Kempe, Henryson, and Dunbar, as well as anonymous romances and lyrics.

7113
16th-Century British Literature
Tudor poetry and prose. Figures taught may include: More, Wyatt, Foxe, Philip Sidney, Mary Sidney, Puttenham, Raleigh, Spenser, Marlowe, Shakespeare, and others.

7153
Shakespeare
A selective survey of Shakespeareís career and of contemporary Shakespeare criticism, with attention to relevant institutional contexts and theoretical problems.

7163
English Drama, 1558-1642
History of the rise of diverse theatrical institutions, with attention to plays by writers such as Nashe, Marlowe, Jonson, Shakespeare, Chapman, Marston, Cary, Middleton, Beaumont, Fletcher, Webster, Ford, and Anon.

7183
17th-Century British Literature
Non-dramatic poetry and prose of the 17th-century up to the Restoration, with attention to the work of such writers as Donne, Bacon, Burton, Wroth, Herbert, Marvell, the Levellers, Philips, and Milton.

7193
Restoration and 18th-Century British Literature
Poetry, drama, and prose of the Restoration and 18th century, chosen from works by Dryden, Congreve, Addison, Steele, Swift, Pope, Defoe, Egerton, Gay, Finch, Thomson, Collins, Gray, Fielding, Montagu, Johnson, Boswell, Gibbon, Smart, Cowper, Thrale, More, and others.

7213
African American Literature
Origins and development of African American literature, a body of writing defined both within and against the American literary tradition.

While the focus shifts among particular offerings of the course, each engages selected aspects of African American writing, stressing 19th- and 20th-century materials with attention to earlier texts. Historical, cultural and theoretical contexts are considered.

7223
18th-Century British Fiction
Readings of British prose fiction of the 18th century, chosen from works by Behn, Bunyan, Swift, Defoe, Richardson, Manley, Henry Fielding, Sarah Fielding, Haywood, Lennox, Sterne, Smollett, Goldsmith, Mackenzie, and others.

7283
Romantic Fiction
Readings of fiction from the Romantic period, 1776-1836, chosen from novels by Lennox, Wollstonecraft, Sade, Lewis, Radcliffe, Walpole, Inchbald, de Staël, Hays, Burney, Austen, Goethe, Constant, Edgeworth, Mary Shelley, Ferrier, Maturin, Scott, and others, with attention to the women writers of popular Romantic fiction.

7293
Romantic Poetry
Readings of poetry from the Romantic period, 1776-1836, chosen from works by Burns, Blake, Baillie, Wordsworth, Coleridge, Smith, Barbauld, Opie, Byron, Shelley, Keats, Bowles, Clare, Hemans, and others, with attention to Romantic theories of poetry and art.

7373
19th-Century British Prose
Readings of nonfictional prose during the Victorian period, concentrating on writers such as Carlyle, Mill, Arnold, Newman, Ruskin, and Pater, including essays by George Eliot, Nightingale, and Norton, with additional attention to periodical literature.

7383
19th-Century British Fiction
Intensive readings of British fiction during the 19th century, including texts chosen from Austen, Scott, the Brontës, Disraeli, Gaskell, Thackeray, Dickens, George Eliot, Trollope, Braddon, Moore, Hardy, and others.

7403
Rhetoric and Composition
Studies in the contemporary theory and practice of rhetoric and composition.

7413
Victorian Poetry
May include Tennyson, E. Brontë, Hemans, Arnold, Clough, E.B. Browning, R. Browning, D.G. Rossetti, Christina Rossetti, Swinburne, Field, Hopkins, M. Coleridge, Hardy, and Mew. Attention also to the aesthetic movement, to the poetry's intertextual relation to Romantic verse, and to other Victorian genres, especially prose essays.

7453
Modern British Fiction
May include Conrad, Woolf, Richardson, Bennett, Lawrence, Mansfield, West, Wells, Sinclair, Forster, Warner, Ford, Rhys, and Huxley. Attention also to these writers'affiliations with their Anglo-Irish and American cohorts, to the fiction's intertextual relation to Victorian writing, and to other modern genres, especially selected prose essays.

7473
Yeats and Modern Irish Literature
A survey including the work of such writers as Yeats, Synge, F. O'Brien, O'Flaherty, P. Kavanaugh, R. Murphy, Heaney, E. O'Brien, Kiely.

7483
Modern British Poetry
A survey including such writers as Hardy, Sitwell, Eliot, Auden, Spender, Larkin, Hughes, S. Smith.

7493
Modern British and Irish Drama
A survey including the work of such writers as Yeats, Wilde, O'Casey, Shaw, Beckett, Osborne, Gregory, Stoppard, Pinter, Wexler, Orton, Friel.

7513
American Literature, 1820-1865
The "American Renaissance" and other aspects of 19th-century literary culture to the Civil War; representative works by writers such as

Irving, Cooper, Emerson, Fuller, Poe, Thoreau, Douglass, Hawthorne, Melville, Dickinson, Whitman, Stowe.

7523
American Literature, 1865-1914
Literature from the Civil War to World War I, with attention to shifting social and cultural conditions; representative works by writers such as Whitman, Twain, James, Howells, S. Crane, Chopin, Norris, Wharton, Dreiser, DuBois, Adams.

7533
American Literature, 1914-1960
Modern American literary culture, tracing and critically considering the canon against a background of national and world events; representative works by writers such as Pound, Stein, Eliot, H.D., H. Crane, O'Neill, Hemingway, Fitzgerald, Faulkner, Stevens, Williams, Hurston, Wright, Hughes, Ellison.

7543
Contemporary American Literature
American writing since 1960, exploring the "postmodern" in relation to the "modern" consciousness and craft in a contemporary cultural context; texts variously drawn from a wide range of writers and genres, with attention to the multicultural diversity of the late 20th-century American literary scene.

7563
American Literary Histories
Problems in the construction, description, and interpretation of the literary history of America, with attention to the issues of canon formation, theoretical approaches, and diverse methodologies.

7573
Contemporary British Literature
Readings of fiction, poetry, and drama from Contemporary British literature, 1939 to the present, chosen from Orwell, Greene, Graves, Lowry, Murdoch, Amis, Lessing, Fowles, Naipaul, Rushdie, Hughes, Larkin, Gunn, Walcott, Heaney, Osborne, Pinter, Stoppard, Drabble, Byatt, and others.

7961
Residency
(See page 16.)

7993
Directed M.A. Research; Directed Writing
Independent study on a project approved by the Graduate Director. One such project is required of all M.A. students in lieu of a thesis.

8103
Representative Figures
The art and life of major literary figures drawn from all periods and from all literatures written in English.

8113
Gender Formation in Early Modern Literature
Inquiry into the construction of gender in texts written before the 19th century.

8123
Gender Formation in Modern Literature
Inquiry into the construction of gender in texts written in the 19th and 20th centuries.

8133
Restoration and 18th-Century Women Writers
A study of women's writing in the Restoration and 18th century from the perspective of genre; topics vary.

8143
19th-Century Women Writers
A study of women's writing in the 19th century from the perspective of genre; topics vary.

8153
20th-Century Women Writers
A study of women's writing in the 20th century from the perspective of genre; topics vary.

8163
Special Topics in Women's Literature
The study of special topics in womenís literature from the perspectives of theme (The Female Subject), motif (The Body in Women's Literature), literary movements, etc.

8173
Special Topics in Literature before 1800
Special topics in literature from the perspectives of cultural change (Literature and Literacy, 1530-1642), politics (Literary Representation and Social Conflict in the English Renaissance), contemporary theory (Discursive Economies of the Renaissance), etc.

8183
Special Topics in 19th-Century British Literature
Special topics in literature from the perspectives of history (The Industrial Revolution), aesthetics (Literature and Art in Victorian England), gender (The New Woman), literary movements (Fin de Siècle), etc.

8193
Special Topics in American Literature
Special topics on bodies of literature, history, and culture.

8203
Special Topics in Modern Literature
Special topics on bodies of literature, history, and culture.

8213
Studies in Genre
Examination of theories of genre in connection with a particular kind of writing such as pastoral, lyric, long poem, novel, autobiography, etc.

8223
The Pre-Raphaelites and Decadence
An inter-disciplinary examination of literature and art during the 19th century in Britain and America, with emphasis on Pre-Raphaelitism and Aestheticism. Readings are chosen from the Rossettis, Morris, Swinburne, Wilde, Pater, and others; artists include D.G. Rossetti, Millais, Siddal, Hunt, Burne-Jones, Moore, Whistler, and Beardsley.

8793
Directed Doctoral Readings
Independent study in areas under preparation for the doctoral qualifying examination.

8993
Directed Doctoral Readings
Independent study to be used during the 36 hours of required course work toward the Ph.D.

9961
Residency
(See page 16.)

9981 (1-9 hours)
Dissertation

History

Chair
Joseph Bradley

Professors
Joseph C. Bradley
Thomas H. Buckley
Andrew Burstein
Paul A. Rahe
James P. Ronda

Associate Professors
Thomas Buoye
Nancy Isenberg
Christine Ruane
Mary Lee Townsend

Assistant Professor
Andrew Wood

The Master of Arts degree in history emphasizes depth of understanding and the mastery and practice of the methods of historical inquiry. Students focus their course work around a primary field of study while learning the principles underlying the ordering and interpretation of historical material, the evaluation of evidence, the explanation of causality, and the meaning of change or continuity over time. The master of arts in history imparts to students an understanding of the complexity of human interaction, a sense of the uniqueness of time and place, and the skill to develop a reasoned interpretation of past peoples and events.

Admission. The student must have at least 30 semester hours of acceptable undergraduate history courses, including at least 12 hours of work at the junior and senior level and sufficient courses to provide a basic understanding of American and European history.

A 2.75 grade point average in all undergraduate work and a 3.0 average in undergraduate history courses is required. Applicants are required to take the General Tests of the Graduate Record Examination and submit satisfactory test scores to the Graduate School along with other application materials.

Students who are deficient in history credits but meet grade-point requirements may be admitted on a conditional basis.

Examinations. A written comprehensive examination over course work is required of all students having completed 21 credit hours. An oral thesis defense will be required of all thesis students. A reading knowledge of one foreign language approved by the faculty of History is required of all degree candidates.

Curriculum

Thesis Option: 30 credit hours

History Requirements

Method and Historiography . . . . . .3 hours

Primary Field . . . . . .15 hours

The primary field must include 1 research seminar. Reading and research seminars for a primary field may be taken more than once so long as the topics addressed differ. The primary fields are these:

- Ancient World and Europe to 1700
- Europe since 1700

- United States
- Non-Western, Russian, and Latin American
- Comparative History: thematic field defined by advisor and approved by the graduate committee

Course work taken outside the primary field, including
1 research seminar . . . . . .6 hours
Thesis . . . . . .6 hours

Non-History Courses (Optional)

Students are encouraged to consider courses offered by the humanities, social science, and law faculties at The University of Tulsa as they plan their degree program.

Non-Thesis Option: 36 credit hours

Beyond the historiography, distribution and language requirements cited above, non-thesis students select additional courses appropriate to their academic interest.

The number of credit hours allotted a course is designated by the last numerical digit of the course number.

History

7003
The Nature of History
Investigation of questions raised by historians, the assumptions they make, and the nature of evidence, and the variety of methods (including quantitative techniques) used to explain the past. Close reading of selected historical texts and critical discussions. Normally taken during the first year of graduate study.

Reading and Research Seminars

Course offerings are organized under the following topical and chronological categories: The American West, Native American history, military history, the Middle Ages, Chinese history, 20th-century American diplomatic history, imperialism, modern Germany, ancient Greece, Russian and Soviet history, Latin American history, labor history, European social and cultural history, and French history.

Reading Seminars

Emphasis on the historiographical issues basic to each primary field. Specific topics change with each offering.

7313
Readings in the History of the Ancient World and Europe to 1700

7333
Readings in the History of Latin America

7413
Readings in the History of Europe since 1700

7513
Readings in the History of the United States

7613
Readings in the History of Russia

7643
Readings in the History of China

7713
Readings in Comparative Social and Cultural History

Research Seminars

Primary source research on topics in each primary field. Specific topics change with each offering.

7323
Research in the History of the Ancient World and Europe to 1700

7423
Research in the History of Europe since 1700

7523
Research in the History of the United States

7623
Research in the History of Russia

7633
Research in the History of Latin America

7653
Research in the History of China

Other Courses

7961
Residency
(See page 16.)

7981-6 (1-6 hours)
Research and Thesis

7991-3 (1-3 hours)
Independent Study

Approved Undergraduate Courses

Students seeking course work in areas not being addressed by scheduled or planned reading and research seminars may petition to enroll in an undergraduate course (6000 level). The graduate advisor will approve such requests after reviewing with the undergraduate course instructor the assignments to be given graduate students. No more than three 6000-level courses can be taken for credit toward the M.A. degree in history; only two such courses can be used to satisfy primary field requirements. 6000-level courses approved for enrollment are listed below.

6133
Seminar in the History of Political Thought
An upper-level seminar focusing on selected topics in the history of political thoughtóa single author, the political thought of a particular time and place, or a theme or school of thought.

6333
Medieval and Renaissance Italy (1000-1700)
The transformation of Italy from marginally free "medieval" society in the 11th century to the home of the "renaissance" in the 15th. Focuses on economic and social issues, including trade and the capitalist ethic, the plague, warfare, and the family. Emphasis on the role played by women and "outgroups."

6403
Spain in America
A topical approach to Spain's settlement and influence in North America. Includes the forging of a Hispanic empire; economic, cultural, and biological exchange between Indians, Africans, and Spaniards; missionary and military frontiers; the roles of women; European and Native American rivalries; and Spain's lasting legacy in America.

6443
Emergence of Modern Russia
Russia from ancient times to 1825, with emphasis on the Kievan and Muscovite states, the building of the Russian empire, Peter the Great, peasant life and serfdom, early rebellions against autocracy.

6453
Russia: Reform and Revolution
Russia from 1825 to 1917, with emphasis on the processes of repression, reform, and revolution. Topics include the Russian intelligentsia, the Great Reforms, populism and terrorism, industrialization, and the revolutions of 1905 and 1917.

6473
Soviet Russia
The Soviet Union from 1917 to 1991, with emphasis on the evolution of state and society. Topics include the Revolution and Civil War, New Economic Policy, the Stalin Revolution, art and culture under dictatorship, Kruschev reforms, the Brezhnev era, and the Gorbachev years.

6483
Hegel, Marx, and Nietzsche
The development of 19th-century German philosophy, including the problem of the nature and significance of history. Emphasis on Hegel, Marx, and Nietzsche, with additional readings from the works of Fichte, Feuerbach, and Schopenhauer. Prerequisite: One course in philosophy or related area with permission of instructor. Same as Phil 4453.

6493
Germany from Frederick to Bismarck
The transformation of central Europe from a divided and contentious backwater into two of the world's great powers: Germany and Austria-Hungary. Emphasizes society, culture, and politics from Frederick the Great and Maria Theresa to Bismarck.

6503
Germany from Bismarck to Hitler
Germany's triumphs and tragedies as a modern world power, emphasizing the role of ideology in shaping the German cultural and political experience.

6553
The Modern American West
The American West in the 20th century, with attention to the region's growing cultural, political, and economic role in national life. Emphasis on the tension between the urban West and traditional rural values.

6563
The Old West
The American West from before the arrival of the Europeans to the beginning of the 20th century, with emphasis on the West as a culturally complex and diverse region.

6603
American Diplomatic History since 1914
American foreign relations from the rise of Woodrow Wilson in 1914 to the present.

6613
American Urban History
The social aspects of urbanization from the first arrival of English colonists to the present, including an examination of community life, politics, population, and the interrelationship between national change and the development of contemporary metropolitan United States.

6773
Modern Japan, 1800 to Present
Examines political, social, cultural, and economic changes in Japan from the last years of the Tokugawa shogunate to the present. Analyzes these changes from the perspectives of power-holders and dissidents, elite and masses.

6793
America at War in the 20th Century
The evolution of American military policies during the 20th century. The strategies and tactics used to implement these policies are studied through an analysis of American participants in the following wars: Spanish American, World War I, World War II, Korea, and Vietnam. Emphasizes on the interrelationships among military, foreign and domestic issues.

6803
Topics in Greek History
A discussion course focused on a narrowly defined historical period, theme, or set of problems. Special emphasis is placed on the analysis of the ancient evidence and on the various scholarly controversies to which it gives rise.

6813
Topics in Roman History
Seminar on selected topics and problems in Roman history; emphasis on the various narrative and epigraphic sources (in translation) and how to use them, and on current scholarship.

6823
Topics in Ancient Near Eastern History
Seminar on selected topics on the history of ancient Egypt, Mesopotamia, or the Holy Lands; readings and interpretations of narrative and epigraphic sources, in translation, and evaluations of problems of past and current scholarship (e.g., the Thutmosid Succession).

6833
Topics in Latin American History
A discussion course focused on a particular time period, country, and/or topic in Latin American history. Emphasis on a critical analysis of his-

torical works, literature, films, and documents.

6843
Topics in European History
Seminar on a specific historical period, theme, or set of problems in European history. Close reading of texts with emphasis on the analysis of sources and the modern scholarly controversies to which they give rise.

6853
Topics in American History
Seminar on a specific historical period, theme, or set of problems in American history. Emphasis on critical analysis of historical works and on modern scholarly controversies.

6973
Seminar

Psychology

Chair
Tod Sloan

Professor
Judy Orth Berry
Robert Hansson
Robert Hogan
Pawel Lewicki
Terrence Luce

Associate Professors
Allan Harkness
Tod Sloan

Assistant Professors
Michael Basso
Eric Daleiden
John McNulty
Elana Newman
Deidra Schleicher
Robert Tett

The Psychology Department offers courses leading to the M.A. and Ph.D. degrees in industrial/organizational psychology and in clinical psychology.

Admission. Admission to the programs is selective, and because of high demand, not all qualified applicants can be admitted. Minimum requirements for admission include a baccalaureate degree from an accredited institution, an undergraduate grade point average of 3.0 or better (on a 4-point scale), satisfactory letters of recommendation, an adequate background in psychology, and satisfactory test scores on the verbal and quantitative portions of the Graduate Record Examination. Candidates for clinical programs should have completed a minimum of 18 hours of undergraduate course work in psychology including courses in abnormal psychology, and either statistics, tests and measurements, or experimental psychology. Applicants should have scores on the verbal and quantitative portions of the Graduate Record Examination of at least 500 for the master's programs and at least 550 for the doctoral programs. Admission to the doctoral programs is open to applicants who have completed a bachelor's degree, as well as applicants who have completed a master's degree.

Industrial/Organizational Psychology

Master of Arts

The M.A. program is a 42-credit-hour degree program. The program is designed to be flexible and students can specialize in: (1) applied personnel topics such as job analysis and employee selection, (2) organizational development, or (3) research and analytical skills for diagnosing organizational problems and evaluating intervention techniques.

General Requirements. The I/O MA program is a non-thesis program. Students must complete at least 42 hours of course work, including six hours of non-applied psychology courses, 21 hours of I/O core courses, six hours of research methodology, and 12 hours of electives. Course work must be approved by the graduate advisor. Students must also complete a three-hour internship and pass a comprehensive exam.

Doctor of Philosophy

The Ph.D. program follows the scientist-practitioner model of psychological training; it prepares students for a wide range of employment opportunities in industry, government, research, consulting, or university settings.

General Requirements. The Ph.D. program requires a minimum of 90 approved semester hours of graduate credit beyond the baccalaureate. In addition, at least 20 hours of research, including dissertation, are required. Although students must complete certain core course work during their first two years, subsequent course work, research, and internships may be tailored to individual needs and interests, with the approval and supervision of the student's major professor and doctoral committee. Structural requirements include completion of a pre-doctoral candidacy research paper, comprehensive examinations in research methodology and industrial psychology, and a dissertation. Successful completion of all of these requirements, except the dissertation, is required before students are formally admitted to doctoral candidacy.

Clinical Psychology

Master of Arts

The M.A. program in clinical psychology is a 45-credit-hour degree program that allows students to develop basic intervention, evaluation, and consultation skills. Graduates of the program are prepared to assume entry-level clinical positions in agency, health-care, and organizational settings. Licensing laws of states vary widely, and students should consult the licensing body in the state in which they intend to practice to determine opportunities and requirements for licensure at the master's level.

General Requirements. The program includes formal course work in the core areas of psychology, research methods, personality and psychopathology, principles of psychological assessment and intervention, and professional issues in clinical psychology. Students are also required to complete six hours of practicum training. There is no thesis requirement. The program of study is fully described in the Handbook of Graduate Programs in Clinical Psychology at the University of Tulsa. Although much of the program is prescribed, students are allowed some flexibility in choice of electives and practicum placements. In addition to providing a solid foundation for a career in clinical psychology, the program requirements satisfy prerequisites for many doctoral programs in clinical psychology.

Doctor of Philosophy

The Ph.D. program in clinical psychology has been continuously accredited by the American Psychological Association since 1991. The program prepares graduates to become scientist-practitioners of clinical psychology. Students develop a broad range of skills for the identification, evaluation, and resolution of human problems in agency, health-care, consulting, academic, or private practice settings. Training is based on the assumption that practice involves application of the theories, methods, and findings of scientific psychology to clinical problems.

General Requirements. Program requirements are officially described in The Handbook For Graduate Programs in Clinical Psychology at the University of Tulsa. The doctoral program requires 90 credit hours of graduate work beyond the baccalaureate. Students complete a 15-hour core in general psychology, a 24-hour clinical core, nine hours of courses in methodology and statistics, at least 12 hours of practicum, and the remainder in seminars, electives, and research. Specialized issues in clinical psychology are addressed in topical seminars that are offered each semester. Students must pass a comprehensive examination for the Ph.D. consisting of a general written and a clinical oral portion. Although a master's thesis is not required, students must demonstrate research competence through completion of the pre-candidacy project, the proposal for the dissertation, and the doctoral dissertation. Students must pass a final oral examination on the dissertation. Flexibility exists in the choice of electives and practicum training experiences, allowing students to tailor the program to meet their individual needs. In addition to the 90-hour program, all students are required to complete a one-year pre-doctoral internship in a setting and training program approved by the clinical program committee. The doctoral training program at The University of Tulsa does not provide this internship. It is the responsibility of the student to apply for and be accepted by an internship that meets the training requirements listed in The Handbook for Graduate Programs in Clinical Psychology.

The number of credit hours allotted a course is designated by the last digit of the course number.

Psychology

7003
Behavioral Neurosciences and Psychopharmacology
Introduction to human neuroanatomy, nervous system functioning, biological foundations of several major behavioral systems, and of psychopharmacology. Survey of current issues in the neurosciences, emphasizing topics of particular relevance in applied settings.

7033
Systems and Theories of Personality
Survey of central contributions and current issues in the psychology of personality, with particular emphasis on theory and research relevant to applied problems.

7043
Social Psychology
Survey of theory and research in social psychology, emphasizing group dynamics, attitudes, and the analysis of problems in applied settings.

7053
Psychometrics
Discussion of principles and techniques of measurement and scale development/validation. Special emphasis is given to assessment of personality and behavior.

7113
Clinical Assessment: Intellectual
Introduction to psychometric theory, the structure of mental abilities, ethics of assessment, issues of human diversity, report writing, and case presentation in the domain of intellectual functioning. Concurrent enrollment in associated laboratory is required.

7133
Cognitive Psychology
A study of major concepts and current issues in learning, memory, perception, cognition, thinking, motivation, and emotion.

7143
History and Systems of Psychology
A survey of contemporary systems and major theories of psychology, treated as evolutionary developments from their historical roots.

7153
Psychopathology
Intensive survey of clinical theory and research concerning various psychiatric disorders at the social, psychological, and physiological levels of analysis. Issues of classification and diagnosis are emphasized, along with the etiology and course of major disorders, and gender and ethnicity issues in psychopathology.

7183
Statistical Methods for Research I
Study of descriptive statistics, probability, sampling theory, parameter estimation, and hypothesis testing. Investigation of chi-square, simple analysis of variance, t-test, bivariate correlation and regression techniques.

7193
Clinical Assessment: Personality
Introduction to personality assessment with emphasis on objective techniques. Issues include methods of test construction, psychometric theory of tests, ethics and test standards, issues of ethnic, cultural, and linguistic diversity in assessment, problems in clinical judgment, and the administration, scoring, and interpretation of several widely used personality tests.

7203
Foundations for the Human Sciences
Survey of contemporary developments in the theory and practice of social science, with emphasis on critical analysis and interdisciplinary studies of the individual in a sociocultural context.

7223
Theory and Practice of Clinical Psychology
Introduction to scientist-practitioners model of clinical psychology. Intake interview and Mental Status Examination skills are developed. Introduction to major theories of clinical intervention and ethnic, cultural, and linguistic diversity issues in clinical work are presented.

7283
Statistical Methods for Research II
Advanced statistical techniques, including analysis of variance, multiple regression, multiple and partial correlation, analysis of covariance and some nonparametric methods. Prerequisite: An introductory statistics course.

7333
Research Methods in Clinical Psychology
Analysis of the rationale and techniques of the scientific study of clinical psychology. Emphasis on methodology and special concerns relevant to the naturalistic study and evaluation of intervention strategies.

7343
Research Methods in Applied Psychology
Designed to serve as a foundational research methods course in both I/O and clinical psychology to develop students' theoretical and empirical understanding of psychology. Examines fundamental concepts in measurement and design, along with methods used in applied research to solve real-world problems.

7383
Multivariate Methods for Research
Considers theoretical, computational, and interpretive issues of multivariate techniques using computer solutions. Topics include multiple analysis of variance (MANOVA) and covariance (MANCOVA), factor analysis, multiple discriminant analysis, regression, canonical correlation and other commonly encountered multivariate techniques.

7441-9 (1-9 hours)
Fieldwork in I/O Psychology
Practical, supervised work experience (i.e., internship) in private or public sector organizations. Emphasis differs across different placements.

7451-6 (1-6 hours)
Clinical Practicum
Practical, supervised work experience with actual clinical populations. Emphasis varies across different placements. Site placement must be individually arranged with practicum coordinator. Because course meetings are essential for integrating science with practice, attendance is required. Enrollment limited to matriculated clinical students.

7463
I/O Practicum
Hands-on experience in various I/O consulting projects (e.g., selection, job analysis, performance appraisal, training, organizational development). Students work on projects under faculty supervision, while learning relevant theory and research methods.

7543
Ethics, Law, & Clinical Practice
Examines ethical principles and standards that provide a guiding framework for professional behavior, and reviews the laws regulating psychological practice. Introduces students to the practice of ethical decision-making across a variety of hypothetical contexts and helps them identify behaviors that reduce the risk of misconduct and promote the ethical practice of psychology.

7703
Child Development
Addresses development from the prenatal period through adolescence. The focus is the child within the family and the family within the community and broader social environment.

7961
Residency
(See page 16.)

7973
Seminar
Intensive, semester-long study of special topics in I/O and clinical psychology.

7991-9 (1-9 hours)
Independent Study

8003
Introduction to Industrial/Organizational Psychology
Survey of theory and research on the influence of individual and organizational factors in personnel psychology and organizational behavior.

8013
I/O Assessment Lab
Administration and interpretation of widely used instruments for assessment of individual, team and organization functioning. Test development, validation, and use in applied and basic research.

8023
Human Factors
Analysis of individuals in human-machine systems. Covers complex systems, development of environments, and the design of equipment and facilities for human use.

8053
Clinical Neuropsychology
Examination of neuroanatomy, brain behavior relationships, and cognitive/behavioral procedures for assessing brain functioning, with overview of major brain disorders and recent developments.

8063
Intervention Techniques
Examination of theoretical approaches to psychological intervention and the intervention techniques generated from these theories. Case material illustrates theory, practical considerations, ethical, diversity, and scientific efficacy issues related to intervention.

8073
Compensation
Focuses on the structure, design, and evaluation of contemporary organizational reward systems. Topics include linking compensation strategies to broader issues of organizational mission and strategic purpose, issues of internal and external equity in reward systems, and methodological strategies for the design of effective compensation systems.

8083
Training
Examines theoretical and practical issues in the development and implementation of training programs. Topics include assessment of training needs, design of training programs to meet organizational needs, psychological principles in the acquisition of knowledge, characteristics of individuals that facilitate and/or inhibit training program success, and evaluation of program effectiveness.

8093
Job Analysis
Examines processes through which job requirements are researched and identified, as well as the basis for developing job tasks and knowledge, abilities, and skills. Students become proficient in all major job analysis techniques that are the foundation for test development, selection, performance evaluation, training, compensation, and job design.

8103
Personnel Testing and Selection
Examines theory and applications of employment testing. Students learn major selection procedures (e.g., interviews, personality and cognitive ability tests, biodata, assessment centers) as well as strategies for test validation. Other evaluation topics such as bias, fairness, and utility analysis are emphasized.

8113
Applied Multivariate Statistics
Covers applications and extensions of the general linear model. Typical topics include linear and non-linear regression analysis, confirmatory factor analysis, structural equation modeling, and meta-analysis. Students will apply techniques to contemporary psychological problems.

8133
Emotion
Review of the dominant theories of emotion, including physiological, cognitive, and behavioral components. Examination of current topics and application of theory to understanding and ameliorating human problems.

8451-6 (1-6 hours)
Doctoral Level Practicum in Clinical Psychology
Practical, supervised work experience with actual clinical populations. Emphasis varies across different placements. Site placement must be individually arranged with practicum coordinator. Because course meetings are essential for integrating science with practice, attendance is required. Enrollment limited to matriculated clinical students.

8800-9 (0-9 hours)
Clinical Psychology Internship
Intensive, full-time experience in an approved training facility engaged in clinical service delivery. Includes professional work with clients, special training opportunities, and close supervision by licensed psychologists. Students must register during the internship, and they must satisfactorily complete the internship for the Ph.D. in clinical psychology.

8973
Doctoral Level Seminar
Rotating topical seminars on current issues of professional relevance.

8991-9 (1-9 hours)
Pre-dissertation Research

9981-9 (1-9 hours)
Dissertation Research

Approved Undergraduate Courses

The following undergraduate courses may be taken for graduate credit within the limits of the degree program and with the approval of the program director and the instructor. Graduate students enrolling in these courses complete assignments in addition to those completed by undergraduate students in the course.

6403
Psychology of Personality
Examines the major issues and methodological approaches to the study of personality, with emphasis on the biological and social factors that contribute to enduring tendencies and to human individuality.

6413
History of Psychology
The history of psychological thought from the pre-Socratic Greeks to the present and the development of psychology in the schools of structuralism, functionalism, behaviorism, Gestalt, and psychoanalysis.

6423
Gender and Psychology
Course reviews psychological research and theory pertaining to gender.

6433
Cognitive Psychology
An examination of cognitive processes involved in human perception, thinking, and learning, with a focus on theories and research on human information procession.

6443
Aging and Society
Examines the nature and implications of aging. Emphasis on competing theoretical perspectives on later life as well as practical issues (coping with stress of bereavement, declining health and independence, families in later life, care giving, abuse, ageism).

6463
Multicultural Community Psychology
Examines theories of culture, personality, and ethnicity; the psychological impact of racism and sexism; the acculturation and assimilation of immigrants; the special problems of refugees; intervention and prevention programs for community development among marginal groups.

6483
Biological Foundations of Behavior
Structure and function of the nervous system and related structures, with emphasis on neuron conduction and transmission, sensation, and current theory and research on the biological correlates of behavior.

6493
Children and Families with Special Needs
Emphasis on psychological, sociological, educational, philosophical, and ethical aspects of children and families with special needs. A family system approach is used to study the special needs accompanying problems in childhood (e.g., disabilities, chronic illness, child abuse).

Speech-Language Pathology

Chair
Paula Cadogan

Professor
Karen Patterson

Assistant Professors
Paula Cadogan
Lori Davis

Clinical Instructors
Jody Chesser
Karen Croley
Jan Fonkalsrud
Mary Moody

Students completing the Master of Science in Speech-Language Pathology degree program are eligible for membership in and are academically prepared for certification by the American Speech-Language-Hearing Association (ASHA). The program is ASHA-CAA accredited and emphasizes clinical education for the management of communication disorders in a variety of professional settings. The four semesters of class work and clinical education include two off-campus clinical experiences in a hospital or clinic and a school setting. Students learn to make professional judgments, plan clinical programs, develop innovative procedures and methods, assume total client management responsibility, and understand and use research information.

Admission

Minimum admission requirements to the department for graduate study include: (1) a baccalaureate from an accredited university, (2) an undergraduate grade point average of at least 3.00, (3) a composite score of at least 900 on the verbal and analytical portions of the Graduate Record Examination, (4) three letters of recommendation, and (5) admission to the Graduate School. Students lacking a bachelor's degree in speech-language pathology must take undergraduate leveling courses in the discipline before being considered for admission to the graduate program.

Clinical clock hours may be transferred from another university when previous clinical experience documents are signed by the program director or clinic director and sent directly to the Communication Disorders Department. Clinical experiences must have been supervised by ASHA-certified staff and documented on the student's transcript by practicum courses. A maximum of 100 clock hours, including observations, may be transferred for which a grade of B or better or P (pass) was earned.

General Requirements

Both thesis and non-thesis degree options are offered by the faculty in consultation with the student. Degrees include a minimum of 40 credit hours of work. The 40 credit hours includes a research methods course. Students must also have a course in statistics. The statistics course is a requirement that may be met as part of an undergraduate degree or may be taken as a graduate course.

Credit hours allotted a course are indicated by the last digit of the course number.

Communication Disorders Audiology (CDAU)

7181
Graduate Clinical Practicum
Supervised diagnostic experiences in audiometric procedures.

7281
Graduate Clinical Practicum
Supervised, advanced diagnostic experiences in audiometric evaluation techniques.

Communication Disorders Speech-Language Pathology (CDSP)

7083
Oro-facial Anomalies
An introduction to and treatment methods for the communication problems arising from congenital oro-facial anomalies. Prerequisite: CDSP 2053, 3113 or equivalent.

7113
Dementia and Brain Injury
Dementia associated with aging and brain injury disorders affecting the intellect and communication skills with an emphasis emphasis on characteristics, diagnosis, and management strategies are emphasized.

7122
The Dysarthrias
Nature, diagnosis, and treatment of the dysarthrias. Prerequisite: permission of instructor.

7133
Child Language Disorders
Methods of assessment and management of language disorders with preschool and school age children. Classroom discourse: instructional discourse, as well as reading and writing disabilities are investigated. Prerequisite: CDSP 2023 and CDSP3033 or equivalent.

7143
Aphasia
Nature, diagnosis, and treatment of aphasia. Anatomical and physiological substrates of language are also presented.

7153
Voice Disorders
Disorders of voice resulting from organic and functional changes in the vocal mechanism, including their etiology, symptomology, diagnosis, and treatment. Prerequisite: CDSP 2053 or permission of instructor.

7163
Augmentative and Alternative Communication
An introduction to the philosophy, evaluation techniques, and criteria used to prescribe and fit alternative communication devices and systems. A variety of high and low tech products, direct access and scanning devices, and switch types will be studied.

7172
Apraxia and Swallowing Disorders
Nature, diagnosis, and treatment of speech apraxia and swallowing disorders.

7181
Graduate Clinical Practicum
Supervised diagnostic/therapeutic experiences designed to meet specific student needs and ASHArequirements. Prerequisite: CDSP3181 or its equivalent.

7213
Fluency Disorders
The development, nature, and theories of ideopathic stuttering, neurogenic stuttering, and cluttering are presented. Diagnostic and treatment procedures are given.

7281
Graduate Clinical Practicum
Supervised intermediate diagnostic/therapeutic experiences meeting student needs and ASHA requirements. Prerequisite: 7181.

7381
Graduate Clinical Practicum
Supervised advanced diagnostic/therapeutic experiences meeting student needs and ASHA requirements. Prerequisite: 7281.

7482
Clinical Externship
Placement in outside agencies for an extensive and concentrated diagnostic/ therapeutic experience. Prerequisite: Permission of externship coordinator.

6542
School Practicum

7912
Research and Paper
Prerequisite: Permission of instructor.

7961
Residency
(See page 16.)

797V (1-3 hours)
Seminar

798V (1-5 hours)
Research and Thesis
Prerequisite: Permission of instructor.

799V (1-3 hours)
Independent Study
Prerequisite: Permission of instructor.

Approved Undergraduate Courses
The following undergraduate courses may be taken for graduate credit with approval from the graduate adviser. Graduate students enrolling in these courses will complete assignments in addition to those completed by undergraduate students in the course.

Communication Disorders Deaf Education (CDDE)

6473
Aural Rehabilitation
Methods used in teaching speech reading and auditory discrimination skills to the deaf and hard of hearing. Consideration of appropriateness of each method relative to age of individual, age of onset, and degree of hearing loss.

Communication Disorders Speech-Language Pathology (CDSP)

6033
Infants and Toddlers at Risk
The development, assessment and management of infants and toddlers at risk. Family issues and writing the IFSP are considered.

6133
Clinical Neurology
Provides a solid understanding of the anatomy and physiology of the human nervous system as a framework for understanding normal and abnormal speech, language and hearing processes.

6163
Evaluation of Speech and Language Disorders
Designed to acquaint the student with basic standardized tests used in the diagnosis of speech and language disorders.

Programs in the College of Business Administration

Mission

The mission of The University of Tulsa College of Business Administration is to educate, mentor, and empower students to become accomplished business and healthcare professionals and lifelong learners in a dynamic and complex world; to create a learning environment that fosters scholarly efforts by both faculty and students; to advance the professions through the creation and dissemination of new knowledge; and to enhance student learning through effective and innovative methods of teaching.

Accreditation

College programs are accredited. The Business Administration program is fully accredited by the International Association for Management Education (AACSB) and is one of a few select programs nationally that has been accredited at both the graduate and undergraduate levels. The Nursing program is approved by the Oklahoma Board of Nursing and is accredited by the National League of Nursing. The Athletic Training program is approved by the National Athletic Trainers Association.

Academic Programs

The Graduate School of The University of Tulsa, through the College of Business Administration, offers the following graduate degrees: the Master of Business Administration (both traditional on-campus program and internet-mediated program, Master of Finance, Master of Information Systems and Accounting, and Master of Taxation. The College also offers combined J.D./M.B.A., J.D./Master of Information Systems and Accounting, and J.D./Master of Taxation degrees in conjunction with the College of Law, and participates with the College of Engineering and Natural Sciences in an interdisciplinary program, the Master of Engineering and Technology Management. (See page 203 in this bulletin).

The Graduate Management Admission Test (GMAT) is required of all applicants to graduate business degree programs, with two exceptions. Applicants to the Master of Taxation program may substitute the Law School Admission Test (LSAT) for the GMAT, and applicants to the Master of Engineering and Technology Management program may substitute the Graduate Record Examination (GRE) for the GMAT.

(Note: Applicants for the Master of Engineering and Technology Management degree should refer to the program description on page 203 of this bulletin for specific requirements in regard to the basic tools and core areas.) Additionally, for all programs, applicants from non-English speaking schools must take the Test of English as a Foreign Language (TOEFL) and receive a score of 575 (old scoring) or 232 (new computer scoring). Refer to the International Applicants section, page 13 of this bulletin, for more information.

Admission

The programs are open to students with baccalaureate degrees from accredited colleges and universities, in any field of study. Admission is limited to applicants who

show high promise of success in business study. Program-specific admission criteria are listed on the following pages with the description of the program.

Curricula

Students in the M.B.A, Master of Science in Finance, Master of Information Systems and Accounting, and Master of Taxation programs at The University of Tulsa must satisfy both general and program-specific curriculum requirements. Students must demonstrate both knowledge of and competency in the basic skills and core areas of business, as appropriate to the objectives of the particular degree program.

Foundation courses for the M.B.A. and Master of Taxation Programs
Acct 0713, Accounting Concepts 3
Econ 0713, Economic Concepts* 3
QM 0713, Statistical Analysis* 3
Math 0713, Basic Calculus* 3
Fin 0723, Finance Concepts 3
Mgt 0723, Organization and Management Processes 3
Mktg 0723, Marketing Concepts 3
MIS 0713, Management Information Systems Concepts 3

*Students in the Master of Taxation program may substitute a finite mathematics course for Basic Calculus, an Introduction to Statistics course for Statistical Analysis, and Principles of Microeconomics for Economic Concepts.

Additional Foundation Courses Required for the M.B.A.:
BL 2013, Legal Environment of Business 3
QM 0723, Operations/Production Management 3

Course descriptions of the foundation courses are provided on page 105. See page 113 for the Master of Science in Finance Foundation Courses.

Waiver of Foundation Courses

Students with prior course work or equivalent learning may be eligible for waivers from one or more of the foundation courses. An initial waiver evaluation is accomplished at the time of application based on all available transcripts. Waivers for the Master of Business Administration, the Master of Science in Finance, and the Master of Information Systems and Accounting programs are based on completion of equivalent business courses with a grade of A or B. Courses for these programs must have been completed within the last six to eight years. There is no time limit imposed on prior course work for the Master of Taxation degree. Additionally, courses in which a student earned a grade of C may be applicable toward waiver in the Master of Taxation degree program.

The curricula specific to each degree program of study follow.

Foundation Courses

The number of credits allotted a course is indicated by the last digit in the course number.

Acct 0713
Accounting Concepts
Introduction to financial and managerial accounting concepts emphasizing the nature and purpose of accounting techniques for selecting and measuring economic events and financial information needed for various types of administrative decisions. Equivalent to two undergraduate courses in accounting principles. Available only to students with baccalaureate degrees.

Econ 0713
Economic Concepts
Introduction to micro and macroeconomic theory involving consumer behavior, theory of the firm, market structures, factor markets, national income, employment, and price behavior. Equivalent to two undergraduate courses in principles of economics. Available only to students with baccalaureate degrees.

BL2013
Legal Environment of Business
Introduction to law and legal principles, including basic principles of contracts, agency, and commercial papers.

Math 0713
Mathematics for Business Applications
Review of algebra and analytic geometry, vectors and matrices, principles of calculus of one and several variables, differential equations, and curve fitting for applications in business. Available only to students with baccalaureate degrees.

MIS 0713
Management Information Systems Concepts
A survey course in information systems, issues, and concepts from a managerial point of view. The objective is to develop a framework for integrating technical, economic, and behavioral topics related to planning and control and organizational information resources. Available only to students with baccalaureate degrees.

QM 0713
Statistical Analysis
An introduction to basic concepts in collection, presentation, analysis, and interpretation of data, emphasizing capabilities of different statistical techniques and business applications. Topics include statistical estimation, hypothesis testing, regression, and time series analysis. Available only to students with baccalaureate degrees. Prerequisite: Math 0713.

Fin 0723
Finance Concepts
An introduction to basic principles and practices of managerial finance, and financial decision-making in a corporate context. Attention is devoted to the effective management of financial resources and to the concepts of financial analysis and planning, working capital, capital budgeting, capital structure, and methods of financing. Available only to students with baccalaureate degrees.

Mgt 0723
Organization and Management Processes
An introduction to basic processes and concepts of management and organizational behavior (i.e., leadership, motivation, communication, job design, control systems, work attitudes, planning and budgeting, organization design and change, etc.) featuring an intensive organizational simulation. Available only to students with baccalaureate degrees.

Mktg 0723
Marketing Concepts
An introduction to managerial considerations in marketing decisions, evaluation of alternative courses of action and strategy in profit terms, demand analysis, case studies in sales, product development, distribution channels, pricing, and promotion areas. Available only to students with baccalaureate degrees.

QM 0723
Operations/Production Management
An introduction to the salient topics of production/operation management. Emphasis placed on effective methods for managing productive systems. The topics include process design, facilities location, forecasting, aggregate planning, inventory control, materials requirements planning, and scheduling. Available only to students with baccalaureate degrees.

Master of Business Administration (M.B.A.) - Traditional Program

Program Advisors
Rebecca Holland
Bodil Mills

The primary goal of the M.B.A. program is to provide a quality graduate-level education that will prepare graduates for professional management careers in the private and public sectors, and for positions of leadership and responsibility in business and society. In particular, the curriculum is designed to:

(1) provide general management graduate-level education for students with baccalaureate degrees in the arts, the humanities, the social, natural, or physical sciences, and engineering, as well as business administration;
(2) develop and strengthen managerial tools and decision-making capabilities for those individuals in managerial positions who wish to improve their effectiveness and enhance their career advancement;
(3) prepare students who plan to pursue doctoral study in business administration.

Students may earn the degree through either full-time or part-time study.

Admission

Admission criteria include, but are not limited to, the following:

(1) an applicant's undergraduate grade point average, both overall and in upper division course work;
(2) an applicant's score on the Graduate Management Admission Test (GMAT); and
(3) an applicant's professional/business experience as evidenced by factors as a record of employment at increasing levels of responsibility.

Curriculum - Traditional M.B.A. program

In addition to demonstrating knowledge of and competency in the basic skills and core areas of business, candidates for the Master of Business Administration degree must complete 30 semester hours of advanced study in business. A minimum of 24 hours must be in courses reserved exclusively for graduate students.

Twenty-one hours of the advanced course work are required courses. (See below for the list of required courses.) Nine hours are electives which may be concentrated in one discipline or distributed among several, as appropriate to the student's interests and career objectives. A maximum of six hours of graduate electives may be taken outside the College of Business Administration, subject to approval by the graduate advisor. No thesis is required for the Master of Business Administration. The 30 semester hours of advanced study are as follows:

Acct 7003, Managerial Accounting* 3
Econ 7003, Managerial Economic Analysis 3
Fin 7003, Financial Administration 3

Mgt 7003, Behavioral Sciences in Administration 3
Mktg 7003, Advanced Marketing Management 3
QM 7003, Introduction to Operations Research 3
Mgt 7883, Business Policy 3
Electives 9
TOTAL 30

*For students with an undergraduate accounting degree an advanced 7000-level course may be substituted.

Waiver of Foundation Courses

Students with prior course work or equivalent learning may be eligible for waivers from one or more of the foundation courses. An initial waiver evaluation is accomplished at the time of application based on all available transcripts. Waivers are based on completion of equivalent business courses, with a grade of A or B. Courses for these programs must have been completed within the last six to eight years.

See page 105 for course descriptions.

Satisfactory Progress

A candidate for the degree is expected to complete the program in a timely manner. All requirements for the degree must be completed within six years from date of enrollment in the program. The 30 semester hours of advanced courses must be completed within the four years prior to graduation. Students who do not make satisfactory progress may be dismissed from the program.

Master of Business Administration - Internet-Mediated (MBA)

Program Advisors
Rebecca Holland
Bodil Mills

The primary goal of the internet-mediated M.B.A. program is to make graduate management education more accessible. This program is designed for busy professionals to study part-time using technology such as CD-ROMs, e-mail, and the Internet to receive course material, complete assignments, and interact with professors and classmates. In particular, the curriculum is designed to:

(1) Provide an Information Technology focused general management education for students with baccalaureate degrees from various curricula;
(2) develop and strengthen managerial tools and decision-making capabilities for those individuals in managerial positions who wish to improve their effectiveness and enhance their career advancement;
(3) allow completion in two years of study.

Admission

Admission criteria include, but are not limited to, the following:

(1) an applicant's undergraduate grade point average, both overall and in upper division course work;
(2) an applicant's score on the Graduate Management Admission Test (GMAT); and
(3) an applicant's professional/business experience as evidenced by factors such as a record of employment at increasing levels of responsibility.

Curriculum - Internet-mediated M.B.A. (MBA) Program

In addition to demonstrating knowledge of and competency in the basic skills and core areas of business, candidates for the MBA degree (internet-mediated) must complete 39 credit hours of advanced study in business. A straightforward, set course sequence of two courses each term, three terms a year for two years, eliminates uncertainty. Students are required to attend one two-day session on campus each term for which they earn 1/2 credit hour. This two-day session includes orientation for the next term, assessment, and intensive seminars. No thesis is required for the degree, but there is a final team project. The 48 semester hours of study are as follows:

Summer - Foundations

IMBA 0713, Accounting & Finance Concepts 3
IMBA 0723, Economics 3
IMBA 0733, Quantitative Analysis & Statistics 3

Fall term (Year One)
IMBA 7113, Accounting for the Information Age 3
IMBA 7123, MIS (Management Information Systems) 3
IMBA 7130, Orientation/Assessment/Seminar 1/2

Spring term (Year One)
IMBA 7213, Management 3
IMBA 7223, Finance 3
IMBA 7231, Orientation/Assessment/Seminar 1/2

Summer term (Year One)
IMBA 7313, Marketing 3
IMBA 7323, Operations Management 3
IMBA 7330, Orientation/Assessment/Seminar 1/2

Fall term (Year Two)
IMBA 7413, Innovation & Corporate Entrepreneurship 3
IMBA 7423, International Business Topics in Finance
and Marketing 3
IMBA 7431, Orientation/Assessment/Seminar 1/2

Spring term (Year Two)
IMBA 7513, Supply Chain Management 3
IMBA 7523, E Commerce 3
IMBA 7530, Orientation/Assessment/Seminar 1/2

Summer term (Year Two)
IMBA 7613, Topics in IT Management 3
IMBA 7623, Strategic Management 3
IMBA 7631, Orientation/Assessment/Seminar 1/2

TOTAL 48

Waiver of Foundation Courses

Foundation and advanced courses have been developed specifically for this graduate program. Students with prior course work or equivalent learning may be eligible for waivers from one or more of the three foundation courses. An initial waiver evaluation is accomplished at the time of application based on all available transcripts. The condition for such a waiver is based on completion of equivalent business courses, with a grade of A or B. Courses for this program must have been completed within the last six to eight years.

Course Descriptions

IMBA0713
Accounting and Finance Concepts
An introduction and integration of accounting and finance concepts in a corporate context. Attention is devoted to accounting techniques for income measurement, accounting information needed for administrative decision, and to the concepts of financial analysis and planning, working capital, capital budgeting, capital structure, and methods of financing.

IMBA0723
Economics
Introduction to micro- and macroeconomic theory involving consumer behavior, theory of the firm, market structures, factor markets, national income, employment, and price behavior.

IMBA0733
Quantitative Analysis and Statistics
An introduction to basic concepts in collection, presentation, analysis, and interpretation of data, emphasizing capabilities of different statistical techniques and business applications. Topics include statistical estimation, hypothesis testing, experimental design, regression analysis, and decision analysis.

IMBA7113
Accounting for the Information Age
Cost accumulation systems, routine planning and control, non-routine decisions. Topics include job order costing, process costing, standard costing, cost-volume-profit analysis, budgetary control and profit planning, internal reporting for business segments, differential costs and revenues, and behavioral aspects of managerial accounting.

IMBA7123
Management Information Systems
Surveys information systems, issues, and concepts from a managerial point of view. Includes developing a framework for integrating technical, economic, and behavioral topics related to planning and control and organizational information resources. Topics include project management methods, project scheduling, control techniques, and group dynamics used to solve information systems problems.

IMBA7130
Orientation/Assessment/Seminar
Students are required to attend a two-day session on campus each term to introduce them to the material for the next term, complete exams, and attend a seminar on a subject related to the course work of the next term.

IMBA7213
Management
Examines general management functions and the role of individual, group, and organizational behavior in the management process. An overview of the pertinent theories of behavioral aspects in the management of formal organizations. Focuses on enabling the student to internalize the conceptual material necessary for management excellence.

IMBA7223
Finance
A study attempting an understanding of the numerous financial decisions confronting the modern business firm. Emphasizes developing practical decision-making approaches for solving financial problems

IMBA7231
Orientation/Assessment/Seminar
Students are required to attend a two-day session on campus each term to introduce them to the material for the next term, complete exams, and attend a seminar on a subject related to the course work of the next term.

IMBA7313
Marketing
Advanced course that integrates managerial marketing concepts. Emphasis on the analytical prerequisites for strategic marketing planning, formal strategic planning methods, and implementation and control issues.

IMBA7323
Operations Management
Introduces the salient topics of operations management. Emphasizes effective methods for managing productive systems. Topics include operations strategy, process design, quality management, forecasting, aggregate planning, inventory management, lean production, and project management

IMBA7330
Orientation/Assessment/Seminar
Students are required to attend a two-day session on campus each term to introduce them to the material for the next term, complete exams, and attend a seminar on a subject related to the course work of the next term.

IMBA7413
Innovation and Corporate Entrepreneurship
Processes for developing, managing and focusing innovative and creative activities within the business context; opportunity recognition and evaluation; how to develop new business concepts for implementation; and issues pertaining to the spin-off of new corporate ventures.

IMBA7423
International Business Topics in Finance and Marketing
Integrated examination of the international business environment as it affects financial and marketing decisions and opportunities, focusing on the impact of global factors on marketing and financial activities, including international agreements, foreign exchange, import/export markets, international treasury functions, and market risk and diversification.

IMBA7430
Orientation/Assessment/Seminar
Students are required to attend a two-day session on campus each term to introduce them to the material for the next term, complete exams, and attend a seminar on a subject related to the course work of the next term.

IMBA7513
Supply Chain Management
Examines integrating the business functions of an enterprise and its allied partners along supply channels into a supply system that synchronizes the flow of products, services, and information to meet customer service requirements while minimizing costs. Includes distribution network configuration, inventory control, supply chain integration and strategic partnering, and use of information technology.

IMBA7523
E Commerce
Examines technologies, existing applications, and projections for the future of the web on business strategies. Students become familiar with the web, browsers, technologies (client side v. server side), Internet-Intranet-Extranet, connectivity and band-width issues, and the security, communications and training issues that accompany electronic commerce.

IMBA7531
Orientation/Assessment/Seminar
Students are required to attend a two-day session on campus each term to introduce them to the material for the next term, complete exams, and attend a seminar on a subject related to the course work of the next term.

IMBA7613
Topics in IT Management
A seminar in current issues in information technology management, including case studies in the identification, development, marketing, financing, and management of ITbusiness opportunities.

IMBA7623
Strategic Management
Examines strategies for competing within industries, diversifying across industries, and expanding globally, including consideration of the organization structures and decision processes through which strategies are formed, carried out, and modified over time.

IMBA7631
Orientation/Assessment/Seminar
Students are required to attend a two-day session on campus each term to introduce them to the material for the next term, complete exams, and attend a seminar on a subject related to the course work of the next term.

Master of Science in Finance

Program Advisor
Rebecca Holland

Finance Department Chair
Roger Bey

The Master of Science in Finance (MSF) program prepares students for a professional career in a range of specialized areas: corporate finance, investments, portfolio management, financial institutions, international finance, and risk management. This program is designed for students who desire an opportunity for in-depth study of the sophisticated analytical techniques and market transactions that drive financial innovation. Curriculum options for corporate finance, investments and portfolio management, and international finance are designed for students with an undergraduate degree in business administration, an MBA, or graduate degrees in other disciplines who desire to specialize in finance. The risk management option is designed for students with strong quantitative backgrounds, typically with undergraduate degrees in mathematics, statistics, physical sciences, and engineering.

Admission

Admission criteria include, but are not limited to, the following:

(1) an applicant's undergraduate grade point average, both overall and in upper division course work;
(2) an applicant's score on the Graduate Management Admission Test (GMAT); and
(3) an applicant's professional/business experience as evidenced by factors such as a record of successful employment at increasing levels of responsibility.

Curriculum

All candidates for the M.S. in Finance degree must have completed or complete the foundation courses and 30 semester hours of advanced study. Depending on the curriculum option, students must complete twenty-one to twenty-four credit hours of the advanced courses and six to nine hours of electives. The curriculum requirements for each option of study are shown on pages 113–116. No thesis is required, but it is an option for the M.S. in Finance degree. A minimum of 21 credit hours must be completed in advanced courses reserved exclusively for graduate students.

Waiver of Foundation Courses

Students with prior course work or equivalent learning may be eligible for waivers from one or more of the foundation courses. An initial waiver evaluation is completed at the time of application based on all available transcripts. The condition for such a waiver is based on completion of equivalent courses, with a grade of A or B. These courses must have been completed within the last six years.

Foundation Courses Hours

Acct 0713, Accounting Concepts 3
Econ 0713, Economic Concepts 3
MIS 0713, Management Information Systems Concepts 3
QM 0713, Statistical Analysis 3
QM 0723, Operations/Productions Management 3
Fin 0723, Finance Concepts 3
Math 0713, Mathematics for Business Applications I[1] 3
Math 2014, Calculus I[2] 4
Math 2024, Calculus II[2] 4

[1]Required for the corporate finance, investments and portfolio management, and international finance options.
[2]Required for the risk management option.

Corporate Finance Option

Required Courses (21 hours) Hours

Acct 6153, Financial Statement Analysis 3
or
Acct 7003, Managerial Accounting 3
Fin 7003, Financial Administration 3
Fin 7013, Long-Term Financial Decisions 3
Fin 7033, Risk Management 3
Fin 7043, Working Capital Management 3
Fin 7093, International Financial Management 3
QM 7003, Introduction to Operations Research 3

Elective Courses I (6-9 hours)

Econ 7003, Managerial Economic Analysis 3
Fin 6113, Student Investment Fund I 3
Fin 7023, Investment Analysis and Management 3
Fin 7053, Portfolio Management 3
Fin 7063, Behavior of Financial Markets 3
Fin 7073, Empirical Methods in Finance 3
Fin 7133, Advanced Topics in Risk Management 3
Fin 7153, Trading and Risk Management 3
Fin 7163, Pricing and Managing Derivatives 3
Fin 7193, Applied Finance Project 3
Fin 7973, (seminar in finance) 3
Fin 7993, Independent Study 3
Master's Thesis 3

Elective Courses II (0-6 hours)

Acct 6153, Financial Statement Analysis 3
Acct 7003, Managerial Accounting 3
Acct 7073, Management Control Systems 3
Econ 7043, Monetary and Fiscal Policy 3
Math 6343, Introduction to Partial Differential Equations 3
Math 6603, Introduction to Numerical Methods 3
MIS 7093, Strategic Information Systems 3
MIS 7123, Decision and Knowledge-Based Systems 3
QM 7053, Computer Simulation 3
Stat 6613, Probability 3

Investments and Portfolio Management Option

Required Courses (21 hours) Hours

Acct 6153, Financial Statement Analysis 3
or
Acct 7003, Managerial Accounting 3
Fin 7003, Financial Administration 3
Fin 7023, Investment Analysis and Management 3
Fin 7033, Risk Management 3
Fin 7053, Portfolio Management 3
Fin 7063, Behavior of Financial Markets 3
QM 7003, Introduction to Operations Research 3

Elective Courses I (3-9 hours)

Fin 6113, Student Investment Fund I 3
Fin 7013, Long-Term Financial Decisions 3
Fin 7043, Working Capital Management 3
Fin 7073, Empirical Methods in Finance 3
Fin 7093, International Financial Management 3
Fin 7133, Advanced Topics in Risk Management 3
Fin 7153, Trading and Risk Management 3
Fin 7163, Pricing and Managing Derivatives 3
Fin 7193, Applied Finance Project 3
Fin 7973, (seminar in finance) 3
Master’s Thesis 3

Elective Courses II (0-6 hours)

Acct 6153, Financial Statement Analysis 3
Acct 7003, Managerial Accounting 3
Econ 7043, Monetary and Fiscal Policy 3
Math 6343, Introduction to Partial Differential Equations 3
Math 6603, Introduction to Numerical Methods 3
MIS 7093, Strategic Information Systems 3

MIS 7123, Decision and Knowledge-Based Systems 3
QM 7053, Computer Simulation 3
Stat 6613, Probability 3

International Finance Option

Required Courses (24 hours) Hours

Acct 6153, Financial Statement Analysis 3
or
Acct 7003, Managerial Accounting 3
Econ 6063, International Economics 3
Fin 7003, Financial Administration 3
Fin 7023, Investment Analysis and Management 3
or
Fin 7053, Portfolio Management 3
Fin 7093, International Financial Management 3
Fin 7993 Independent Study (International internship or study of finance at an international university 3
Law 5363, International Law 3
QM 7003, Introduction to Operations Research 3

Elective Courses (6 hours)

Acct 6153, Financial Statement Analysis 3
Acct 7003, Managerial Accounting 3
Econ 7003, Managerial Economic Analysis 3
Econ 7043, Monetary and Fiscal Policy 3
Fin 6113, Student Investment Fund I 3
Fin 7013, Long-Term Financial Decisions 3
Fin 7023, Investment Analysis and Management 3
Fin 7033, Risk Management 3
Fin 7043, Working Capital Management 3
Fin 7053, Portfolio Management 3
Fin 7063, Behavior of Financial Markets 3
Fin 7073, Empirical Methods in Finance 3
Fin 7133, Advanced Topics in Risk Management 3
Fin 7153, Trading and Risk Management 3
Fin 7163, Pricing and Managing Derivatives 3
Fin 7193, Applied Finance Project 3
Fin 7973, (seminar in finance) 3
Fin 7993, Independent Study 3
Mktg 7043, International Marketing 3
Master’s Thesis. 3

Risk Management Option

Required Courses (24 hours) Hours

Fin 7003, Financial Administration 3
Fin 7023, Investment Analysis and Management 3
or
Fin 7053, Portfolio Management 3
Fin 7033, Risk Management 3
Fin 7073, Empirical Methods in Finance 3
Fin 7133, Advanced Topics in Risk Management 3
Fin 7153, Trading and Risk Management 3
Math 7503, Stochastic Simulation and Queuing 3
QM 7003, Introduction to Operations Research 3

Elective Courses I (3-6 hours)

Fin 6113, Student Investment Fund I 3
Fin 7023, Investment Analysis and Management 3
or
Fin 7053, Portfolio Management 3
Fin 7043, Working Capital Management 3
Fin 7063, Behavior of Financial Markets 3
Fin 7093, International Financial Management 3
Fin 7163, Pricing and Managing Derivatives 3
Fin 7193, Applied Finance Project 3
Fin 7973, (seminar in finance) 3
Fin 7993, Independent Study 3
Master's Thesis 3

Elective Courses II (0-3 hours)

Math 6543, Introduction to Partial Differential Equations 3
Math 6603, Introduction to Numerical Methods 3
MIS 7093, Strategic Information Systems 3
MIS 7123, Decision and Knowledge-Based Systems 3
QM 7053, Computer Simulation 3
Stat 6613, Probability 3

Master of Information Systems and Accounting

Program Advisor
Rebecca Holland

MIS Department Chair and Director of School of Accounting
Anita S. Hollander

The Master of Information Systems and Accounting program prepares students for a professional accounting and/or information systems career. This program is designed for students who want to blend topics typically associated with information systems and accounting programs of study. Persons who have an information systems background strengthen their information systems expertise and gain additional accounting and business knowledge. Persons who plan to enter CPA practice as well as persons already practicing in the accounting area develop technical competence and conceptual understanding in accounting and information systems. Faculty from the College of Business Administration and qualified accounting and information systems professionals provide courses for both beginning and advanced students. Students may earn the degree through either part-time or full-time study.

Admission

Admission criteria include, but are not limited to, the applicant's

(1) undergraduate grade point average, both overall and in upper-division course work;
(2) score on the Graduate Management Admission Test (GMAT) or the Law School Admission Test (LSAT); and
(3) professional/business experience as evidenced by factors as a record of employment at increasing levels of responsibility.

Waiver of Foundation Courses

Students with prior course work or equivalent learning may be eligible for waivers from one or more of the College of Business graduate program Foundation courses (a list is available from the College of Business Graduate Office). An initial waiver evaluation for the graduate degree is accomplished at the time of application based on all available transcripts. The condition for such a waiver is based on completion of equivalent courses, with a grade of A or B. Courses for this program must have been completed within the last six to eight years (depending upon the course in question).

Satisfactory Progress

A candidate for the degree is expected to complete the program of study in a timely manner. All requirements for the program must be completed within six years from the date of enrollment in the program. Students who do not make satisfactory progress may be dismissed from the program.

Curriculum

In addition to the requisite foundation knowledge and competencies described on page 117, candidates pursuing the Master of Information Systems and Accounting degree must complete MIS 2013 and CS 1043 (or equivalents) before beginning this 30-hour program. Students take approved graduate courses in business, information systems, computer science, and/or accounting. A minimum of 21 semester hours must be in courses reserved exclusively for graduate students. Students may not repeat courses completed during their undergraduate program.

Students who intend to fulfill the requirements to sit for the Certified Public Accountant examination in Oklahoma must also complete 30 hours in accounting, including at least three hours of auditing. Effective July 1, 2003, persons sitting for the CPA examination in Oklahoma must complete 150 hours of course work, with 76 hours of course work beyond the 3000 level and 36 hours of upper division accounting courses (including one course in auditing). Therefore, students who do not have an undergraduate accounting degree but wish to use this program to fulfill the requirements to sit for the CPA exam should complete Acct 3110/3113/3123 Accounting Processes and Problem Solving I A/B (or equivalent), before beginning the program. (Ideally, completion of Acct 3130/3133/3143, Accounting Processes and Problem Solving I A/B (or equivalent), should also be completed before beginning the program.)

No thesis is required for the Master of Information Systems and Accounting degree. A minimum of 21 semester hours must be in courses reserved exclusively for graduate students.

Course Requirements

Block I: Required Accounting and Management Information Systems Courses (12 hours)

Acct 7113, Information Systems Auditing and Security 3
Acct 7213, Financial Systems and Corporate Applications 3
Acct 7223 or MIS 7223, Business on the Web 3
Acct 7293 or MIS 7093, Strategic Information Systems 3

Block II: Elective Accounting and Management Information Systems Courses (0-18 hours)

Acct 7003, Managerial Accounting 3
Acct 7073, Management Control Systems 3
Acct 7973, Seminar in Accounting Issues 3
Acct 7083, Professional Accounting Issues 3
Acct 7093, Graduate Accounting Seminar 3
MIS 7113, Telecommunications for Managers 3
MIS 7133, Databases/Analysis and Design 3
MIS 7123, Decision Support Strategies for Businesses 3
MIS 7973, Seminar in Management Information Systems 3

Block III: Approved Undergraduate Course Electives (0-9 hours)

Acct 6123 and 6143, Accounting Processes and Problem Solving II 6
Acct 6213, Financial Accounting Research Applications 3
Acct 6223, Internal Reporting Issues 3
Acct 6233, Topics in Federal Income Taxation 3
Acct 6243, Auditing Assurance for Accounting Systems 3
Acct 6973, Seminar in Accounting 3
MIS 6023, Business Programming Concepts II 3
MIS 6083, Database Design and Applications 3
MIS 6013, Systems Analysis and Design 3
MIS 6143, Telecommunications Systems 3
MIS 6403, Systems Development Project 3
MIS 6423, MIS Senior Seminar 3
MIS 6413, Decision Support Strategies 3
MIS 6163, Internet Development Project 3
MIS 6173, Network Administration 3
MIS 6973, Seminar in Management Information Systems 3

Block IV: Other Electives (0-18 hours)

Up to 18 hours of approved graduate courses in business, information systems, computer science, and/or accounting courses may be selected with the approval of the graduate advisor. Appropriate courses offered by the College of Business Administration, College of Engineering or other colleges are eligible for credit.

See pages 130-132 for course descriptions.

Master of Taxation

Program Advisor
Rebecca Holland

Director of School of Accounting
Anita S. Hollander

The Master of Taxation program prepares students for a professional tax career. Persons who plan to enter tax practice as well as persons already practicing in the tax area develop technical competence and conceptual understanding in taxation. Full-time faculty from the School of Accounting and qualified tax professionals provide tax courses for both beginning and advanced students. Students may earn the degree through either part-time or full-time study.

Admission

Admission criteria include, but are not limited to, the applicant's:

(1) undergraduate grade point average, both overall and in upper-division course work;
(2) score on the Graduate Management Admission Test (GMAT) or the Law School Admission Test (LSAT); and
(3) professional/business experience as evidenced by factors as a record of employment at increasing levels of responsibility.

Curriculum

In addition to the requisite foundation knowledge and competencies described on pages 103-104, candidates for the Master of Taxation degree must complete

(1) 12 semester hours of prerequisite undergraduate accounting course work, including one course in taxation;
(2) 30 semester hours of graduate study with five required courses (15 hours) in taxation. Fifteen hours of approved electives may be in other graduate accounting, taxation, or business courses, as well as courses in other colleges of the university.

No thesis is required for the Master of Taxation degree. At least 21 semester hours must be in courses reserved exclusively for graduate students.

Waiver of Foundation Courses

Students with prior course work or equivalent learning may be eligible for waivers from one or more of the foundation courses. An initial waiver evaluation for the Master of Taxation degree is accomplished at the time of application based on all available transcripts. The condition for such a waiver is based on completion of equivalent courses with a grade of A, B, or C. There is no time limit imposed on prior course work for the Master of Taxation degree.

The requisite 15 hours in taxation must be distributed as follows:

Block I: Required Tax Courses (15 hours)

Acct 7233, Tax Research, Practice and Planning 3
Acct 7063, Federal Income Taxation of Corporations and Shareholders I 3
Acct 7143, Taxation of Partnerships and S-Corporations 3
Acct 7153, Tax Accounting Methods 3
Acct 7163, Federal Income Taxation of Corporations and Shareholders II 3

Block II: Elective Tax Courses (0-15 hours)

Acct 7123, Oil and Gas Taxation 3
Law 5503, Taxation of Estate, Trusts and Gifts 3
Acct 7173, Taxation of Pensions and Employee Benefits 3
Acct 7183, Taxation of Property and Security Transactions 3
Acct 7193, International Aspects of Taxation 3
Acct 7973, Seminar in Tax Accounting Issues 3
Acct 7991-3, Independent Study in Accounting 1-3

Block III: Other Electives (0-15 hours)

Up to 15 hours of non-tax graduate courses may be selected with the approval of the graduate advisor. Appropriate courses offered by the College of Business Administration, College of Law or other colleges are eligible for credit.

See pages 122-124 for course descriptions.

Satisfactory Progress

A candidate for the degree is expected to complete the program of study in a timely manner. All requirements for the program must be completed within six years from the date of enrollment in the program. Students who do not make satisfactory progress may be dismissed from the program.

Accounting

Director
Anita S. Hollander

Professor
Patrick A. Hennessee

Associate Professors
Karen S. Cravens
Anita S. Hollander
Dennis H. Hudson
Stephen R. Rockwell

Assistant Professor
Wray E. Bradley

7223
Business on the Web
Student research and project seminar that explores the growing number of businesses on the Web and business transactions completed using the Internet. Sample topics include legal issues, regulations, design issues, business issues, Web tools (including tutorials), electronic commerce infrastructures and architectures, standards, support partners and Internet support vendors. Prerequisites: MIS 0713 or equivalent with at least a B, and permission of instructor.

7003
Managerial Accounting
Study of cost accumulation systems, routine planning and control, non-routine decisions. Topics include job order costing, process costing, standard costing, cost-volume-profit analysis, budgetary control and profit planning, internal reporting for business segments, differential costs and revenues, and behavioral aspects of managerial accounting. Acct 2113/ 2123 or equivalent. Not open to students who recently have completed Acct 4223 or equivalent.

7063
Federal Income Taxation of Corporations and Shareholders I
Study of concepts and principles of federal income taxation of corporations and their shareholders. Students are expected to apply their knowledge to solve advanced tax problems. Prerequisite: Acct 4233 or equivalent.

7073
Management Control Systems
Study of design and use of management control systems. Topics include The Rise and Fall of Management Accounting, Activity-based Costing, World-Class Management Accounting, and Cost Accounting in the New Manufacturing Environment. Key features are case studies and research projects. Prerequisite: Accounting 3133/3143 or equivalent, Acct 7003, or permission of instructor.

7083
Professional Accounting Issues
Study of issues and forces influencing the development of both private and public elements of the accounting profession. Topics covered include certification, specialization, ethics, legal liability, rulemaking processes, and extensions of the attest function. Prerequisite: Permission of instructor.

7093
Graduate Accounting Seminar
Critical analysis of selected topics in financial accounting, accounting theory, auditing/assurance services, international accounting, governmental accounting and/or not for profit accounting. Prerequisite: Acct 3133/6133 and 3143/ 6143 or equivalent and permission of the instructor.

7113
Information Systems Auditing and Security
A critical analysis of the data and information flows in a variety of information system architectures. Security issues are also researched and discussed. Prerequisite: Permission of instructor

7123
Oil and Gas Taxation
Designed to develop competence in applying federal tax law and regulations to the oil and gas industry. Emphasis on the production

phase of the oil and gas industry, starting with the search for oil and gas and ending when the products of the wells are delivered to pipelines for transportation to refineries or customers. Prerequisite: Acct 4233.

7143
Taxation of Partnerships and S-Corporations
Tax treatment in relation to the formation of a partnership, partnership operation, partnership distributions, and the sale of a partnership interest. S Corporations are compared to partnerships along with the use of S-Corporations. Prerequisite: Acct 4233.

7153
Tax Accounting Methods
Problems relating to tax accounting emphasizing income recognition under various accounting methods such as installment reporting, cost and accrual method of accounting, accounting for long-term contracts. Topics include prepaids, accounting for interest, unstated interest, accounting for inventories, and tax planning considerations. Prerequisite: Acct 4233.

7163
Federal Income Taxation of Corporations and Shareholders II
A continuation of Federal Income Taxation of Corporations and Shareholders I (Accounting 7063) with emphasis on corporate reorganizations and liquidation of subsidiaries. Examination of the accumulated earning tax, personal holding companies, and collapsible corporations. Prerequisite: Acct 7063.

7173
Taxation of Pensions and Employee Benefits
Focuses on the main areas of pension and employee benefits taxation, regulation, and law with the primary emphasis on taxation. Topics include employee welfare plans and basic ERISAlaw governing employee benefits; nonqualified deferred compensation plans; and qualified pension and savings plans including IRAs, Simplified Employee Pension and Keogh plans. Prerequisite: Acct 4233 or permission of instructor.

7183
Taxation of Property and Security Transactions
Tax consequences in property transactions. Emphasizes basis determination, recognition of gains and losses, nontaxable exchanges, capital gains and losses, disposition of business property. Includes basis computation, effects of liabilities on property transactions, wash sales, sales between related parties, sale of personal residence, involuntary conversions, like-kind exchanges, Section 1231 sales, recapture provisions, tax planning. Prerequisite: Acct 4233.

7193
International Aspects of Taxation
International taxation of U.S. entities and U.S. foreign tax laws, emphasizing taxation of U.S. citizens living abroad and of U.S.-based corporations. Includes foreign source income, foreign tax credits or declarations, DISCS, foreign currency gains and losses, U.S. taxation of aliens, controlled foreign corporations, foreign personal holding companies and sales corporations, and tax planning. Prerequisite: Acct 4233.

7213
Financial Systems and Corporate Applications
Intensive study of the evolution of financial/accounting information systems and corporation applications such as enterprise resource planning systems (ERP). Prerequisite: Permission of instructor.

7233
Tax Research, Practice and Planning
Development of tax research skills and their application to tax practice and planning. Factual cases are analyzed to isolate critical facts and tax questions, and develop knowledge of the use of computerized tax data bases, tax services and periodicals. Issues relevant to tax practice before the Internal Revenue Service are explored. Prerequisites: Acct 4233, or equivalent Introduction to Tax course.

7293
Strategic Information Systems
A study of the strategic value of information in a firm and the integration of strategic management and information systems. Focus is on information as a competitive weapon as well as its role in value chain analysis. Prerequisite:

MIS 0713 or its equivalent with a grade of "B" or better.

7973
Seminar in Accounting Issues
A critical analysis of selected topics in accounting. Prerequisite: Permission of instructor.

7983
Thesis
Development and study of a research area in written thesis acceptable to the candidate's thesis committee.

799V (1-3 hours)
Independent Study in Accounting
Individual study in a specialized area of interest. Prerequisites: Permission of graduate advisor and supervisory professor.

Approved Undergraduate Accounting Courses

The following undergraduate courses may be taken for graduate credit with approval from the graduate advisor. A student enrolling in these courses will complete assignments in addition to those completed by the undergraduate students in the course.

6133
Accounting Processes and Problem Solving IIA.
Continuation of Acct 3113 and 3123. Integrated study of several accounting perspectives in analyzing and reporting information. Generic business events of service, manufacturing, merchandising, and not-for-profit entities are analyzed. Themes include income, cash flows, economic resources, obligations and capital. Emphasizes student research, problem solving and critical thinking. Offered spring semester. Prerequisites: Acct 3113, 3123, and MIS 3003 or equivalents. Corequisites: Acct 6143 and 3130.

6143
Accounting Processes and Problem Solving IIB
Continuation of Acct 3113 and 3123. Integrated study of several accounting perspectives in analyzing and reporting information. Generic business events of service, manufacturing, merchandising, and not-for-profit entities are analyzed. Themes include income, cash flows, economic resources, obligations and capital. Emphasizes student research, problem solving and critical thinking. Offered spring semester. Prerequisites: Acct 3113, 3123, and MIS 3003 or equivalents. Corequisites: Acct 6123 and 3130.

6213
Financial Accounting Research Applications
Impact of technical considerations of business events on financial statements. Includes accounting theories that may conflict with one another and thereby lead to different conclusions in different circumstances. Inductive-deductive method of inquiry and empirical studies cast in a pragmatic framework. Offered spring semester. Prerequisites: Acct 3133/6123 and Acct 3143/6143 or equivalents.

6223
Internal Reporting Issues
Conceptual and practical aspects of designing and using management information systems for planning, control, and decision making in manufacturing, merchandising, service and not-for-profit organizations. Offered spring semester. Prerequisites: Acct 3133/6123 and Acct 3143/6143 or equivalents.

6233
Topics in Federal Income Taxation
Principles and concepts of federal income taxation as applied to various taxable entities. Emphasis on tax planning and research skills to provide solutions for business and individual tax situations in a constantly changing tax environment. Offered fall semester. Prerequisites: Acct 3133 (6123) and Acct 3143 (6143) or equivalents.

6243
Auditing Assurance forAccounting Systems
Designing and auditing traditional automated systems and information-age systems. Focuses on impact of information technology on flow of information, business and accounting controls, auditing accounting systems, financial auditing and internal auditing issues. Offered fall semester. Acct 3133 (6123) and Acct 3143 (6143) or equivalents.

6973
Seminar in Accounting
In-depth study of selected topics in accounting. Prerequisites: As determined by course instructor.

Finance

Chair
Roger P. Bey

Professors
Roger P. Bey
Richard C. Burgess
J. Markham Collins
Robert J. Monroe

Associate Professor
Larry J. Johnson

7003
Financial Administration
Devoted to an understanding of the numerous financial decisions confronting the modern business firm. Specific emphasis is placed on developing practical decision-making approaches for solving financial problems. Prerequisites: All foundation M.B.A. courses.

7013
Long-Term Financial Decisions
Emphasis on the optimal acquisition and allocation of long-term sources of capital. Topics include capital budgeting evaluation models, cash flow analysis, diversification, portfolio approaches to capital budgeting, capital structure, cost of capital, lease-purchase decisions, abandonment, and mergers. Prerequisite: Fin 7003.

7023
Investment Analysis and Management
Theory and tools of analysis required in managing financial assets. Employing modern decision and probability theory, statistical techniques, and the computer, the course investigates the entire process of investing in financial assets, from the analysis of individual securities to the final combination of securities into portfolios. Prerequisite: Fin 7003.

7033
Risk Management
Introduces the use and pricing of derivative assets. Covers mathematical concepts underlying derivative asset analysis, the institutional structure of derivative markets and contracts, elementary pricing relations, the binominal and Black-Scholes options pricing models. Futures, options, bond and foreign currency options, implied binomial trees, and alternative option pricing models are explored. Prerequisite: Fin 7003.

7043
Working Capital Management
Financial planning and management of short-term assets and liabilities. Integration of quantitative techniques and microeconomics to financial decisions. Emphasis on profit planning, financial forecasting, accounts receivable, and cash management. Prerequisite: Fin 7003.

7053
Portfolio Management
Development and application of modern portfolio theory to the selection of financial assets. Topics include diversification, portfolio construction and revision, and portfolio management. Prerequisite: Fin 7003.

7063
The Behavior of Financial Markets
Analysis of current trends and recent developments in financial intermediaries and financial markets. Prerequisite: Fin 0723.

7073
Empirical Methods in Finance
Reviews probability and statistical techniques used in quantitative finance, and normal, log-normal, and CEVdistributions. Covers estimation and non-parametric techniques used in finance (MLE, GMM, GARCH). Introduces financial databases (Compustat, CRSP, Ibbot-

son, etc.) and estimation application software (Matlab, S-Plus, Barra, SAS, etc.) for exercises in estimating volatilities and correlations and their stability. Prerequisites: Math 2024 and QM 0713.

7083
Real Estate Investment Decisions
Analysis of the investment and development process in real estate. Considers the basic nature of real estate, market analysis, and financial analysis of real estate investment opportunities. Prerequisite: Fin 0723.

7093
International Financial Management
Examines the international business environment and the challenges and opportunities it presents for financial managers. Emphasis on foreign exchange, international treasury functions, international risk, and diversification. Prerequisite: Fin 7003.

7133
Advanced Topics in Risk Management
Risk measurement and management, including market, credit, and liquidity risk, settlement measurement techniques for contracts such as duration, portfolio Beta, factor sensitivities, Value at RiskTM, dynamic portfolio distribution analysis, and extreme value analysis. Includes techniques for trading desk risk management, total portfolio market exposure limits, and counterpart credit exposure limits. Prerequisite: Fin 7033.

7153
Trading and Risk Management
Case studies and historical market simulations teach key principles of finance theory. Fundamentals of trading and the nature and uses of financial instruments introduced through the Financial Analysis and Securities Trading (FAST) system computer-based simulation trading program. Students assume roles of speculator, hedger, market maker, financial intermediary, and financial analyst. Prerequisites: Fin 7073 and 7133.

7163
Pricing and Managing Derivatives
Pricing and risk management of energy derivatives. Stochastic processes underlying energy prices are analyzed. Complexities of real world markets are incorporated into complex risk management strategies and the pricing of exotic options. Students implement their own trading strategies, compete against each other in trading exercises, and manage their own investment portfolios. Prerequisites: Fin 7073 and 7133.

7193
Applied Finance Project
An applied project exploring a quantitative finance problem that might be met in practice and involves the development or use of a quantitative financial technique. Requires prior approval of the supervising faculty member. Prerequisites: Fin 7073 and Fin 7133.

7961
Residency
(See page 16.)

7973
Seminar in Finance
A critical analysis of selected topics in finance. Prerequisite: Permission of instructor.

7991-3 (1-3 hours)
Independent Study in Finance
Open to graduate students who wish to pursue individual study or investigation of a field of finance. Students are required to plan their program of study and prepare a formal report of their findings. The field of interest selected for study may not be that investigated in meeting thesis requirements. Prerequisite: Permission of graduate advisor.

Approved Undergraduate Finance Courses
The following undergraduate courses may be taken for graduate credit with approval from the graduate advisor. A student enrolling in these courses will complete assignments in addition to those completed by the undergraduate students in the courses.

6023*
Finance Concepts
An introduction to basic principles and practices of managerial finance and financial decision-making in a corporate context. Attention to

effective management of financial resources and concepts of financial analysis and planning, working capital, capital budgeting, capital structure, and methods of financing. Available only to students with baccalaureate degrees. Prerequisites: Group 1 foundation M.B.A. courses.

6113
Student Investment Fund
Actual management of a financial asset portfolio. Students determine the investment style, asset allocation, selection of securities, and place the trades, and are responsible for maintaining and updating all policies, procedures, accounting records, and a web site. Prerequisite: Fin 7003, an application form, and instructor's approval.

6973
Seminar in Finance
A critical study of selected topics in finance.

*May not be used as an M.B.A. elective. This is a required course for the Master of Engineering and Technology Management.

International Business

The following interdisciplinary course is offered in the College of Business Administration:

6013
Topics in International Business
A critical study of selected topics in international business. Emphasis on contemporary economic and political relationships. Prerequisite: Junior standing and permission of international business advisor.

Management

Chair
Ralph W. Jackson

Professor
George S. Vozikis

Associate Professors
Gary J. Castrogiovanni
Ralph W. Jackson
David W. Pan
Arthur A. Rasher
P.C. Smith

Assistant Professors
David J. Glew
Jill R. Hough
Marc D. Street

7003
The Behavioral Sciences in Administration
An overview of pertinent theories that deal with the behavioral aspects of the management of formal organizations. Lecture, case study, and small group exercises allow the student to internalize the conceptual material necessary for management excellence. Students with an undergraduate major in management may, with permission of the graduate advisor, select a management course approved for graduate credit other than Mgt 7003. Prerequisites: All foundation M.B.A. courses.

7023
Negotiation and Influence
Theories and skills relevant to negotiating and bargaining in a wide range of business and organizational situations. Topics include motivation factors, integrative and distributive strategies, bargaining tactics, communication issues, power, conflict, and persuasion. Prerequisite: Mgt 7003.

7033
Entrepreneurship
Provides an understanding of entrepreneurship and the entrepreneurial process. Emphasis on understanding the free enterprise system and what it takes to start and build a new venture outside (entrepreneurship) as well as inside (intrapreneurship) an existing organization.

7063
Management Strategy and Policy
Focuses on developing a comprehensive understanding of the nature of strategic competition in industries and the factors that determine the success or failure of firms. Students learn how to perform competitive analyses and develop them into competitive strategies. Prerequisites: All foundation M.B.A. courses.

7083
Organizational Change: Strategy and Techniques
Techniques and theories of organization development and change from the standpoint of both the change agent and the manager or administrator responsible for effecting changes in the organization's structure, procedures, functioning, etc. Group discussions and demonstrations and a group dynamics laboratory explore both theory and practice. Prerequisite: Written permission of the instructor prior to registration.

7093
Problems in Applied Business Research
Applied research practices and techniques, with emphasis on decision-oriented problem solving in a business environment. Actual real world business problems are addressed and studied through the application of legitimate research procedures. Prerequisites: 15 graduate credit hours and permission of instructor.

7883
Business Policy
An integrative course focusing on the perspective, skills, and responsibilities of management in setting organizational goals and objectives, and integrating the plans and activities of the

organization's functional and technical areas to achieve those goals and objectives. Enrollment limited to M.B.A. and Master of Accountancy candidates. Ordinarily taken in the student's last semester. Prerequisites: All 7003 M.B.A. core courses.

7961
Residency
(See page 16.)

7973
Seminar in Management
A critical analysis of selected topics in management. Prerequisite: Permission of instructor.

7991-3 (1-3 hours)
Independent Study in Management
Open to graduate students who wish to pursue individual study or investigation of a field of management. Students are required to plan their program of study and prepare a formal report of their findings. The field of interest selected for study may not be that investigated in meeting thesis requirements. Prerequisite: Permission of graduate advisor.

Approved Undergraduate Management Courses

The following undergraduate courses may be taken for graduate credit with approval from the graduate advisor. A student enrolling in these courses will complete assignments in addition to those completed by the undergraduate students in the courses.

6023*
Organization and Management Processes
Introduces basic processes and concepts of management and organizational behavior (i.e., leadership, motivation, communication, job design, control systems, work attitudes, planning and budgeting, organization design and change, etc.) featuring an intensive organizational simulation. Available only to students with baccalaureate degrees. Prerequisites: Group 1 foundation M.B.A. courses.

6123
Laboratory in Group Dynamics
Group processes and structural factors affecting the interaction process and intra- and intergroup performance characteristics are examined through theory, research, and class activities. Implications are drawn for management practices in relation to work groups, task and project teams, committees, and leadership. Interpersonal skill development is also emphasized. Prerequisite: Permission of instructor.

6403
Human Resource Management
An overview of the processes of procuring, developing, and facilitating productive involvement of the human resources needed by the organization in order to achieve its goals. The roles of personnel departments, organizational strategic planners, and line supervisors are considered. Prerequisite: Mgt 0723.

6433
Organization Structure and Design
Explains the organizational world and how to aid the manager in solving pressing problems faced by the typical business firm. Topics include growth models of the firm, alternative formal structures, environmental factors and contingencies, organizational goal setting, and company effectiveness. For graduate credit the prerequisite is Mgt 0723.

6453
Analysis for Management Decision-making
Methods of data collection, analysis, and interpretation are covered. Issues relevant to epistemology and evaluation methodology are examined. Special attention paid to the implications of this material for management decision-making. Prerequisites: QM 0713, Mgt 0723.

6483
Men and Women of the Organization
An exploration of legal, organizational, and policy issues; personal consequences to both men and women; and organizational and personal management skills necessary for coping effectively. A growing body of research is drawn upon to identify issues and alternatives for both men and women. Prerequisite for graduate credit: Mgt 0723 or 3003.

6973
Seminar in Management
A critical study of topics in management.

*May not be used as an M.B.A. elective. This is a required course for the Master of Engineering and Technology Management.

Management Information Systems

Chair
Anita S. Hollander

Professor
A. Gale Sullenberger

Associate Professor
Anita S. Hollander

Assistant Professors
Russell Haines
Lori N. Komp Leonard
Nicholas C. Romano, Jr.

7093
Strategic Information Systems
A study of the strategic value of information in a firm and the integration of strategic management and information systems. Focus is on information as a competitive weapon as well as its role in value chain analysis. Prerequisites: MIS 0713 or its equivalent with a grade of "B" or better.

7113
Telecommunications for Managers
Seminar in the management, business and organizational issues related to telecommunications networks. Includes coverage of hardware, software, applications, and standards used for the transmission and reception of information in both local and wide-area telecommunications networks. Prerequisites: MIS 0713 or equivalent with at least a B, and permission of instructor.

7123
Decision Support Strategies for Businesses
Seminar dealing with information systems designed to support decisions. Fundamental decision support system, data mining, data warehousing and knowledge management concepts are investigated. Language/tools for building these systems are also examined. Prerequisites: Permission of the instructor.

7133
Databases/Analysis and Design
Examines analysis and logical design of business processes and information systems focusing on the systems development life cycle, and organizational data needs, analysis and design of databases, retrieval of data using query languages, and administration of data resources within an organization. Prerequisites: MIS 3023 Business Programming Concepts II or equivalent and permission of instructor

7213
Financial Systems and Corporate Applications
Intensive study of the evolution of financial/accounting information systems and corporation applications such as enterprise resource planning systems (ERP). Prerequisite: Permission of instructor.

7223
Business on the Web
Student research and project seminar that explores the growing number of businesses on the Web and business transactions completed using the Internet. Sample topics include legal issues, regulations, design issues, business issues, Web tools (including tutorials), electronic commerce infrastructures and architectures, standards, support partners and Internet support vendors. Prerequisites: MIS 0713 or equivalent with at least a B, and permission of instructor.

7973
Seminar in Management Information Systems
A critical study of selected topics in management information systems. Prerequisite: As determined by instructor.

Approved Undergraduate Management Information Systems Courses

The following undergraduate courses may be taken for graduate credit with approval from the graduate advisor. A student enrolling in these courses will complete assignments in addition to those completed by the undergraduate students in the course.

6013
Systems Analysis and Design
Introduces analysis and logical design of business processes and information systems focusing on the systems development life cycle. Topics include development methodologies; project management; feasibility, cost-benefit and requirements analysis; modeling techniques; and documentation of current and future system designs. Prerequisites: MIS 6083 Database Design and Applications or it can be taken as a co-requisite.

6023
Business Programming Concepts II
A continuation of MIS 2013. The second of a two-course study of programming logic, languages, standards and conventions; data and file structures, systems architectures and platforms, and fundamental IS knowledge and concepts. Students study both structured and windows programming concepts to learn to apply programming knowledge and logic skills using a variety of languages and tools. Prerequisite: MIS 2013.

6083
Database Design and Applications
Examines organizational data needs, analysis and design of databases, retrieval of data using query languages, and administration of data resources within an organization. Students learn conceptual and logical data modeling techniques, as well as the skills necessary to create, query, update and administer databases. Prerequisite: MIS 3023/6023, Business Programming Concepts II, or equivalent and permission of instructor.

6143
Telecommunications Systems
Introduces business and organizational issues related to data and voice communication. Students learn about standards and technology used in telecommunications networks. Topics include hardware, software, and applications used for the transmission and reception of information in both local and wide-area telecommunications networks. Prerequisites: MIS 0713 or equivalent with at least a B, and permission of instructor.

6163
Internet Development Project
Develops the skills necessary to build Internet based commerce infrastructures. Introduces and applies a variety of web tools and concepts. Prerequisites: MIS 3023/6023, Business Programming Concepts II, or equivalent and permission of instructor.

6173
Network Administration
Addresses issues relevant to mangers of telecommunications networks. Students learn about the design and implementation of data networks and administration of network operating systems. Includes lab work and participation in network hardware/software projects. Prerequisite: MIS 6143 and permission of instructor

6403
Systems Development Project
Students apply skills and knowledge developed throughout the curriculum by staffing a systems analysis and design project team to implement computer-based solutions to actual individual and organizational problems. Emphasizes project management skills. Prerequisites: MIS 6083 Database Design and Applications; MIS 6013 Systems Analysis and Design; and permission of instructor.

6413
Decision Support Strategies
Examines information systems designed to support decisions. Fundamental decision support system, data mining, data warehousing and knowledge management concepts are investigated. Language/tools for building these

systems are also examined. Prerequisite: Permission of instructor.

6423
MIS Senior Seminar
A series of modules intended to deepen student learning in topics covered throughout the MIS curriculum and expose students to the latest information systems research and thought. Includes corporate applications, object-oriented modeling and programming, emerging technologies, tools, and trends, and professional issues such as certifications, ethics, and associations. Prerequisite: Permission of instructor.

6973
Seminar in Management Information Systems
A critical study of selected topics in management information systems. Prerequisites: As determined by the instructor.

Marketing

Chair
Ralph W. Jackson

Associate Professor
Ralph W. Jackson

Professors
James W. Cagley
Lester A. Neidell
Saeed Samiee

6023*
Marketing Concepts
Introduces managerial considerations in marketing decisions, evaluation of alternative courses of action and strategy in profit terms, demand analysis, case studies in sales, product development, distribution channels, pricing, and promotion areas. Available only to students with baccalaureate degrees. Prerequisites: Group 1 foundation M.B.A. courses.

7003
Advanced Marketing Management
An advanced course that integrates managerial marketing concepts. Emphasis on the analytical prerequisites for strategic marketing planning, formal strategic planning methods, and implementation and control issues. Prerequisites: All foundation M.B.A. courses.

7013
Problems in Consumer Behavior
Consumer behavior patterns with emphasis on the implications for marketing analysis and executive action. Prerequisite: Mktg 7003.

7023
Marketing Research
Application of the systems approach to marketing information problems. Study of research concepts and techniques and the application of research findings to the formulation of marketing policies. Prerequisites: All foundation M.B.A. courses.

7043
International Marketing
An introduction to and an examination of the application of marketing concepts, theories, principles, and strategies in the international business environment. Focuses on the impact of global factors on marketing decision-making including international agreements, markets, and institutions and export management.

7961
Residency
(See page 16.)

7973
Seminar in Marketing
A critical analysis of selected topics in marketing. Prerequisite: Permission of instructor.

7983
Thesis
The development and study of a research area in a written thesis acceptable to the candidate's thesis committee.

799V (1-3 hours)
Independent Study in Marketing
Open to graduate students who wish to pursue individual study or investigation of a field of marketing. Students are required to plan their program of study and prepare a formal report of their findings. The field of interest may not be that investigated in meeting thesis requirements. Prerequisite: Permission of graduate advisor.

*May not be used as an M.B.A. elective. This is a required course for the Master of Engineering and Technology Management.

Operations Management

Chair
Roger P. Bey

Professors
Robert W. Lawless
Robert A. Russell
A. Gale Sullenberger
Timothy L. Urban

Associate Professor
Wen-Chyuan Chiang

7003
Introduction to Operations Research
A survey of the field of operations research or management science including such topics as linear programming, Bayesian decision theory, queuing theory, inventory theory, and other deterministic and stochastic modeling techniques. Students with an undergraduate major in management science may, with the permission of the graduate advisor, select a management science course approved for graduate credit other than QM 7003. Prerequisites: All foundation M.B.A. courses.

7013
Multivariate Analysis
A computer-based approach to conceptual implications of the analysis of relationships among observations in multivariate systems and their application to the process of decision-making. Specific techniques emphasized are multiple regression, discriminant analysis, and factor analysis. Prerequisite: All foundation M.B.A. courses.

7043
Problems in Operations Research
A second course in operations research. Topics include fundamentals of mathematical programming, multiple objective decision-making and goal programming, network models, integer and dynamic programming, advanced topics in project management, and stochastic processes. Prerequisite: QM 7003.

7053
Computer Simulation
Coverage of Monte Carlo simulation with emphasis on learning a simulation language (such as SLAM), simulation methodology, developing and validating simulation models, and supporting statistical concepts. Prerequisites: MIS 0713, QM 7003.

7961
Residency
(See page 16.)

7973
Seminar in Quantitative Analysis
A critical analysis of selected topics in quantitative analysis. Prerequisite: Permission of instructor.

7991-3 (1-3 hours)
Independent Study in Quantitative Analysis
Open to graduate students who wish to pursue individual study or investigation of a field of quantitative analysis. Students are required to plan their program of study and prepare a formal report of their findings. The field of interest selected for study may not be that investigated in meeting thesis requirements. Prerequisite: Permission of graduate advisor.

Approved Undergraduate Quantitative Methods Courses
The following undergraduate courses may be taken for graduate credit with approval from the graduate advisor. A student enrolling in these courses will complete assignments in addition to those completed by the undergraduate students in the courses.

6023*
Operations/Production Management
Introduction to the salient topics of production/operation management. Emphasis on

effective methods for managing productive systems. Topics include process design, facilities location, forecasting, aggregate planning, inventory control, materials requirements planning, and scheduling. Available only to students with baccalaureate degrees. Prerequisites: Group I Foundation M.B.A. courses.

6403
Operations Management II
Advanced topics in production/operations management including productivity, materials requirements planning (MRP), capacity planning, inventory control systems, forecasting, aggregate planning, scheduling, and quality control. Prerequisites: QM 0713, 0723.

6513
Management Science
Topics in management science/operations research including decision analysis, network models, risk analysis, stochastic processes, multiple criteria decision-making, decision support systems, and some exposure to integer and dynamic programming. Prerequisites: QM 0713, 0723.

*May not be used as an M.B.A. elective. This is a required course for the Master of Engineering and Technology Management.

School of Nursing

Director
Susan Gaston

Professors
Susan Gaston
Barbara Martin

Associate Professors
Kristi S. Nix

Assistant Professors
Lee Anne Nichols
Marcia Ray Burrus
David W. Carr, Visiting

Athletic Training
Greg Gardner, Curriculum Director and Clinical Assistant Professor
Robin Ploeger, Clinical Assistant Professor

The School of Nursing offers graduate courses that may be used as electives in other majors. The following graduate courses may be taken for graduate credit within the limits of the graduate degree program and with the approval of the graduate program advisor and the instructor. The number of credit hours allotted a course is designated by the last numerical digit of the course number.

Applied Health Science

7013
Health Management Techniques
Overview of the U.S. healthcare system and introduction of concepts and techniques of management, organization, planning and control, problem solving, and personnel management as they relate to the healthcare system.

7023
Health Law and Legislation
Legal responsibilities and liabilities in relation to consumer and providers of health services. Topics include licensure, malpractice, negligence, consumer rights, the federal legislative process, and social welfare in the U.S.

Nursing

7003
Methods of Research in Nursing
The development of research studies within a nursing framework, using both qualitative and quantitative methods. Emphasis on problem formulation, selected research designs, research interpretation and application, data analysis, and human rights considerations. The development of a research proposal is the expected outcome.

7013
Nursing Administration I
Examination and theoretical application of administrative principles and functions in the organization and management of the delivery of nursing services in public and private healthcare agencies. Emphasis on nursing care delivery models, patient care management issues, quality assurance models, and evaluation of nursing services.

7023
Nursing Administration II
Examination of the phenomena that interact to influence the nurse executive role. These include role theory and role behaviors, interpersonal relations, leadership theory and strategies, networking and spheres of influence, and career planning.

7033
Nursing Administration III
Emphasis on significant issues that impact on the delivery of nursing care within the context of the healthcare institution/system. These include third party payment, health policy, certification, licensure, federal funding, resource competition and allocation, budgeting, and financial planning. Prerequisite: Nsg 7013.

7045 and 7055
Nursing Administration Practicum I and II
Each practicum includes a minimum of 160 hours administrative experience and 15 hours seminar. The practica are designed to provide an overview of the healthcare administrative functions. The seminars provide an opportunity for examination and open discussion of issues of healthcare agency management. The approach is from the general to the particular, with students working with an administrative mentor. Prerequisites: AHS 7013, 7023, Nsg 7003, 7013, 7023, 7033, and 7063. Some of these courses may be taken concurrently with permission of instructor.

7063
Theories of Nursing Practice
Theory development in nursing, ontological and epistemological issues, and theory application. Assessment of organizational structure and outcome evaluation using theoretical frameworks. The development of a theory of nursing administration is the expected outcome.

Approved Undergraduate Courses
The following undergraduate courses may be taken for graduate credit within the limits of the graduate degree program and with the approval of the graduate program advisor and the instructor. A student enrolling in these courses will complete assignments in addition to those completed by undergraduate students in the course.

Nursing

6403
Nursing and Computers
The use of computers in nursing practice, service administration, education, and research. Basic computer structures and functions are introduced. Experiences include use of microcomputers and mainframe computers, nursing software, clinical computers, and hospital information systems.

6413
Challenges of Childhood
Investigation of challenges that developmental disability presents to child, family, and community, and of genetic, prenatal, environmental and cultural influences in relation to diagnoses/syndromes of children with special needs. Emphasis on family-centered care as the cornerstone of intervention. For students in any field that involves caring for children with special needs.

Athletic Training

6053
Therapeutic Exercise
Emphasis on essentials of a rehabilitation program, physical examination, principles of therapeutic exercise, muscle reeducation, techniques of rehabilitation, and special therapeutic techniques.

6063
Therapeutic Modalities
Principles of electrophysics and biophysics, specific physiological effects and therapeutic indications and contraindications associated with use of electro-therapeutic modalities, hydro-therapeutic modalities, cryotherapy, radiant energy, paraffin, intermittent compression unit, massage, and other contemporary modalities.

6453
Legal Aspects in Athletic Training
Analysis of the legal system and major problems/issues in sports medicine. Includes analysis of fundamental legal principles.

6463
Biomechanics
Introduction to the biomechanics of human movement, including terminology and mechanical concepts. Emphasis on anatomical and mechanical considerations as applied to injured and non-injured athletes.

6473
Current Trends and Issues in Athletic Training
Emphasis on contemporary issues in sports medicine. Topics include casting and bracing techniques, physical therapy techniques, orthopedics, general medicine, and pharmacology in relation to the field of sports medicine. Includes laboratory experience.

Programs in the College of Engineering and Natural Sciences

The College of Engineering and Natural Sciences offers Master of Science degrees in biology, chemical engineering, chemistry, computer science, electrical engineering, geosciences, mathematics, mechanical engineering, and petroleum engineering. The Master of Engineering degree is offered in chemical engineering, electrical engineering, mechanical engineering, and petroleum engineering. Two interdisciplinary masters' degrees are also offered—a Master of Engineering and Technology Management degree in cooperation with the College of Business Administration and a Master of Science in Mathematics and Science Education in cooperation with the School of Education. Doctor of Philosophy degrees are offered in biology, chemical engineering, computer science, geosciences, mechanical engineering, and petroleum engineering.

Biological Science

Chair
Glen E. Collier

Professors
Glen E. Collier
Estelle Levetin
Richard L. Reeder

Associate Professors
Charles R. Brown
Mark A. Buchheim
Kenton S. Miller
Harrington Wells

Assistant Professors
Brad A. Amendt
Laura Berkowitz
Peggy S. Hill
William A. Rosche
Randy Wymore

M.S. and Ph.D. degrees are offered in biology. Both degree programs are research-oriented and require a combination of appropriate course work and independent study leading to completion of a thesis. Research opportunities exist within the areas of animal behavior, ecology, physiology, microbiology, genetics, and cell, molecular and developmental biology.

Research facilities include well-equipped laboratories for molecular biology, microbiology, histology, physiology, flow cytometry, automated DNA sequencing, and transmission and scanning electron microscopy.

Admission. Applicants should have a baccalaureate degree from an accredited institution, with 20 semester hours of biology or equivalent, three semesters of chemistry, two semesters of physics, and math through calculus. The grade point average must be 3.0 or better on a 4-point scale. Applications should be made through the Graduate School and must include the following:

(1) Results from both the general and an advanced (discipline) tests of the Graduate Record Examination, and on the TOEFL for students from countries where English is not the official language.
(2) A letter of intent describing the applicant's background, specific interests in biological science, and long-term professional objectives.
(3) Three references or evaluations from qualified individuals familiar with the applicant’s academic and/or technical background.

Students not meeting all of the specific course requirements at the time of application may be admitted on conditional grounds. In such cases, course work required to make up deficiencies will be determined by the Departmental Graduate Committee and will be undertaken during the first year. Credit for courses required to correct deficiencies cannot be applied to the graduate degree requirements.

Master’s Degree Program

Graduate training in biology at the M.S. level is intended to prepare students for

career opportunities in education, industry, and government, or for continued graduate studies. A joint Juris Doctor/Master of Science program also is available for students interested in an interdisciplinary degree encompassing training both in law and biological science. The J.D./M.S. degree is a non-thesis program.

General Requirements. Students admitted to the program will work with a professor in a specified area of research. Students must plan a program of courses and overall research goals in consultation with their supervising professor. By the end of the second semester of full-time study, the student's advisory committee must be declared, and a detailed research proposal must be submitted to that committee for approval by the end of the third semester; changes in the program thereafter will be subject to the approval of the advisory committee.

To qualify for the M.S. degree, candidates must meet the general residence and academic requirements outlined in the Graduate Bulletin and:

(1) Complete 30 hours of graduate work, including Introduction to Biological Research (3 hours), three elective courses (9 hours), Seminar in Biology (3-6 hours), Research Experience (6-9 hours), and thesis research (6 hours). Not more than 30 percent of the student's course work may be at the 6000 level.
(2) Complete a research thesis. The research should be of adequate originality and quality to be recognized by the faculty as meeting criteria usually applied for publication in a scientific journal.
(3) Present the results of their work in a public seminar and defend the thesis satisfactorily in an oral examination.

Doctor of Philosophy Program

The Faculty of Biological Science offers a program of study leading to the Ph.D. in biology. Course requirements are designed to provide a breadth of knowledge in the field of biology. An in-depth understanding of one area of specialization is achieved through elective courses, independent study, and thesis research. Students in the Ph.D. program are initially advised by the Departmental Graduate Advisor. By the end of the third semester of full-time study, the student must select a supervising professor and advisory committee. The advisory committee will be chaired by the supervising professor and will include two other members of the graduate faculty.

Residency Requirements. Students must spend at least two consecutive academic years in full-time residency.

Course Requirements. For students without a master's degree, course work for the Ph.D. in biology consists of 90 credit hours, including Introduction to Biological Research (3 hours), five elective courses (15 hours), Seminar in Biology (3-9 hours), Directed Doctoral Readings (3-6 hours), Research Experience (42-48 hours), and Dissertation Research (18 hours). For students entering the program with a master's degree, course work for the Ph.D. in biology consists of Introduction to Biological Research (3 hours), two elective courses (6 hours), Seminar in Biology (3-6 hours), Directed Doctoral Readings (3-6 hours), Research Experience (24-27 hours), and Dissertation Research (18 hours).

Qualifying Examinations. Following successful completion of course require-

ments and not later than 30 months after entering the program, a student must qualify for Ph.D. candidacy by passing a set of qualifying examinations. Students entering the program with a master's degree will take these examinations within 20 months. The examinations will include both written and oral segments. In the event of failure, the examinations may be retaken once. The written examination consists of questions submitted by the graduate faculty and will be evaluated by the Departmental Graduate Committee. After the written examination is passed, an oral examination based on the student's thesis research proposal will be administered by the student's advisory committee, which will then recommend or deny Ph.D. candidacy, subject to approval by the Graduate Dean. Upon admission to candidacy and presentation of an acceptable research proposal, two additional members shall be added to the student's advisory committee, with the approval of the Graduate Dean. At least one of these two members must come from outside the department.

Dissertation. Each Ph.D. candidate must write a dissertation on the results of their research, thus demonstrating the student's ability to conduct independent investigation in the selected areas of specialization. Candidates are expected to make adequate progress toward their degree each semester they are enrolled in the program. The dissertation must follow the general procedures and format approved by the Graduate School and must be presented to the full advisory committee for review and examination. Each Ph.D. candidate will present a seminar on their research to the university community, followed by a final oral examination before the advisory committee. The examination will include a defense of the dissertation and questioning in areas related to the research. Upon acceptance of the dissertation and successful completion of the oral examination, the advisory committee will recommend the candidate to the Graduate Dean for the Ph.D. degree.

Elective Graduate Courses for Biological Science

7103
Mathematical Biology
Introduction to mathematical models of biological processes. Prerequisites: Math 1084; Stat 3813 or equivalent or consent of instructor. Suggested: Biol 4093, Phys 1023, Chem 1023, Biol 2123 and 2143, CS 1033, or equivalent.

7123
Human Genetics
An overview of the current knowledge in human genetics: topics include cytology, biochemical genetics, immunogenetics, population genetics, and genetics of development, cancer, and behavior. Prerequisite: A course in genetics.

7143
Molecular and Developmental Genetics
Molecular aspects of eukaryotic gene regulation and the molecular genetics of development in selected systems. Prerequisite: A course in genetics.

7153
Endocrinology
Hormones: sites of production, receptors, actions, chemistry, and regulation. Vertebrate hormones are emphasized. Prerequisite: A course in animal physiology.

7173
Environmental Physiology
Physiological responses of plants and animals to environmental stimuli and stresses. Prerequisite: A course in plant or animal physiology.

7193
Biological Chemistry
An examination of biological problems from a biochemical perspective.

7223
Advanced Cell Biology
Current concepts and techniques in the analyses of cell structure, growth and differentiation. Emphasis is on integrating form and function at the organellar and molecular levels. Prerequisite: Permission of instructor.

7233
Bacterial Diversity
Molecular aspects of microbial structure and function. Emphasis on metabolic pathways and regulation of growth, development and differentiation in representative microbial systems. Prerequisites: Biol 2054, Chem 3013, 3023 and 3053 (or equivalent).

7253
Seminar in Organismic/Environmental Biology
Selected topics covering organismic and environmental biology. Topics vary.

7263
Seminar in Cell/Molecular Biology
Selected topics in cell and molecular biology. Topics vary.

7303
Experimental Design
Fundamental concepts in the design of experiments for biological research, including hypothesis formation and sampling design to control variance. Single and multiple regressions, randomized block designs, factorial experiments, as well as analysis of variance, covariance, and response surfaces are emphasized. Prerequisite: Statistics or permission of instructor.

7503
Ecological Genetics
Interfacing of population genetics and the adaptive forces placed on populations by the environment, both biotic and abiotic. Prerequisites: Biol 7104, 3124 (or equivalent).

6023
Environmental Microbiology
Problems in environmental biology and their solutions are examined as they relate to microorganisms. Prerequisites: Biol 3084 or Biol 3314 (or equivalent).

6054
Histology
Microscopic anatomy and histophysiology of tissues and organs of mammals. Correlation of structure and function is emphasized. Prerequisites: Biology core courses (or equivalent); a previous physiology or anatomy course is helpful.

6123
Advanced Genetics
Principles of transmission, mutation, and function of genetic material. Application of genetic analysis to other biological questions. Prerequisites: Biology core courses (or equivalent).

6143
Evolution
Patterns of biological diversity and processes that produce and maintain diversity. Prerequisites: Biology core courses (or equivalent).

6153
Animal Behavior
Topics include animal communication, foraging, sexual selection, mating systems, social organization, spacing patterns, learning, evolutionarily stable strategies, alternative mating tactics, and human sociobiology. Prerequisites: Biol 1504, 1604 (or equivalent).

6164
Field Ecology
Lecture and field course emphasizing ecological principles through field experiments. Includes design and implementation of field studies and analysis of data that are generated. Independent research project required. Prerequisites: Biol 1504, 1604 (or equivalent).

6183
Experimental Microbiology
Lecture/laboratory course that emphasizes methods in microbial genetics and microbial physiology. Prerequisite: Biol 3084 (or equivalent).

6204
Comparative Vertebrate Anatomy
Comparative study of the structure and function of chordate organ systems with emphasis on vertebrates. Prerequisites: Biology core courses (or equivalent).

6224
Vertebrate Physiology
Vertebrate organ systems: their modes of action, interactions, and contributions to homeostasis. Prerequisites: Biology core courses, Chemistry (or equivalent).

6234
Comparative Animal Physiology
Comparisons of bodily functions of major vertebrate and invertebrate groups with special emphasis on adaptations for survival and for maintenance of homeostasis in a variety of environments. Prerequisites: Biology core courses, Chemistry (or equivalent).

6243
Mechanisms of Animal Development
Analysis of mechanisms of differentiation and development in several model animal systems. Emphasis on the genetic contribution to the developmental program, cell:cell interactions and environmental factors that influence development. Prerequisites: Biology core courses (or equivalent).

6253
Molecular Evolution
The evolution of macro molecules; the rates and patterns of change in DNA and proteins and the mechanism responsible for these changes. Prerequisites. Biology core courses (or equivalent).

6254
Comparative Vertebrate Embryology
Comparative developmental anatomy of the vertebrates. Prerequisites: Biology core courses (or equivalent).

6263
Selected Topics in Molecular Genetics
Current research in a selected topic in molecular genetics. The topic varies, but is drawn from such areas as control of transcription in eukaryotes, DNA replication and control of chromosome structure and function. Prerequisites: Biology core courses (or equivalent).

6283
Selected Topics in Molecular Cell Biology
Current research in a selected topic in molecular cell biology. The topic varies, but is drawn from such areas as cell-cell signaling, protein targeting and transport and specialized cell physiologies. Prerequisites: Biology core courses (or equivalent).

6314
The Fungi and Algae
Diversity and basic biology of the fungi and the algae including those aspects that influence human activities and health. Prerequisites: Biol 1504, 1604 (or equivalent).

6454
Plant Anatomy
Vascular plant structure emphasizing microscopic anatomy of tissues and organs and utilizing both light and electron microscopy. Prerequisites: Biol 1504, 1604 (or equivalent).

6464
Plant Physiology
Physical, biochemical, and developmental processes of higher plants including use of plants in biotechnology. Prerequisites: Biology core courses (or equivalent).

6504
The Higher Plants
Diversity and morphology of the true plants from the mosses through the flowering plants with emphasis on the evolutionary history of these organisms using fossil, structural, and molecular evidence. Prerequisites: Biol 1504, 1604 (or equivalent).

6524
Plant Systematics
Introduction to plant identification, taxonomy, and systematics. The emphasis of both lecture and laboratory is on regional flora. Prerequisites: Biol 1504, 1604 (or equivalent).

6604
Selected Topics in Invertebrate Zoology
Topics and taxa vary from semester to semester, but are drawn from field ecology, evolution, behavior, systematics and physiology of insects, crustaceans, mollusks, and others. Prerequisites: Biol 1504, 1604 (or equivalent).

6614
Selected Topics in Vertebrate Zoology
Topics and taxa vary from semester to semester, but are drawn from field ecology, evolution, behavior, systematics and physiology of fish, reptiles, birds and mammals. Biol 1504, 1604 (or equivalent).

6793
Population Ecology
Quantitative approach to the study of plant and animal populations with emphasis on such concepts as density, dispersal, structure, and dynamics. Prerequisites: Biology core courses (or equivalent).

6823
Selected Topics in Microbiology
Senior seminar that provides experience in critical reading, discussion, and writing of professional papers in the fields of microbial ecology and diversity. Prerequisites: Biology core courses (or equivalent).

6833
Immunology
Cellular and molecular mechanisms involved in host immune protection, auto immunity, and immunopathologic processes. Prerequisites: Biology core courses (or equivalent).

In addition to biology courses, the following are also approved electives:

ChE 6583, Introduction to Biochemical Engineering
Chem 6431, Techniques of Instrumental Analysis
Chem 6433, Instrumental Analysis
Chem 6531, Biochemistry Laboratory
Chem 6533, Biochemistry I
Chem 6543, Biochemistry II
Stat 6413, Probability I
Stat 6623, Probability II
Geog 6053, Geomorphology

Supporting Graduate Courses for Biological Science

Geology 7433
Organic Geochemistry
Geochemistry of organic substances with emphasis on the origin and diagenesis of petroleum. Prerequisites: Chem 1024 and permission of instructor.

Law 5473
Environmental Policy
The protection, preservation, and restoration of a habitable environment, including such aspects as water and air pollution, land use planning, techniques to enforce policies and relevant jurisdictional problems, administrative action, public and private litigation, taxing schemes and current trends. Recommended prerequisite: Administrative Law.

Law 5443
Environmental Law
Topics include economic analysis of law, regulatory theory, rights of nature, valuation of lives, risk assessment, and design of alternative institutional models for the generation and implementation of effective environmental policy.

Additional graduate courses for Biological Science

7011-9 (1-9 hours)
Research Experience
Research training in a laboratory or field setting typically directed toward the Masters or Ph.D. degree under the supervision of a major professor.

7203
Introduction to Biological Research
Biological research methodologies, emphasizing laboratory and/or field experience. Students will conduct or participate in research projects. Required of all incoming M.S. and Ph.D. students.

7961
Residency
(See page 16.)

7971-3 (1-3 hours)
Seminar in Biology
Reports and discussions of advanced biological topics.

7981-6 (1-6 hours)
Thesis
Directed research within an approved area of study. Examination and written thesis required.

7991-3 (1-3 hours)
Independent Study
Individual selected study is done in association with a member of the faculty.

8991-9 (1-9 hours)
Directed Doctoral Readings
Prerequisite: Admission to the Ph.D. program.

9981-9 (1-9 hours)
Dissertation Research
Directed research on some problem within an approved area of the discipline. Prerequisite: Admission to the Ph.D. program.

Chemical Engineering

Chair
Keith D. Wisecarver

Professors
Kraemer D. Luks
Francis S. Manning
Kerry L. Sublette

Associate Professors
Charles M. Sheppard
Keith D. Wisecarver

Assistant Professor
Laura P. Ford

Applied Assistant Professor
Christi L. Patton

The Chemical Engineering Department offers both master's and Ph.D. degrees, as described below.

Master's Programs

The objective of the master's programs is to prepare the student for professional work in chemical engineering at a more advanced level than the B.S. or for further study leading to the Ph.D. degree. Both thesis and non-thesis options are available. Study at the master's level includes a range of fundamental courses in chemical engineering and allied areas, and independent study or research in an area of specialization.

Admission. Applicants must satisfy the general admission requirements of the Graduate School and specific requirements of the discipline as follows:

- Either a 3.0 minimum overall grade point average in an ABET-accredited chemical engineering program, or
- a minimum score of 600 on the GRE General (aptitude) Quantitative Test.

All applicants from non-English speaking countries who have not received degrees from U.S. universities must score a minimum of 550 on the TOEFL.

Applicants are selected for admission on March 1 and November 1. Applicants should designate their major fields of research interest. Admission may be denied to maintain the desired balance of students in various interest fields.

Special Master's Program. A special program in chemical engineering is available for non-chemical engineers and non-engineers. This program is intended for applicants desiring a master's degree in chemical engineering, but having no B.S. in chemical engineering. The admission requirements for this program are more rigorous than for persons having a B.S. in chemical engineering and are as follows:

- A B.S. degree in an engineering discipline other than chemical engineering or in one of the physical sciences.
- A 3.0 minimum overall GPA in undergraduate study, and approval by the discipline graduate coordinator and Graduate Dean.
- A minimum score of 650 on GRE General (aptitude) Quantitative Test.
- Students may be asked to take a number of remedial courses at the undergradu-

ate level to make up for deficiencies in mathematics, physics, chemistry, and/or engineering. The student's advisor will select elective courses to strengthen the student in areas not stressed at the undergraduate level.

- All applicants from non-English speaking countries who have not received degrees from U.S. universities must score a minimum of 550 on the TOEFL.

General Master's Degree Requirements. A 3.0 grade point average is the minimum normal for the master's degree program. Students must maintain a 3.0 overall grade point average and at least a 3.0 average in their major field of study.

Not more than six hours of C grades in course work can be applied to a master's degree. Thesis grades are recorded on a pass-fail basis and are not computed in grade point averages. A passing grade in all thesis hours is required.

Initial advisement of all master's program students is done by the Director of the Graduate Programs.

All courses taken for graduate credit in these programs shall be selected from those listed in this bulletin, subject to the approval of the advisor. Independent study must be approved by the Director of the Graduate Programs.

Curriculum Requirements

Thesis option leading to the Master of Science degree

Minimum total hours 30
- Semester hours of thesis 6-9
- Core chemical engineering curriculum (ChE 7003, 7023, 7033, and 7043) . . .12
- Maximum semester hours at approved 6000 level 6
- Maximum semester hours of independent study 3

Non-thesis option leading to the Master of Engineering degree

Minimum total hours 30
- Required semester hours of master's project 3
- Core chemical engineering curriculum (ChE 7003, 7023, 7033, and 7043) . . .12
- Maximum semester hours at approved 6000 level 9
- Maximum semester hours of independent study 3
- Maximum semester hours outside of major department 9

By the end of the first semester after enrollment, the thesis-option student must select a general research area and a research advisor for the thesis. After consulting with the student, the advisor recommends, for the Graduate Dean's approval, an advisory committee consisting of the advisor and two other graduate faculty members. At least one member of this committee must be from outside the major discipline and may be a qualified expert in the research area from outside the university. The student has 60 days from the time an advisor is chosen to form the advisory committee and to submit and defend before the committee a research project plan that includes a review of pertinent literature and a concise statement of the objectives to be met.

Upon completion of the research, the student must pass a comprehensive oral examination. The student's advisory committee conducts this examination, which

covers the student's entire graduate program, with emphasis on the research work and content of the thesis.

Students choosing the non-thesis option are required to choose an advisor and form an advisory committee for the master's project before the end of their first semester of residence. The advisory committee will consist of the project advisor and at least two other graduate faculty members.

Ph.D. Program Requirements

The principal objectives of the Ph.D. program are to provide students with an opportunity to reach a critical understanding of basic scientific and engineering principles underlying their fields of interest and to cultivate their ability to apply these principles creatively through advanced methods of analysis, research, and synthesis. The Ph.D. is awarded primarily on the basis of research.

Admission. Applicants must have a baccalaureate or master's degree in chemical engineering or a closely related field from an accredited institution.

Admission for Ph.D. work requires approval of the discipline graduate coordinator and the Graduate Dean, and

- either a 3.5 minimum overall grade point average in an ABET-accredited chemical engineering program, or
- a minimum combined score of 1100 on the GRE exam with a minimum score of 700 on the Quantitative Exam.

The number of candidates in this program is limited. Applicants should designate their major fields of interest. Admission may be denied to maintain a balance of students in various interest fields.

Applicants are selected for admission on March 1 and November 1.

Applicants from non-English speaking countries who have not received a B.S. degree from a U.S. university must satisfy English proficiency requirements (TOEFL score of 550).

Curriculum Requirements. The Ph.D. program requires at least 72 approved semester hours of graduate credit above the baccalaureate level, generally distributed in the following manner:

- At least 23 semester hours of research and dissertation (which may include the master's degree thesis);
- A core chemical engineering curriculum of ChE 7003, 7023, 7033, and 7043;
- A minimum of 6 semester hours of 6000-level or 7000-level mathematics;
- At least 36 hours of graduate credit in course work, including a maximum of 12 hours of 6000-level courses, and a maximum of 6 hours of independent study;
- A maximum of 12 hours of course work that may be taken outside chemical engineering.

These requirements are not variable except under special circumstances and with permission of the student's Advisory Committee and the Graduate Dean.

Other Requirements

Language and Residence. There is no foreign language requirement for the Ph.D. degree in chemical engineering. At least two consecutive semesters in residence at The

University of Tulsa as a full-time student are required. For teaching fellows and research assistants, four consecutive semesters of eight or nine hours per term are required.

Transfer Credits. Students will normally not be allowed to transfer any graduate credits for the M.S. degree. Students with an M.S. degree may transfer 30 semester hours towards the Ph.D. program (including 21 semester hours of course work and 9 hours of thesis work).

Advisory Committee. Students in the Ph.D. program will be advised initially by the Director of Graduate Programs. The student must select a research area and a research advisor or co-advisors by the end of the second semester after enrollment in the program. The student, after consultation with the advisor or co-advisors, recommends the other members of the advisory committee to the Graduate Dean by the end of the third semester of enrollment. The advisory committee must have at least four graduate faculty members, consisting of at least two members from the department of chemical engineering and one member from outside the department of chemical engineering. One member of the advisory committee may be a qualified expert in the research area from outside the university. The advisory committee approves the dissertation and administers the final dissertation oral examination.

Qualifying Examination. Prospective Ph.D. students must take the qualifying exam at the end of their second semester of enrollment. This exam is based on the core curriculum of chemical engineering and mathematics. Students are strongly encouraged to have completed the core curriculum at this time. The examination will be given normally in November and April. This exam can be retaken only once.

Dissertation Proposal. After passing the qualifying examination, Ph.D. students submit and defend a research proposal on their intended dissertation topic before the end of the semester following the qualifying examination. The proposal is presented orally before the advisory committee in a forum open to any students or faculty who wish to attend.

Candidacy. A student in the Ph.D. program cannot apply for candidacy until the qualifying examination has been passed.

Dissertation. Each Ph.D. candidate must write a dissertation on the results of his or her research. The dissertation must demonstrate the candidate's abilities in independent investigation in the area of interest and must contribute to some field of science or engineering technology.

The dissertation must follow the Graduate School's recommended procedures for submission to the student's advisory committee, and before it is finally typed or reproduced it must be presented to the full advisory committee for examination and review.

The dissertation shall be presented orally before the advisory committee in a forum open to any students or faculty who wish to attend. The dissertation must be microfilmed and published in Dissertation Abstracts. The dissertation is graded on a pass-fail basis.

Final Oral Examination. Each candidate must pass a final oral examination before the advisory committee. The examination will consist of a defense of the dissertation, the general field of the dissertation, and other parts of the program which

may be chosen by the committee.

The advisory committee recommends the candidate to the Graduate Dean for the Ph.D. degree upon successful completion of the final oral examination and acceptance of the dissertation. Passing grades must be obtained in all the dissertation hours to fulfill degree requirements.

The number of credits allotted a course is indicated by the last digit in the course number.

7003
Fluid Mechanics
Motion of ideal, Newtonian, and non-Newtonian fluids. Continuity and Navier-Stokes equations. Turbulence and boundary-layer theories. Flow through conduits. Prerequisite: Permission of instructor.

7013
Petroleum Microbiology
Microbiology of oil and gas production and processing including causes, prevention, and treatment of souring; microbial enhancement of oil recovery; bioremediation of petroleum contaminated soils and groundwater; and risk-based corrective action management of hydrocarbon contaminated groundwater. Prerequisite: Permission of instructor.

7023
Thermodynamics
An advanced study of the laws of thermodynamics with special emphasis on application to physical properties and phase transitions. Prerequisite: Permission of instructor.

7033
Reaction Kinetics
A study of chemical reaction rates and mechanisms. The design of batch and flow reactors. Catalytic reactions, reactor stability, and non-ideal reactors are emphasized. Prerequisite: Permission of instructor.

7043
Heat and Mass Transfer
Basic transport equations as applied to momentum, mass, and heat transfer. Heat and mass transfer coefficients in laminar and turbulent flow and for binary and multicomponent systems. Boundary layers. Models, analogies, multiphase systems, coupled transport processes. Prerequisite: Permission of instructor.

7063
Phase Equilibrium Thermodynamics
An advanced treatment of chemical thermodynamics as related to chemical equilibria, with frequent reference to historical and current literature. Prerequisite: Permission of instructor.

7103
Catalysis
Kinetics of catalytic processes; catalytic surfaces and surface phenomena; catalyst preparation and evaluation; catalyst deactivation; heat and mass transfer effects; homogeneous catalysis. Applications to the design of catalytic reactors. Prerequisite: Permission of instructor.

7113
Biochemical Engineering
Advanced topics in the design, modeling, and analysis of bioreactors. Bioprocess economics, downstream processing, instrumentation and control, and the nuts-and-bolts of fermenter design. Prerequisite: permission of instructor.

7123
Computer-Aided Chemical Process Design
Introduction to computational tools for the synthesis, analysis, and evaluation of chemical processes. Use of process simulators for the design and operation of chemical plants. Analysis of heat-exchanger networks and separation systems. Prerequisite: Permission of instructor.

7173
Multiphase Reactor Design
Design of multiphase reactors, including gas-liquid, gas-liquid-solid, and fluidized-bed reactors. Emphasis on multiphase reactor hydrodynamics, heat and mass transfer, and modeling. Prerequisite: Permission of instructor.

7213
Problem-Solving in Chemical Engineering
Introduction to the Reynolds Transport Theorem. Solving chemical process models with an emphasis on stability and advanced solution methods including Green's functions, series solutions and Bessel functions. Engineering applications of scalar, vector and tensor variables. Prerequisite: Permission of instructor.

7863-9 (3-9 hours)
Special Topics in Chemical Engineering
Presentation of special-interest topics of an advanced nature.

7913
Master's Project
Directed research or project on some problem in applied chemical engineering. Prerequisite: Permission of department. Pass-fail basis only.

7961
Residency
(See page 16.)

7971-3 (1-3 hours)
Seminar
Reports and discussions of advanced topics in chemical engineering, including invited guest speakers.

7981-6 (1-6 hours)
Research and Thesis
Directed research on some problem in the field of chemical engineering. Examination and written thesis required. Prerequisite: Permission of instructor. Pass-fail basis only.

7991-6 (1-6 hours)
Independent Study
Individual or group studies of advanced topics pertaining to chemical engineering. Selected study is performed by appointment with the faculty.

9981-9 (1-9 hours)
Research and Dissertation
Original research on some problem within the field of chemical engineering on the Ph.D. level. Prerequisite: Admission to the Ph.D. program. Pass-fail basis only.

9991-9 (1-9 hours)
Independent Study
Individual or group studies of advanced topics at the Ph.D. level pertaining to chemical engineering. Selected study is performed by appointment with the faculty. Prerequisite: Admission to Ph.D. program.

Approved Undergraduate Courses
Many undergraduate courses may be taken for graduate credit with approval from the program advisor. A student enrolling in these courses will complete assignments in addition to those completed by the undergraduate students in the courses.

6423
Natural Gas Plant Design
The application of chemical engineering and economic principles to the design of natural gas plant equipment; includes use of state-of-the-art simulation packages. Prerequisite: Approval of graduate coordinator.

6463
Chemical Reactor Design
Application of the rates of homogeneous and heterogeneous reactions to the design and the engineering evaluation of chemical reactors. Prerequisite: Approval of graduate coordinator.

6483
Chemical Engineering Plant Design
Design of chemical and petrochemical plants and process equipment. Evaluation of the economic, safety, health, and environmental aspects of a proposed project. Use of spreadsheets and state-of-the-art process simulators. Oral and written reports. Prerequisite: Approval of graduate coordinator.

6504
Process Component Design
Open-ended problems in economic design of chemical process components. Economic aspects of engineering, including evaluating alternative courses of action, depreciation, replacement analysis, and process optimization. Lecture 3 hours per week, laboratory 3 hours per week. Prerequisite: Approval of graduate coordinator.

6513
Process Control
Principles of the design of automatic control for chemical processes, including PID feedback control, feed-forward control, and cascade control. Prerequisite: Approval of graduate coordinator.

6563
Environmental Engineering
Pollution control and waste management. Municipal and industrial water and wastewater treatment. Ground water protection and remediation. Air pollution sources and remediation. Solid waste management. Hazardous waste management and treatment. Environmental law and regulations. Prerequisite: Approval of graduate coordinator.

6583
Petroleum Refinery Design
The application of chemical engineering principles to the design of petroleum refinery equipment, including crude fractionators, heat exchangers, and fired heaters. Computer simulation is emphasized. Prerequisite: Approval of graduate coordinator.

6593
Polymer Engineering
Basic principles of science and engineering applied to polymer technology. Topics include polymer synthesis reactor engineering, structure and properties of polymers, rheology and mechanical properties, polymer processing and technology. Prerequisite: Approval of graduate coordinator.

Chemistry

Chair
Dale C. Teeters

Professors
Robert E. Howard
Dale C. Teeters

Associate Professors
Thomas M. Harris
William T. Potter
Gordon H. Purser
Nicholas E. Takach

Assistant Professors
Gilbert N. Belofsky
John C. DiCesare

The Master of Science in Chemistry program provides graduates with the advanced knowledge necessary to continue in Ph.D. programs at other institutions and the skills and expertise needed by those who will use master's-level training in industry. While research is oriented toward applications of chemistry, the curriculum emphasizes essential principles and basic knowledge.

Admission. To be admitted to the program an applicant must have a bachelor's degree and an adequate background in chemistry. An undergraduate grade point average of at least 3.0 is required; however, students with industrial experience in chemistry and averages below 3.0 may be admitted on probation at the discretion of the graduate advisor and with permission of the Graduate School.

Applicants must achieve acceptable scores on the Graduate Record Examination. Those from non-English speaking countries who have not received any degrees from a United States university must satisfy English proficiency requirements, including a score of 550 or above on the TOEFL.

General Requirements. Upon admission, the student will confer with the department graduate advisor to plan course sequencing and discuss research or report options. Satisfactory progress in course work is required and a 3.0 grade-point average is the minimum needed for continuance in the program.

All students must complete the following curriculum requirements:

- Nine hours of graduate core courses: Chem 6043, Inorganic Chemistry; Chem 7113, Advanced Organic Chemistry; and Chem 7123, Advanced Physical Chemistry.
- A minimum of six hours of graduate courses taken in departments outside chemistry.
- Three hours of graduate seminar.

Students without the necessary prerequisite undergraduate courses will be required to take these as deficiencies. No more than six hours of transfer credit beyond the bachelor's degree from an accredited institution may contribute toward fulfilling these requirements. No more than six hours of independent study will be allowed.

Thesis Program Requirements. The thesis program is strongly recommended for those planning to pursue graduate study at the Ph.D. level and for those with research-oriented employment. By the end of the first semester, the student should select a

research area and a thesis advisor who will supervise the research and the remainder of the student's course work.

Required for thesis option:

- Nine hours of core course
- Minimum of six hours of graduate courses outside the department.
- Three to six hours of thesis credit.
- A minimum total of 30 graduate hours are required to complete the thesis option.

In collaboration with the advisor, the student should identify a three-member thesis committee. Two members must be from the department with the advisor as the committee chair; the third member must be from outside the department. An expert from outside the University may be used with the approval of the Graduate School.

In carrying out the thesis project, the student must complete a minimum of three and maximum of six hours of thesis credit. On completion of the research, the student will write a thesis that conforms to the Graduate School's recommended procedures. With the advisor's approval, a draft of the thesis will be forwarded to the other members of the thesis committee for examination and review. After the thesis has been reviewed and judged ready for defense by the advisor and by the other members of the thesis committee, the student must pass an oral thesis examination.

The oral examination is comprehensive, covering the student's entire graduate program and emphasizing the research work and content of the thesis. All thesis and oral examination requirements must be scheduled and completed to meet Graduate School deadlines.

Non-Thesis Option. This option is provided for students who desire a stronger foundation in chemistry for professional schools or personal knowledge. Completion of this option requires six additional hours of course work, and preparation of a master's report.

- Required for non-thesis option:
- Nine hours of core courses.
- Minimum of six hours of graduate courses outside the department.
- A minimum total of 33 graduate hours are required to complete the non-thesis option.
- Three hours of report.
- A minimum of 33 semester hours is required to complete the non-thesis option.

During the first semester of enrollment and in consultation with the graduate advisor, the student will select a general area in which to write a report and a member of the faculty to supervise it. The report is a result of independent study and may involve extensive literature search, laboratory work, or review of an area. The report must follow the general guidelines for writing a thesis and is subject to the advisor's approval. Students in this option must enroll in Master's Report 7913 for the report portion of their study.

Chemistry and Biochemistry

7113
Advanced Organic Chemistry
Emphasis on current theories of reaction mechanisms as they apply to organic reactions. Prerequisite: Chem 3021, 3023.

7123
Advanced Physical Chemistry
Theory of chemical bonding, statistical mechanics, and advanced topics in spectroscopy and kinetics. Prerequisite: Chem 4023 and 4021.

7143
Advanced Biochemistry
Enzyme structure and mechanism, protein modification and signal transduction in sensory systems, DNA and RNA biochemistry, biochemistry of disease. Prerequisites: Chem 3051 and 3053.

7153
Materials Chemistry
Relationships between chemical bonding and the physicochemical properties of materials including selected high-performance metals, ceramics, and electronic materials. Prerequisite: consent of instructor.

7163
Advanced Polymer Chemistry
Advanced topics in kinetics, thermodynamics, and physical properties of polymers. Prerequisites: Chem 4023 and 4093.

7863
Advanced Topics in Chemistry
Advanced study of an area of research activity. Important concepts, the contribution of modern instrumentation, and relevance of the research will be emphasized. Prerequisite: consent of instructor.

7973
Graduate Seminar
Reports and discussions of advanced topics in chemistry given by students, faculty, and invited quest speakers.

7913
Master's Report
Directed research or project on some problem in an approved area. Examination and written report required. Prerequisite: Permission of department. Pass-fail basis only.

7961
Residency
(See page 16.)

7983
Research and Thesis
Directed research on a problem in an approved area. Written thesis and formal defense before graduate committee is required. Prerequisite: Permission of department. Pass-fail basis only.

Approved Undergraduate Courses
Many undergraduate courses may be taken for graduate credit with approval from the program advisor. A student enrolling in these courses will complete assignments in addition to those completed by the undergraduate students in the courses.

6101
Inorganic Synthesis and Characterization
A laboratory course involving synthesis and characterization of inorganic compounds. Three hours of laboratory per week. Prerequisite: Chem 2014. 4102

6301
Physical Chemistry Laboratory I
Laboratory experiments to accompany Chem 3033. Experiments related to thermochemistry, thermodynamics, phase behavior polymers, colloids, gas properties, colligative properties, and physical properties are assigned. Prerequisite or corequisite: Chem 3033.

6303
Physical Chemistry I
Quantitative relationships in chemical systems including gas laws, kinetic molecular theory, thermodynamics, and phase behavior. Prerequisites: Chem 1023, 1021, Phys 2063, Math 2073.

6412
Qualitative Organic Analysis
Theory and practice of IR, NMR, UVand mass spectroscopy in the identification of organic compounds. Includes separation of mixtures and the preparation of derivatives of unknowns. One lecture and three hours of laboratory per week. Prerequisites: Chem 3021, 3023.

6421
Physical Chemistry Laboratory II
Laboratory experiments supplementing Chem 4023, with experiments related to spectroscopy, kinetics, polymers, colloids, electrochemistry, diffusion, and thermochemistry. Prerequisites: Chem 3031, 3033. Prerequisite or corequisite: Chem 4023.

6423
Physical Chemistry II
Modern physical chemistry topics including molecular quantum mechanics, spectroscopy, and kinetics. Emphasis on quantitative understanding of chemical systems. Prerequisites: Chem 3033 or ChE 3063, Math 2073. Prerequisite or corequisite: Phys 2063.

6433
Instrumental Analysis
Overview of spectroscopic, chromatographic and electroanalytical techniques for chemical analysis. Three lectures per week. Prerequisites: Chem 3011, 4021, 4023. Corequisite: Chem 4031 or 4051 (chemistry majors only).

6443
Inorganic Chemistry
An introduction to the field of inorganic chemistry at an advanced level. Three lectures per week. Prerequisites: Chem 3021, 3023, 4021, 4023.

6451
Instrumental Analysis Laboratory
Laboratory experiments supplementing Chem 4033, with emphasis on methods development. Chemistry majors only. Prerequisites: Chem 3011, 4021, 4023. Corequisite: Chem 4033.

6453
Environmental Chemistry
Chemical issues related to aquatic and atmospheric environments. Topics include acid base, complexation, and redox equilibria; microbial processes in aquatic systems; atmospheric monitoring; and atmospheric photochemistry. Prerequisite: Permission of instructor.

6493
Polymer Chemistry
Introductory polymer chemistry including theory of polymerization, molecular weight measurements, step-growth and chain-growth polymerization, polymer structure and physical properties, and viscoelastic properties. Prerequisites: Chem 3013,3033, or permission of instructor.

6531
Biochemistry I Laboratory
Introduction to the isolation, identification, and reactions of biological materials. Three hours of laboratory per week. Prerequisite or corequisite: Chem 4133.

6533
Biochemistry I
An introduction to the chemical aspects of biological systems with emphasis on structure and chemistry of carbohydrates, lipids, proteins, and nucleic acids. Prerequisites: Chem 3011, 3013.

6543
Biochemistry II
Selected advanced topics in biochemistry with an emphasis on structure and function relationships. Three lectures per week. Prerequisite: Chem 4133.

Computer Science

Chair
William A. Coberly

Associate Chair
Roger L. Wainwright

Professors
J.C. Díaz
Dale A. Schoenefeld
Sujeet Shenoi
Roger L. Wainwright

Associate Professors
William A. Coberly
Rosanne F. Gamble
Sandip Sen

Assistant Professor
John C. Hale

The Department of Mathematical and Computer Sciences offers programs leading to the M.S. degree with thesis and non-thesis options and to the Ph.D. degree in computer science.

M.S. Program

Admission. An applicant must hold a baccalaureate degree from an accredited college or university in computer science or a related discipline. In addition, the following requirements must be met:

- A 3.0 undergraduate GPA.
- At least 15 hours of computer science.
- At least 15 hours of mathematics and statistics at the level of calculus and above.
- An acceptable score on the Graduate Record Exam.

Upon the recommendation of the Graduate Dean, students who fail to meet all the above requirements may be admitted conditionally, pending removal of deficiencies. All applicants from non-English-speaking countries must submit a score of at least 550 on the TOEFL exam.

Requirements. A student who has been fully admitted to the Graduate School should meet with the graduate coordinator of the computer science program to plan a program through to the completion of the degree requirements. This program is subject to change by mutual consent, but a current version remains on file.

The core requirements for the master's degree include at least five courses at the 7000+ level, subject to approval of the graduate coordinator.

In addition, students who have not completed equivalent undergraduate courses must complete the following courses: CS 1043, Introduction to Programming and Problem Solving; CS 2003, Fundamentals of Algorithm and Computer Applications; CS 2123, Data Structures; CS 3013, Discrete Mathematics; and CS 3053, Operating Systems.

Up to 12 credit hours of 6000-level courses may be taken with the approval of the graduate coordinator.

Each student must complete 30 credit hours, which may optionally include up to a six-credit-hour research oriented master's thesis.

CS 6413, Compiler Construction, is required.

Additional computer science courses needed to meet the above requirements are chosen as electives by the student from the list of approved undergraduate and supporting courses. Other courses may be selected subject to approval of the graduate coordinator.

Each student producing a master's thesis must pass an oral examination, including presentation of the research results, upon completion of all other degree requirements.

Ph.D. Program

The primary focus in selecting and training candidates for the doctoral program is to ensure breadth of knowledge and to develop the student's ability to do independent and productive research, synthesis, and design. The basic objectives of the program are these: 1) to ensure skills in the use of the tools of computer science and a broad understanding of the discipline's basic areas; 2) to ensure a firm foundation in computational mathematics; and 3) to provide opportunities for advanced specialization and creative research in computer science.

Admission. The applicant for the doctoral program in computer science must hold a baccalaureate degree and a master's degree from accredited institutions in the United States or a recognized institution in another country, with a 3.0/4.0 GPA in each degree. Each application must include a letter of intent describing the applicant's interests and career objectives, plus three letters of reference. All applicants must also submit Graduate Record General Examination scores. International applicants whose native language is not English must submit, in addition to the above, a TOEFL (Test of English as a Foreign Language) score of at least 575.

Admission to the doctoral program in computer science is open to degree holders in all branches of science and engineering. Applicants who lack only a few of the computer science undergraduate proficiency courses may be admitted conditionally to the doctoral program, but they will be required to remove those deficiencies by taking prescribed undergraduate courses and obtaining a grade of B or better in each deficiency course. No graduate credit is allowed for courses taken to remove deficiencies. A complete list of the computer science undergraduate deficiency courses is available from the department.

Curriculum Requirements. A minimum of 90 hours beyond the baccalaureate degree is required for the Ph.D. These may include a maximum of 30 hours transferred from the master’s degree. The following conditions apply:

A minimum of 20 research and dissertation hours must be earned, which may include a maximum of six thesis hours transferred from a computer science master’s degree. Research and dissertation hours also include a maximum of six hours in research internship, and a minimum of 18 dissertation research hours.

A minimum of 54 hours must be earned in course work and independent study, which may include a maximum of 27 graduate course hours with grade B or better transferred from the master’s degree. Course work and independent study hours also include a minimum of 30 graduate computer science hours (not including independent study), of which 24 must be 7000-level or above; a minimum of six graduate mathe-

matics hours, to form part of a minimum core of 48 graduate computer science or mathematics hours, which may include independent study; a maximum of 12 hours of 6000-level computer science courses; a maximum of 18 hours of 6000-level courses; and a maximum of nine hours of independent study. All courses outside of computer science must have the approval of the student's major professor.

Language and Residence Requirements. Because research is a full-time activity and technology changes very rapidly in this field, part-time study for the Ph.D. is not encouraged. Every doctoral student is required to satisfy a one-year, full-time residence (nine hours a semester) in work towards the doctorate.

However, there is no foreign language requirement for the Ph.D. degree in computer science.

Comprehensive Examinations. Every computer science doctoral student is required to pass four of the eight areas of the comprehensive examination, which consists of a written test on at least four of the following eight areas: programming languages, database systems theory, analysis of algorithms, computer architecture or operating system theory, scientific computing, computer graphics, and software engineering. It is the student's responsibility to take the courses and do the reading necessary to prepare for the examination. Detailed syllabi are available from the department.

The comprehensive examination is given twice a year, in the third week of each regular semester. A doctoral student may take all or part of the comprehensive examination a maximum of two consecutive times, and any area passed the first time need not be retaken. A minimum of two areas of the comprehensive examination must be attempted during the first 13 months that the student is enrolled in the doctoral program. Failure to pass four areas of the comprehensive examination within the two allowed opportunities results in dismissal from the program.

Advisory Committee. Within eight weeks of passing the comprehensive examination, the student shall secure the agreement of a doctoral faculty member to serve as the candidate's major professor and shall request an advisory committee. (Students who fail to secure a major professor will be dropped from the program.) The members of the advisory committee are selected with the assistance of the candidate's major professor, the computer science graduate coordinator, and the department chair with the intent that this committee will become the student's doctoral committee. When appropriate, the advisory committee may suggest alternate graduate faculty members for the doctoral committee. This committee must consist of at least five graduate faculty members, including at least one member from mathematics and one from outside the Department of Mathematical and Computer Sciences. The candidate's major professor chairs the doctoral committee. The purpose of the advisory committee is to assist the applicant in planning the proposed program of study for the doctoral degree. This includes identifying any deficiencies in the applicant's graduate record to date, scheduling a research internship, and scheduling the qualifying examination.

Qualifying Examination. Within one year of passing the comprehensive examination, the student must attempt the qualifying examination, which is administered by

the student's doctoral committee. The student must apply for the examination at least four weeks before it is to be held. At the time of the application, the student must furnish the members of his or her committee with 1) an in-depth written proposal for research in an area of scientific or technological importance and should relate any progress to date, and 2) a written report of a scholarly or research nature that demonstrates the student's ability to explore a topic in depth. The report should be of at least master's level quality and may be undertaken as a research course of three credits. A master's thesis, a properly documented computer project, or the report from a research internship may also be acceptable. The report must be accepted by the committee.

The qualifying examination consists of two parts, one written, one oral. The written part, prepared by the members of the doctoral committee, is in the student's major and, if any, minor field. It could be the analysis of a significant problem in some aspect of the student's field of specialization. It will also include advanced material in the area in which the student contemplates producing a dissertation. The oral portion consists of the oral defense of the written proposal the student submits; however the examiners may also ask questions over the student's major, minor, and related topics.

Following the exam, the chair of the doctoral committee then submits a report to the Graduate Dean, signed by all the members of the student's committee, indicating whether the student has passed or failed. If the student failed, he or she may, at the discretion of the doctoral committee, repeat the examination within three months. One dissenting vote is permitted to grant a pass to the student on the first attempt at the qualifying exam, but a unanimous vote of approval is required to pass the second attempt. A third attempt at the qualifying examination may either be postponed or not allowed.

Research Internship. Each prospective candidate for the doctoral program is strongly urged to participate in a research internship prior to admission to candidacy. The research internship consists of at least three full-time months (or the equivalent) of research participation in an industrial or government research laboratory. The internship does not have to be in the exact area in which the dissertation research is planned, but should be in a closely related area. During the internship, the student enrolls for up to six credits in CS 8981-6, Research Internship. The student should consult his major professor, the members of his committee, and other computer science faculty members for possible opportunities to secure an internship.

Admission to Candidacy. A doctoral student in full standing and not on probation can apply for candidacy. Admission to candidacy is recommended by the advisory committee upon passing four areas of the computer science comprehensive examination, successful completion of a minimum of 45 acceptable course work hours, and passing the qualifying examination.

Doctoral Dissertation. The doctoral dissertation is the final and the most important component of the series of academic goals which culminate in the awarding of the doctoral degree. The dissertation is to be a work of original research scholarship which represents a patentable invention or material publishable in an archival publication. It should demonstrate the student's ability to address a significant intellectual problem and arrive at a successful conclusion.

Final Oral Examination. The final oral examination is a defense of the dissertation and is open to the public. The candidate will prepare and distribute reading copies of the dissertation to each Doctoral Committee member four weeks prior to the oral examination.

Time Limitations. Any doctoral student not completing all degree requirements within four years of passing the qualifying examination will be dropped from the program.

The number of credits allotted a course is indicated by the last digit in the course number.

Computer Science

7013
Programming Languages
Detailed examination of the key concepts and constructs of modern programming languages including imperative, functional, logic and object-oriented paradigms; concurrency. Also focuses on critical language design and implementation issues. Prerequisite: CS 4013.

7053
Operating Systems Theory
Formal analysis of concurrent processes synchronization, protection and recovery issues, management policies for system components, operating systems for parallel and distributed systems. Discussion of implementation issues, and operating system performance evaluation. Prerequisite: CS 3053.

7063
Parallel Architectures
Advanced treatment of parallel computer architecture covering new technological developments, including details of multiprocessor systems, shared memory, distributed memory, interconnection networks, clusters, and specialized machines. Prerequisite: CS 4063.

7213
Software Project Management
Formal approach to the state-of-the art techniques in software design and development including structured programming, top-down design, stepwise refinement and reorganization, documentation, and standards. Students work in teams in organizing, managing, and developing a large software project. Prerequisite: CS 2123.

7233
Knowledge Base Systems
Various symbolic data structures for representing knowledge. Design and performance issues for knowledge utilization. Knowledge acquisition, automatic problem solving issues, real-time systems, object-oriented programming. Prerequisite: CS 2123.

7253
Advanced Information Structures
Advanced topics in data structures including stacks, queues, tree structures, tables, lists, multi-linked structures, encrypting, file organization, B* trees, heaps, storage reclamation, and other topics of current research. Prerequisite: CS 2123.

7263
Scientific Computing
Provides in-depth presentation of issues central to numerical computing: the effect of finite precision on numerical computation, the theory and application of splines, and the theory and applications of computational differentiation. Prerequisites: CS 4533, or Math 2024 and CS 2003, or equivalent.

7293
Theory of Symbolic Computation
An introduction to list-processing languages, algebraic manipulation, the construction of symbolic computation packages, and areas of research and applications. Prerequisite: CS 3053, Math 3073, Math 4123.

7313
Advanced Artificial Intelligence
Detailed overview of research issues relevant to computational approaches to understanding and creating intelligent behavior. Includes philosophical foundations, knowledge repre-

sentation, planning, machine learning, multiagent systems. Students work in groups on final research project. Prerequisite: CS 6613.

7323
Distributed Artificial Intelligence
A thorough introduction of the research and application of techniques for coordination of multiple, autonomous agents sharing common resources and/or goals. Students will work in groups on a final research project. Prerequisite: CS 6613.

7333
Machine Learning
Comprehensive survey of computational mechanisms that allow autonomous agents to acquire knowledge and expertise and enables them to improve performance on a given set of tasks from experience. Covers symbolic and subsymbolic schemes; supervised, reinforcement, and unsupervised learning; single agent and multiagent systems; robot learning; learning information agents; practical applications. Students work in groups on final research project. Prerequisite: CS 6613.

7353
Analysis of Algorithms
Design and analysis of efficient algorithms. Design techniques including recursion, divide-and-conquer, and dynamic programming. Applications include sorting, searching, dynamic structures, path finding, fast multiplication. Non-deterministic algorithms. Computationally hard problems. NP-completeness. Prerequisites: CS 2123, 3013.

7413
Advanced Computer Graphics
An in-depth study of the hardware, software, and algorithms used in computer graphics. Graphics information storage and retrieval. Interactive graphics systems and image processing. Prerequisites: CS 2123, 3053, 4613, Math 2073.

7423
Image Processing
Study of algorithms and hardware for processing images. Algorithms range from visual enhancement and pseudo coloring, through feature extraction, scene analysis, and visual pattern recognition. Prerequisite: CS 3053 or permission of instructor.

7513
Advanced Topics in Database Systems
Relational databases; hierarchic, network data models; data structures; concurrency control; security. Prerequisites: CS 3013, 4163.

7533
Quantitative System Performance
Techniques for experimental design, measurement, simulation and modeling for performance analysis of computer systems. Workloads, selection and characterization. Planning and benchmarking. Little's and other operational laws. Queuing networks. Load-dependent service centers and hierarchical decomposition. Prerequisites: CS 3053, Stat 3813 or permission of instructor.

7543
Parallel Languages and Environments
Overview of language standards for parallel programming. Automatic detection of parallel sections for procedural languages. Discussion of shared memory and message-passing paradigms. Development of tools and environments for programming homogeneous and heterogeneous parallel processors. Prerequisite: CS 4353 or permission of instructor.

7553
Parallel Algorithms
Design and analysis of parallel algorithms with emphasis on distributed memory parallel computation. Topics include numerical problems, sorting algorithms, matrix operations, graph theory and combinational algorithms. Course open to students from other disciplines with strong mathematics background. Prerequisites: CS 2123, CS 3053, or permission of instructor.

7613
Computer Networks and Distributed Processing
Data communications techniques and protocol. Distributed system software and architecture. Distributed database systems. Prerequisites: CS 3053, 4323.

7653
Microcomputer Systems and Applications
Fundamentals of microcomputer systems, architecture, peripherals, and interfacing. Applications of small computers. Design and implementation of an application project is required. Prerequisites: CS 2163, 3053.

7861-3 (1-3 hours)
Special Topics in Computer Science
Devoted to various advanced topics of general computer science not covered by the regular curriculum. May be repeated with change of topic, maximum credit six hours. Prerequisite: Graduate standing and permission of instructor.

7911-3 (1-3 hours)
Master's Report
Project-oriented research on some problem within an approved area of computer science directed by the faculty. An oral presentation and written report are required. Prerequisite: Permission of department. Pass-fail basis only.

7961
Residency
(See page 16.)

7971-3 (1-3 hours)
Computer Science Seminar
Reports and discussions of advanced computer science topics. Prerequisite: Permission of instructor.

7981-6 (1-6 hours)
Research and Thesis
Directed research on some problem within an approved area of computer science. Examination and written thesis required. Prerequisite: Permission of department. Pass-fail basis only.

7991-3 (1-3 hours)
Independent Study
Individual or group studies of advanced topics in computer science. Selected study is done by appointment with the faculty. Prerequisite: Permission of department.

8241-3 (1-3 hours)
Advanced Topics in Scientific Computing
Advanced topics in scientific computing such as QZ algorithm for the generalized eigenvalue problem, frontal methods for sparse matrices, multigrid method, domain decomposition method, local grid refinement, curvilinear grid refinement and hybrid finite elements. May be repeated with a change of topic; maximum graduate credit nine hours. Prerequisite: Math 7243 or consent of instructor.

8341-3 (1-3 hours)
Advanced Topics in AI and Databases
Advanced topics in artificial intelligence and databases. May be repeated as a seminar course as often as needed, or as an organized course with change of topic and maximum graduate credit of nine hours. Prerequisite: CS 7233 and consent of instructor.

8411-3 (1-3 hours)
Advanced Topics in Computer Graphics and Image Processing
Advanced topics in computer graphics and image processing such as ray tracing, object description construction, scene analysis and computer vision. May be repeated with a change of topic; maximum graduate credit nine hours. Prerequisites: CS 7413, CS 7423.

8541-3 (1-3 hours)
Advanced Topics in Parallel Processing
Advanced topics in parallel processing such as cellular automata, advanced parallel programming techniques, and other topics. May be repeated with a change of topic; maximum graduate credit nine hours. Prerequisites: CS 4543, CS 7553.

8981-6 (1-6 hours)
Research Internship
Research participation in an industrial or government research laboratory. Internship should culminate in written report for evaluation by the instructor. Independent evaluation by the immediate supervisor at the research laboratory where the internship took place is also used in assigning course grade. Prerequisite: Admission to Ph.D. program, completion of comprehensive examinations, consent of major professor. Pass-fail basis only.

9981-9 (1-9 hours)
Research and Dissertation
Original research on some problem within the field of computer science on the Ph.D. level. Prerequisites: Admission to Ph.D. program, completion of comprehensive examinations, consent of instructor. Pass-fail basis only.

9991-3 (1-3 hours)
Independent Study
Individual studies of advanced topics at the Ph.D. level. Selected study is performed by appointment with the faculty. Prerequisite: Admission to Ph.D. program, consent of instructor. Pass-fail basis only.

Approved Undergraduate Courses
Several undergraduate courses may be taken for graduate credit with approval from the program advisor. A student enrolling in these courses will complete assignments in addition to those completed by the undergraduate students in the courses. The courses include the following:

6013
Electronic Commerce
Electronic commerce technology, models and issues. Principles and case studies of electronic commerce. Introduction to security architectures for electronic commerce including digital signatures, certificates, and public key infrastructure (PKI). Legal and national policy electronic commerce issues. Prerequisite: CS 2123 or permission of the instructor

6153
Computer Security
Introduction to security problems in computing, basic encryption and decryption techniques, secure encryption systems, cryptographic protocols and practices, security in networks and distributed systems, legal and ethical issues in computer security. Prerequisites: CS 3013 and CS 3053.

6333
Network Programming
Modern computer networks and concurrent programming. Internet architecture: hosts, routers and gateway protocols of the Internet and discussion of TCP/IP and Domain Name Service. Interprocess communication and synchronization on single and networked hosts as well as client-server programming. Computer network security issues. Implementation of communicating processes on a network. Prerequisite: CS 3053 or permission of instructor.

6413
Compiler Construction
Algebraic language syntax and semantic definition. Languages, grammars and parsing algorithms. Semantics processing. Attribute grammars and syntax-directed translation. Declarations processing, type-checking, storage allocation, code generation. Prerequisites: CS 2123 and CS 3003.

6423
ComputerArchitecture
Operating systems strategies and architecture features required to support them. Alternative implementations. Survey of advanced topics in a variety modern computer and microprocessor architectures. Prerequisite: CS 2033 or permission of instructor.

6433
Information Systems Assurance
Design and analysis methods for high assurance information systems. Safety, reliability and security. Specification of mission-critical system properties. Software and hardware validation, verification and certification. Prerequisite: CS 4153.

6483
Theory of Computing
Finite automata. Regular languages and grammars. Properties of regular languages. Context free languages and grammars. Pushdown automata. Properties of context free languages. Chomsky hierarchy. Tqring machines. Limits of algorithmic computation. Prerequisite: CS 3013.

6523
Database Systems
Thorough introduction to the theory and practice of database systems. Emphasis on theoretical considerations in modeling data and in designing efficient, easy-to-use database systems. Also covers practical issues of query lan-

guages and optimization, transaction processing, concurrency control and recovery techniques as well as embedding structured queries in high-level language. Prerequisites: CS 2123 and CS 3013.

6573
Object Oriented Software
Concepts and techniques of object-oriented software construction are motivated by improving quality, reusability, and extendibility. Classes, assertions, genericity, inheritance, polymorphism, and dynamic binding are illustrated using contemporary environments. Prerequisite: CS 2123 or permission of instructor.

6613
Artificial Intelligence
Comprehensive introduction to principles and techniques of artificial intelligence (AI). Emphasis on scientific and technological motivations for AI. In-depth coverage of agents and environments, search techniques, game playing, knowledge representation, rule-based reasoning, logic, planning, learning, reasoning under uncertainty. Programming in LISP and rule-based languages. Prerequisites: CS 2123 and CS 3013.

6673
Data Communication and Networking
Overview of networking issues. Topics include discussion of physical media used in modern networks and of wireless technology. Networking standards such as Ethernet and fast Ethernet. Networking protocols such as DHCP, TCP/IP, IPX/SPX, SNMP, ICMP, RIP etc. Networking hardware such as routers, bridges, receivers and transceivers. Prerequisite: CS 3053 or permission of instructor.

6683
Software Specification and Design
Formal and semi-formal methods of specification and design are used to describe the various requirements of a non-trivial software system. Prerequisites: CS 2123 and CS 3013.

6693
Scientific Software Environments
Scientific software environments discussed, focusing on case studies that illustrate the interplay of mathematical modeling, scientific computing, and applied sciences and engineering. Issues of high performance architectures, software engineering methodology for large-scale codes, and visualization of large data sets. Emphasizes high performance computing science and engineering problems. Extensive use of electronic textbooks. Computer projects required. Prerequisites: Math 3073 and either CS 2503 or CS2003. Same as Math 4533.

6783
Parallel Programming
Discussion of languages and environments for programming parallel processors including program annotations, language extensions, and software tools. Discussion of shared and distributed memory paradigms, and homogeneous and heterogeneous parallel computing. Issues of vector and data parallel computing. Portability and performance evaluation, concepts, and tools. Prerequisite: CS 2503 or CS 3003, and consent of instructor.

6813
Fundamentals of Computer Graphics
Introduction to computer graphics software and hardware. Two and three-dimensional object descriptions and transformations, clipping scan conversion, and visible surface computations. Raster and vector organized display systems, hardcopy devices, interactive input devices. Emphasis on design of interactive systems. Prerequisite: CS 2123.

Electrical Engineering

Chair
Gerald R. Kane

Professors
Kaveh Ashenayi
Marcus O. Durham
Gerald R. Kane

Associate Professors
Peter G. LoPresti
Surendra Singh
Heng-Ming Tai

The Department of Electrical Engineering offers programs leading to the Master of Science (M.S.) and Master of Engineering (M.E.) degrees in electrical engineering. The Master of Science program is research-oriented and requires a formal research thesis. The Master of Engineering program is course work-oriented. The programs provide advanced preparation in specialized areas of electrical engineering for recent graduates and working engineers who wish to improve their technical capabilities.

Master's Program

Admission. An applicant must have a baccalaureate degree in engineering or applied sciences with exemplary grades and a satisfactory score on the GRE General Tests. An applicant must satisfy the general admission requirements of the Graduate School and receive the approval of the program coordinator and the Graduate Dean.

A minimum undergraduate grade point average of 3.0 and a minimum score of 650 on the GRE quantitative section are required for admission to the program. Applicants from non-English speaking countries must also present a TOEFL score of 550 or greater.

Students who do not satisfy these requirements but have a grade point average of 3.0 or over in electrical engineering courses in their last two years of study may be considered for probationary admission. A student having a degree in a field other than electrical engineering may be required to take deficiency courses.

General Requirements. Both the M.S. and M.E. programs require completion of 30 credit hours. Acceptance in the M.S. option requires the approval of the departmental graduate faculty and will be decided on the basis of individual merit after receipt of a formal written request from the student. Upon completion of nine hours of 7000-level course work within the program, the student interested in the M.S. option must select an area of research and a faculty advisor. In addition, the student must file an application with the department graduate faculty for admission to the M.S. program. The advisor approves the remainder of the student's study program and supervises the thesis. The advisor, after consulting with the student, recommends at least two other graduate faculty members (to serve as committee members) to the Graduate Dean. At least one member of this committee must be from outside the department and may be recommended as a qualified expert from outside the university community.

A 3.0 overall grade point average is the minimum acceptable performance level for the program and must be maintained for all courses applied toward the degree. Students receiving three C grades in nine hours of course work during their graduate studies will be dismissed. Grades for the design report and thesis hours are recorded on a pass-fail basis and are not computed in the grade point average, although a passing grade is required.

All students in either option are required to complete the following:

SYMBOL 183 \f "Symbol" Core courses: 15 hours

Each student is required to take EE 7073, Fundamentals of Engineering and Management. The remaining 12-hour requirement may be met by taking any four of the following six classes: EE 7013, Random Processes in Engineering; EE 7023, Electromagnetics; EE 7033, Electric Power Systems Design; EE 7043, Solid State Electronics and Devices; EE 7053, Optimization Techniques; EE7063, Computer Engineering.

SYMBOL 183 \f "Symbol" Elective courses: 15 hours

Elective courses must be approved by the graduate advisor and/or the department chair. No more than six hours of electives may be taken outside the department. Students in M.E. option may undertake a three-hour design project under the supervision of a faculty advisor and write a design report. A public design review is required.

The M.S. in electrical engineering requires that six of these 15 hours be dedicated to thesis. A formal defense of the master's thesis is required. Upon completion of the thesis, the M.S. candidate must pass a comprehensive examination. The examination can be written, oral, or both depending on the discretion of the committee members. The comprehensive examination will cover the student's entire graduate program with emphasis on the thesis. Oral examinations must be scheduled at least two weeks prior to their occurrence, and all the graduate faculty of the college is invited to attend.

The number of credits allotted a course is indicated by the last digit in the course number.

Electrical Engineering

7013*

Random Processes in Engineering

A review of probability and an introduction to stochastic processes as used in communication and control. Topics include probability theory, random variables, expected values and moments, multivariate Gaussian distributions, stochastic processes, autocorrelation and power spectral densities, and an introduction to estimation and queuing theory. Prerequisite: EE 4073 or equivalent.

7023*

Electromagnetic Theory

Introduction to waves. Reflection and transmission of waves. Uniqueness, image theory, equivalence principle reciprocity and Green's Functions. Plane wave functions, rectangular waveguide, partially filled waveguide, model expansion of fields. Cylindrical wave functions, circular waveguide, scattering by cylinders. Spherical wave functions, scattering by spheres. Prerequisite: EE 4023 or equivalent.

7033*
Electrical Power Systems Design and Protection
Analysis of balanced and unbalanced polyphase systems. Transmission line analysis, per unit parameters, load flow analysis; symmetrical components, methods of unbalanced faults, economical optimization of systems, miscellaneous topics of energy conversion, transmission, and system control. Prerequisite: EE 4133 or equivalent.

7043*
Semiconductor Devices and Circuits
An intensive study of electronic circuit design based on semiconductor diodes, bipolar junction transistors, and field effect transistors. Topics include biasing, equivalent circuits and modeling, numerical methods used in computer analysis, nonlinear time solutions. Prerequisite: EE 4043 or equivalent.

7053*
Optimization Techniques
Analysis of linear and nonlinear optimization methods. Minimum principle, dynamic programming, gradient techniques, the simplex method, robustness, and linear quadratic problems.

7063*
Computer Engineering
Design techniques and components of programmable digital systems. Microprocessors, read only memories, and microprogramming. Input/output interface methods, design criteria of random access and mass storage memories, minicomputers, and digital controller architecture. Prerequisite: EE 4263 or equivalent.

7073*
Fundamentals of Engineering and Management
Issues facing engineers in the modern industrial environment, including management of technology, total quality management, project management, technology transfer, ethics, professionalism, and intellectual property. The objective to develop understanding and skills relevant to important but non-technical issues facing engineers in modern competitive global business environments and international standardization of product design.

7113
Advanced Signal Processing
Multidimensional sampling theory, Z and Fourier transforms. Transformation of distributed parameter continuous systems to multidimensional digital models. Emphasis on the application of these concepts to problems in exploration seismology and image processing. Computational methods and algorithms are an important part of the course. Prerequisite: EE 4213 or equivalent.

7123
Passive and Active Microwave Circuits
Equivalent currents and voltages in waveguides, matrix representation of multiports, reciprocal and non-reciprocal networks. Scattering matrix, its properties and applications. Computer-aided analysis and optimization of microwave circuits. Multiconductor transmission lines, TEM directional couplers. Prerequisite: EE 7023.

7133
Power System Reliability
Fundamental techniques and concepts for evaluating the long- and short-term reliability of any system, probability and Markov processes, static spinning generation capacity; transmission lines; composite, interconnected and DC system reliability evaluation; frequency and duration techniques. Prerequisite: EE 7033, Stat 4413, or permission of instructor.

7143
Linear Electronics
Topics in analysis and design of circuits, active filters, A/D and D/A converters, sample and hold circuits, phase-lock loops, frequency synthesis, comparators, modulators and demodulators, and video amplifiers. Prerequisite: EE 4043 or equivalent.

7153
Optimal and Adaptive Control Systems
Analysis and design of model reference adaptive systems. Theory and design methods for optimal control. Calculus of variations, Pontryagin's minimum principle, dynamic program-

ming, Kalman filtering, optimal stabilization and regulator design, optimal output feedback and dynamic compensator. Prerequisite: EE 4153.

7163
Cellular Logic and Iterative Systems
Sequential Machines and Cellular Automata. Tessalation. Iterative Circuit Synthesis. Near Neighbor and Global Communication tradeoff. Systolic Arrays. Prerequisite: EE 7063.

7213
Coding and Information Theory
Source coding, information measures, entropy, Shannon's theorems, channel capacity, error-correcting codes, arithmetic codes, linear codes, convolutional codes, cyclic codes, encoding and decoding. Prerequisite: EE 4073 or permission of instructor.

7223
Numerical Methods In Electromagnetics
Formulation of integral equations. Simple numerical methods for solving I.E.'s choice of basis functions. Solution of strip equation, finite length tube, cylinder of general cross-section. Utilization of symmetry. Electric field and magnetic field integral equations for cylindrical structures, TE and TM polarizations. Cylindrical antennas and scatterers, thin wires. Three-dimensional electrostatic problems. Prerequisite: EE 7023 or permission of instructor.

7243
Power Electronics
Rigorous study of solid-state power electronic devices, converter, rectifiers, choppers, and power supplies. Over current protection requirements and cooling requirements. Prerequisite: EE 7043, or permission of instructor.

7253
Computer Control Systems
Sampling of processes and Sampling theorem. Stability of discrete systems, analysis and design using Z-transform, frequency response, and state variable methods. Design of discrete controllers, compensators, and observers. Optimal feedback control for linear processes with quadratic performance criteria. Computers for process control and automation. Implementation of control strategies. Prerequisite: EE 4253.

7313
Pattern Recognition
Decision functions. Pattern classification by distance and likelihood functions. Trainable pattern classifiers using deterministic and statistical methods. Clustering and feature selection. Syntatic pattern recognition, game-playing machines, question and answers machines. Prerequisite: EE 7013.

7323
Fiber-Optic Transmission Systems
Component basic principles, and applications in optical communications systems. System design and evaluation techniques and tools. Recent technological advances pertinent to future systems.

7413
Neural Networks
Analysis of various artificial neural network models. Topics covered include associative memories, multilayer perceptrons, learning algorithms such as backpropagation, unsupervised and supervised learning, and applications to signal classification, pattern recognition, adaptive control systems and optimization problems. Prerequisite: EE 7013 or permission of instructor.

7863
Special Topics in Electrical Engineering
Content varies yearly. Typical topics include advanced analysis and design of communications and signal processing systems, wave propagation, advanced circuits, microelectronics, energy conversion, and transportation systems. Prerequisite: Permission of instructor.

7913
Design Report
Individual report on individual or group design studies. Public design review with graduate committee is required. Prerequisite: Permission of instructor. Pass-fail basis only.

7961
Residency
(See page 16.)

7971
Graduate Seminar

7981-6 (1-6 hours)
Research and Thesis
Directed research on a problem in an approved area. Written thesis and formal defense before graduate committee is required. Prerequisite: Permission of department. Pass-fail basis only.

7991-3 (1-3 hours)
Independent Study
Individual or group studies of advanced topics. Selected study is done by appointment with the faculty.

***Core courses in the master's program.**

Approved Undergraduate Courses

6403
Information and Communication Systems
Information, its meaning and quantification. Modulation and transmission of information, classification and modeling of noise sources and their effects in communication systems. Introduction to the signal extraction problem. Prerequisites: EE 3113 and Stat 3813 or 4413

6423
Radio Frequency Engineering
CW and pulse response of transmission lines. Waveguide analysis and design. Antenna types and characteristics. Propagation of radio waves and transmission path analysis. Prerequisite: EE 4023.

6433
Power Systems Analysis
Principles of balanced and unbalanced polyphase AC power systems. Load flow, component models and parameters. Prerequisites: EE 3033.

6443
VLSI Design
Hierarchal design methodology for very large scale integration of nMOS and CMOS. Physics of MOS devices. Design rules checking computer aided design tools. Prerequisites: EE 4043 and EE 2163.

6453
Modern Control Systems
Analysis and design of analog and digital control systems. Nonlinear and discrete data systems, concepts of controllability and observability, state variable feedback compensation. Introduction to parameter identification, adaptive and optimal control systems. Prerequisites: EE 4053.

6473
Introduction to Neural Networks
An introduction to artificial neural network models, learning algorithms, implementations and applications. Associative memories, Hopfield nets, supervised and reinforcement learning, Adaptive Resonance Theory. Prerequisites: EE 2003 and Math 7073, or permission of instructor.

6513
Digital Signal Processing
An introductory course in digital signal processing and digital filtering. Topics include sampled data systems, modeling and analysis of digital filter design. Course material is applicable to a wide range of data processing applications. Prerequisites: EE 3113 or permission of instructor.

6463
Antennas
Maxwell's Equations. Ideal versus practical dipoles. Radiation patterns. Impedance of antennas. Arrays. Yagi Uda Antennas. Aperture antennas. Pattern multiplication techniques. Image theory. Feeding techniques. Introduction to pattern synthesis. Scanning. Prerequisites: EE 4023.

6553
Digital Control Systems
The use of digital computers in the real time control of dynamic systems such as servomechanisms, chemical processes, aircraft, etc. Topics covered include sampling, Z-transform, digital filters, computer-aided design, design using transform techniques, design using state variable techniques, quantization, and system identification. Prerequisites: EE 4053 or permission of instructor.

6563
Microprocessors in Digital Design
Major microprocessor families, emphasizing architectural developments of the processor family, the microcomputer system consisting of the microprocessor and its support chips, and application of the minimal or near minimal microprocessor systems to realistic engineering as opposed to stand alone computer facility. Both single chip complete systems and large wordlength multichip systems are discussed. Prerequisites: EE 2163 and either EE 2063 or CS 2033.

6623
Electro-Optics
Fourier optics. White light processing. Integrated optics. Optoelectronic devices. Modulation and detection. Coherence. Holography. Photographic techniques. Low light and infrared applications. System design and tradeoffs. Prerequisites: EE 4023 or permission of instructor.

6723
Robotics
Design and performance analysis of robots and manipulators as applied in automation. Mechanical and electrical components as well as software and hardware needed for their control. Prerequisites: EE 4053 or permission of instructor.

Geosciences

Chair
Colin Barker

Professors
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Janet A. Haggerty
Peter J. Michael

Associate Professors
Steven J. Bellovich
Dennis R. Kerr
Christopher L. Liner
J. Bryan Tapp

Assistant Professors
Duryodhan Epili

Master of Science and Doctor of Philosophy degrees are offered in geology, geophysics, and geochemistry. The major areas of emphasis in the graduate program include sedimentary geology and reservoir characterization, marine geology, low temperature and petroleum geochemistry, environmental geoscience, and geophysical prospecting and tectonics.

A joint law/master of science in geosciences degree, described on page xx of this bulletin, is also offered.

Master's Degree Programs

A master's degree can be earned through either a thesis or a non-thesis program. In the non-thesis program, a major paper or report is substituted for the thesis, and six hours of course work are added.

Admission. Applicants must satisfy the general admission requirements of the Graduate School. They must also be approved by the Graduate Advisor and satisfy the following requirements:

- Bachelor's degree in natural science, physical science, mathematics, or engineering.
- An undergraduate grade point average of at least 3.0. Students who do not satisfy this requirement but have at least a 3.0 GPA in their major field may be admitted on probation at the discretion of the Graduate Advisor.
- Probationary status is removed by completing nine hours of approved graduate study with a GPA of 3.0 or higher in one semester for a full-time student and within three terms for a part-time student.
- Letters of recommendation from at least three professors or former supervisors who are familiar with the applicant's work performance and academic potential.
- If the student's undergraduate major is not in one of the geological sciences, admission to the Graduate School may be deferred and the student required to take appropriate undergraduate geosciences courses, as determined by the Graduate Advisor, before re-evaluation for admission. These deficiencies may, under certain circumstances and with the approval of the Graduate Advisor, be made up after admission to the Graduate School.
- All applicants are required to take the General Graduate Record Examination.
- Applicants whose native language is not English must also take the TOEFL

examination and score at least 550 (or equivalent computerized score). Exceptional applicants with TOEFL scores below 550 may be admitted conditionally and required to take deficiency courses in English or retake the TOEFL examination.

General Requirements. A 3.0 grade point average is the minimum needed for all master's degree programs.

No graduate credit is allowed for a course in which a grade lower than C has been received, and no more than six hours of C grades will be accepted for graduate credit. Thesis and report grades are recorded on a pass-fail basis and are not computed in grade point averages, although a passing grade in all thesis or report hours is required.

Initial advisement of all master's program students is by a departmental graduate advisor appointed by the Graduate Committee.

All courses taken for graduate credit in these programs shall be selected from those listed in this bulletin, except for students concentrating in environmental geoscience, and the choices are subject to the approval of the student's advisor, the thesis committee, and the Graduate Advisor. Students concentrating in environmental geoscience may take up to 6 hours in the College of Law, which will be taken pass/fail and counted as courses outside the major discipline.

Thesis Program Requirements

Minimum semester hours outside major discipline 6
Required semester hours of thesis 6
Minimum semester hours of at least 7000 level, excluding thesis 12
Minimum semester hours in major discipline, excluding thesis 9
Maximum semester hours of independent study 6
Minimum total hours 30

Students may be required to complete prerequisite undergraduate courses and remove deficiencies without graduate credit, resulting in a program of more than 30 semester hours.

Students should select a general research area and a research advisor for their theses by the end of the first semester. The research advisor approves the remainder of the study program and supervises the research.

Under the guidance of the research advisor, the student will prepare a thesis research proposal acceptable to prospective committee members. This must occur by the end of the third semester in the master's program. The student will also be expected to present his or her research proposal orally to the thesis committee.

The thesis committee consists of the advisor and a minimum of two other graduate faculty members. At least one member of the committee must be from outside the specific area of research; one member may be a recognized expert in the research area from outside the university. The thesis committee is recommended by the advisor, after consultation with the student, to the Graduate Dean for approval.

On completion of the research, the student will write a thesis that conforms to the Graduate School's guidelines. With the advisor's approval, a draft of the thesis will be forwarded to the other members of the thesis committee for examination and review.

After the thesis has been reviewed and judged ready for defense by the advisor and all members of the thesis committee, the student must pass an oral defense-of-thesis.

The oral defense will cover the research work and content of the thesis. A reading copy of the thesis that has been judged ready for oral defense by the advisor must be delivered to all members of the committee at least 14 calendar days before the date of the oral examination. The oral defense should be scheduled for a date at least one week prior to the start of final examinations in any given semester, but a student planning to graduate at the end of the spring semester needs to complete the oral defense and deposit the final, typed version of the thesis in the library by April 15.

Published Manuscript Option. A student enrolled in the thesis option master's program may, with the approval of the thesis committee, submit a manuscript that has been accepted by a peer-reviewed journal as a substitute for a formal thesis. The manuscript must be approved by the committee, and the student is required to document acceptance of the manuscript for publication. Although not required, it is expected that the thesis committee will be involved in the review and revision of the manuscript prior to publication. The committee may require that the student include appendices in the final document in order to preserve data and techniques that are not described in the manuscript. The final document must include the manuscript, in journal format, or a copy of the published paper, plus any required appendices. After the manuscript has been reviewed, and judged ready for defense by the advisor and all members of the thesis committee, the student must pass an oral defense.

The oral defense will cover the research work and content of the manuscript. A copy of the manuscript, and the appropriate appendices, must be delivered to all members of the committee at least 14 calendar days before the date of the oral examination. The oral defense should be scheduled for a date at least one week prior to the start of final examinations in any given semester, but a student planning to graduate at the end of the spring semester needs to complete the oral defense and deposit the approved manuscript and appendices in the library by April 15.

Non-Thesis Program Requirements

Minimum semester hours outside major discipline 6
Required semester hours of non-thesis option report 3
Minimum semester hours of at least 7000 level, excluding report 15
Minimum semester hours in major discipline, excluding report 9
Maximum semester hours in independent study, excluding report 6
Minimum total hours 36

Students may be required to complete prerequisite undergraduate courses and remove deficiencies without graduate credit, resulting in a program of more than 36 semester hours.

Students intending to take the non-thesis option should declare to the Graduate School at the end of their first semester (or for part-time students, after completing nine credit hours). This option requires the approval of the departmental chair and Graduate Dean. At the time of enrollment in a non-thesis option, the student must select both a general area in which to write a report and a member of the graduate faculty willing to supervise the report and approve the remainder of the study program.

The report is the culmination of independent study and may be the result of an extensive literature search, fieldwork, laboratory work, or similar effort. The report must follow the general guidelines for writing a thesis and is subject to the advisor's approval. Students in the non-thesis option must enroll in Geol or Gphy 7913 for the report portion of their program. There will be a public oral presentation.

Ph.D. Program

The principal objectives of the Ph.D. program are to provide students an opportunity to reach a critical understanding of basic scientific principles underlying their fields of interest and to cultivate their ability to apply these principles creatively through training in advanced methods of analysis, research, and synthesis.

Admission. An applicant must have a baccalaureate or master's degree in physical sciences, natural sciences, engineering, or mathematics from an accredited college or university.

Students with baccalaureate degrees must meet the requirements for admission to the master's program. Admission to Ph.D. work requires at least a 3.3 grade point average in the first 30 hours of graduate work and approval of the Graduate Advisor and the Graduate Dean.

Students with master’s degrees must have a 3.3 minimum grade point average in their master's work and be approved by the Graduate Advisor and the Graduate Dean. Exceptional students whose grade point average does not meet these standards may be admitted to the Ph.D. program on a probationary basis, subject to approval by the Graduate Dean.

In addition the following requirements must be met:

- All applicants are required to take the General Graduate Record Examination. In addition, geology applicants are encouraged to take the Advanced Graduate Record Examination in geology. Students with B.S. degrees in disciplines other than geology may wish to take the Advanced Graduate Record Examination in their major.
- Applicants whose native language is not English must take the TOEFL examination and score at least 550 (or equivalent computerized score). Exceptional applicants with TOEFL scores below 550 (or equivalent computerized score) may be admitted conditionally and required to take deficiency courses in English or retake the TOEFL examination.

Curriculum Requirements. The Ph.D. program requires 90 approved semester hours of graduate credit above the baccalaureate level, distributed in the following manner:

Minimum semester hours of research and dissertation, which may include 6 hours of master’s degree thesis credits 20
Minimum semester hours of graduate credit in course work and independent study, including master's degree course work 54
Minimum semester hours of course work outside the major area 12
Maximum semester hours of independent study 12
Maximum semester hours of undergraduate courses listed in this bulletin for graduate credit 24

Students may be required to complete prerequisite undergraduate courses and remove deficiencies without graduate credit, resulting in a program of more than 90 semester hours. If acceptable to the advisory committee, as many as 30 credit hours of course work completed in a master's program at any accredited institution may be counted toward the 90 hours of graduate credit. Upon agreement of the advisory committee the master's program credit hours may be distributed among the 54 hours of graduate credit, the 20 hours of research and dissertation, and/or the 12 hours outside the major area of study, according to the course descriptions listed on the master's program transcript. Not more than 12 semester hours of approved doctoral-level courses beyond the M.S. may be transferred from another institution. A GPA of at least a 3.3 must be maintained. These requirements are not variable except under special circumstances and with permission of the student's advisory committee and the Graduate Dean.

Residence Requirements. At least two consecutive semesters in residence as a full-time student at The University of Tulsa are required.

Qualifying Examination. The qualifying examination will be taken on a designated date at the beginning of April or November in the second semester of the Ph.D. program. The examination will consist of two segments: (1) a closed-book, written examination prepared by a committee made up of three geosciences faculty members and not to exceed one day in length; (2) an oral examination that follows within two weeks to allow time for evaluation of the responses to the written exam. The written examination and subsequent oral examination will result in either a pass or fail as determined by a consensus of the committee. Students who fail will be permitted to retake the examination once in the following semester at the regularly scheduled time. A second failure results in dismissal from the program. After successful completion of the qualifying examination, the student will set up an advisory committee and prepare a dissertation research proposal, which must be completed by the end of the third semester in the program and will be followed by an oral defense within two weeks of submission.

Advisory Committee. Each student in the Ph.D. program is initially advised by a graduate faculty advisor. The student should select a general research area and a research advisor for the dissertation before the qualifying examination. The advisor, after consultation with the student, recommends the other members of the advisory committee to the Graduate Dean.

The advisory committee must have at least five graduate faculty members but no more than six members. At least three of the members, including the chair, must be from the Geosciences Department with the additional member(s) providing breadth to the committee by adding experience from other disciplines. One committee member may be a recognized expert in the research from outside the university.

The advisory committee approves the student's program of course work, reviews recommendations from the qualifying examination committee, reviews progress, approves program changes and the dissertation topic, recommends the student for candidacy upon completion of requirements, and administers the final dissertation oral examination.

Admission to Candidacy. A student in the Ph.D. program cannot apply for candi-

dacy until 45 semester hours of required graduate course work have been completed. Admission to candidacy is recommended by the advisory committee upon successful completion of the qualifying examination and acceptance of the research proposal. The research proposal is discussed in detail in the following section.

Research Proposal. A research proposal detailing the planned course of research for the dissertation should be completed within one semester after successful completion of the qualifying examination. This proposal should be developed under the supervision of the research advisor, and with the oversight of the advisory committee. It should include a literature review, research justification, description of the significance of the research, detailed methodology, and time budget. The proposal must be of professional quality. The research proposal must be submitted at least 14 calendar days prior to the proposal defense. All members of the advisory committee will review the research proposal before the defense. A favorable vote of a majority of the advisory committee is required for approval of the proposal.

After successful defense of the research proposal, the student will be admitted into candidacy, proceed with his or her planned research, and write a dissertation. Major changes in research direction must be approved by the advisory committee, and the student should maintain contact with the committee during all stages of the research. The student is expected to present periodic progress reviews in a colloquium setting.

Dissertation. Each Ph.D. candidate must write a dissertation based upon the results of original research. The dissertation must demonstrate the candidate's abilities to conduct independent scientific investigation in his area of interest and must be a contribution to the understanding of geology, geophysics, or geochemistry.

The dissertation must also conform to the Graduate School's guidelines. Subject to the advisor's approval, a draft of the dissertation is submitted to the members of the advisory committee for review. Barring unusual circumstances, advisory committee members must return all comments and recommendations to the student within 14 calendar days; failure to do so will result in their loss of right to make further modifications to the dissertation. Advisory committee members are not required to act as editors but may require that the student seek professional editorial help. After the dissertation has been reviewed and judged of suitable quality by the advisory committee, the student may schedule a dissertation defense. Before scheduling the defense, the student has the responsibility to see that all rules and requirements have been met. Students should note that several dissertation drafts may be necessary before the defense can be scheduled. The reading copy of the dissertation that has been judged ready for defense must be delivered to the committee members at least 14 calendar days before the scheduled dated of defense. At least one week prior to the defense a reading copy should be deposited in the departmental office for faculty and student review.

Defense of Dissertation. A Ph.D. candidate must orally defend his or her dissertation in a public setting before the advisory committee. The oral defense of dissertation will consist of a presentation of results and conclusions followed by a public session in which the student will be expected to answer questions about the dissertation. Questions may cover all aspects of geosciences pertinent to the dissertation research.

After the public session, members of the advisory committee meet privately with the candidate for further questioning. At this time, minor changes to the dissertation may be required, and the dissertation will be awarded the evaluation of unconditional pass, conditional pass, or failure. In the case of a conditional pass, the student is responsible for revisions recommended by the committee. The defense of dissertation must be scheduled for a date at least one week prior to the start of final examinations in any given semester, but a student planning to graduate at the end of the spring semester needs to complete the oral defense and deposit the final, typed version of the dissertation in the library by April 15.

Upon successful completion of the dissertation defense and approval of the final written version of the dissertation, the advisory committee recommends the candidate for the Ph.D. degree. After acceptance by the Graduate School, the dissertation must be microfilmed and published in Dissertation Abstracts. A letter grade is not given for the dissertation, which is graded on a pass-fail basis.

The number of credits allotted a course is indicated by the last digit of the course number.

Geology

7313
Clastic Sedimentology and Depositional Systems
An overview of the mechanics of detrital transport and deposition. Survey of clastic depositional environments and facies. Field trips may be required; if so, a nominal fee over an above tuition will be assessed to cover expenses. Prerequisite: Geol 3153 or permission of instructor.

7323
Stratigraphy of the Ocean Basins
Advanced topics on the Late Mesozoic and Cenozoic record of the seafloor, facies, paleoceanography, and biostratigraphy. Prerequisite: Permission of instructor. Geol 4253 recommended but not required.

7333
Advanced Stratigraphic Analysis
Application of quantitative methods to stratigraphic analysis. Survey and application of sequence stratigraphy. Course activities emphasize hands-on exercises. Prerequisite: Permission of instructor.

7353
Sandstone Petrography
Study of the classification, texture, composition, and diagenesis of sandstone and related clastic sedimentary rocks. Laboratory exercises emphasize microanalysis. Prerequisites: Geol 3153 or permission of instructor.

7363
Advanced Carbonate Petrology
Advanced topics in the classification, genesis, diagenesis, and evolution of carbonate rocks with emphasis on microfacies analysis. Prerequisite: Permission of instructor. Geol 4313 recommended but not required.

7383
Advanced Petroleum Geology
Review and application of geological concepts of petroleum exploration and production. Prerequisites: Geol 3153, 4063, and 7433, or permission of instructor.

7713
Regional Tectonics
Review course covering structural styles, associations, and models. Involves extensive reading on geology of selected areas. Seminar format, term papers required. Prerequisites: Geol 3063 and permission of instructor.

7723
Geomechanics
Introduction to the application of continuum

mechanics to geology. Topics covered include stress, strain, buckling, bending, fracturing, isostasy, and heat conduction. Term paper and field trip required. A nominal fee will be charged to cover travel expenses. Prerequisites: Geol 3063, 3061, Math 2073, Phys 2063, and permission of instructor.

7401-6 (1-6 hours)
Special Topics in Geochemistry

7433
Organic Geochemistry
Geochemistry of organic substances with emphasis on the origin and diagenesis of petroleum. Prerequisites: Chem 1023, Geol 4063, or permission of instructor.

7443
Clay Mineralogy
Classification, identification, and genesis of clay minerals and clay rocks, their uses and exploitation. Laboratory stresses X-ray diffraction methods of identification of clay materials, the analysis of clay rocks, and the petrographic examination of fabrics in clay materials. Laboratory to be arranged. Prerequisites: Geol 4144, 3153, or equivalents.

7453
Isotope Geochemistry
Basic concepts of nuclear structure and reactions applied to cosmic and geologic problems including geochronology and stable isotope fractionation. Prerequisite: Permission of instructor.

7463
Thermal Modeling of Petroleum Generation
Comprehensive introduction to thermal models including methods for constraining temperature histories through time and constructing burial histories. Uses and limitations of thermal models. Prerequisite: Permission of instructor.

7861-6 (1-6 hours)
Special Topics in Geology

7913
Geology Report
Non-thesis option report in geology. Pass-fail only.

7961
Residency
(See page 16.)

7981-6 (1-6 hours)
Research and Thesis
Directed research on some problem within an approved area. Examination and written thesis required. Pass-fail only. Prerequisite: Permission of discipline.

7991-4 (1-4 hours)
Independent Study
Individual or group studies of advanced topics. Selected study is performed by appointment with the faculty. Prerequisite: Permission.

9981-9 (1-9 hours)
Research and Dissertation
Original research on some problem within the field of earth sciences at the Ph.D. level. A maximum of 15 hours can be taken in one semester. Pass-fail only. Prerequisite: Admission to Ph.D. program.

9991-9 (1-9 hours)
Independent Study
Individual or group studies in advanced topics at the Ph.D. level. Selected study is undertaken by appointment with the faculty. Prerequisites: Admission to the Ph.D. program and permission.

Geophysics

7033
Advanced Seismology
Study of the physical and mathematical principles governing seismic wave propagation. Includes aspects of acoustic and elastic wave theory. Prerequisites: Gphy 3053, Math 4133 and 4143, or permission of instructor.

7053
Seismic Stratigraphy
Interpretation of seismic reflection records. Lectures on new concepts used to obtain strati-

graphic information from seismic records. Prerequisites: Gphy 4004 and permission of instructor.

7063
Geophysical Time Series Analysis
Advanced treatment of recent topics of interest in exploration geophysics. Subject matter includes topics in time series analysis and seismic imaging. Prerequisites: Gphy 4004 or permission of instructor.

7073
Advanced Exploration Geophysics
Advanced treatment of recent topics in exploration geophysics, with emphasis on reflection prospecting. Content changes somewhat from year to year. Prerequisites: Gphy 4004 or permission of instructor.

7083
Seismic Reflection Data Processing
Experience in computer processing of seismic data. Prerequisites: Gphy 4004, 4033, and permission of instructor.

7301-6 (1-6 hours)
Special Topics in Geophysics

7513
Advanced Environmental Geophysics
Detailed study of data acquisition, processing, interpretation, and reporting for environmental geophysics projects. Methods include conductivity, magnetic, seismic, and radar surveying. Extensive use is made of recent literature and case histories.

7913
Geophysics Report
Non-thesis option report in geophysics. Pass-fail only.

7961-6 (1-6 hours)
Residency
(See page 16.)

7981-6 (1-6 hours)
Research and Thesis
Directed research on some problem within an approved area. Examination and written thesis required. Pass-fail only. Prerequisite: Permission of discipline.

7991-4 (1-4 hours)
Independent Study
Individual or group studies of advanced topics. Selected study is performed by appointment with the faculty. Prerequisite: Permission.

9981-9 (1-9 hours)
Research and Dissertation
Original research on a problem within the field of earth sciences at the Ph.D. level. A maximum of 15 hours can be taken in one semester. Pass-fail only. Prerequisite: Admission to Ph.D. program.

9991-9 (1-9 hours)
Independent Study
Individual or group studies of advanced topics at the Ph.D. level. Selected study is undertaken by appointment with the faculty. Prerequisites: Admission to the Ph.D. program and permission.

Approved Undergraduate Courses

Several undergraduate courses may be taken for graduate credit with approval from the program advisor. A student enrolling in these courses will complete assignments in addition to those completed by the undergraduate students in the courses.

Geography

6053
Geomorphology
Description, analysis, and interpretation of land-form on the earth's surface. Utilization of aerial photographs and topographic maps. Prerequisite: Geol 1013 or Geog 2003

Geology

6033
Tectonics and Sedimentation
Combination lecture and seminar style course directed at the relationship between tectonic deformation and sedimentation processes. Field trip required; a fee over and above tuition is assessed to cover expenses. Prerequisites: Geol 3063, 3151, 3153.

6083
Introduction to Geographic Information Systems
Fundmentals of the design and use of spatial datasets in computerized mapping and analysis of spatial data. Concentrates on technical and scientific aspects of the collection, query, analysis and presentation of spatial data from a wide range of disciplines using industry standard software tools. Involves both lecture and computer lab components. Prerequisites: Geog 2003 or Geol 1014, or equivalent; CS 2053 or equivalent, senior/graduate standing or permission of instructor.

6113
Geotectonics
Seminar style course covering global tectonics, structural associations and assemblages, petrologic associations and assemblages and the mechanics of plate motion and interaction. Field trip and term paper required. A nominal fee is collected to cover travel expenses. Prerequisites: Geol 3063, 3153, 4144, Math 2073, Phys 2063, or permission of instructor.

6463
Petroleum Geology
A synthesis of geology, geophysics, and geochemistry as applied to petroleum exploration, petroleum production, and enhanced oil recovery. Prerequisites: Geol 1013 and 3153.

6493
Geochemistry
Study of the chemical principles that govern the distribution of elements among the atmosphere, hydrosphere, and solid earth. Prerequisite: Chem 1023.

6513
Hydrogeology
Introduction to the properties of water and the hydrologic cycle. Both surface and groundwater systems are covered in addition to exploration techniques, well design, well hydraulics and aquifer tests. Prerequisite: Geol 3153.

6544
Igneous and Metamorphic Rocks and Processes
The important igneous and metamorphic rocks of the earth's crust and their processes of formation, alteration, and occurrence in space and time. Laboratory stresses the coordination of megascopic and petrographic studies
of rocks. Two lecture hours and one three-hour laboratory session each week. When field trips are required, a nominal fee over and above tuition is assessed to cover expenses. Prerequisite: Geol 2143.

6553
Environmental Geochemistry
Geochemical processes controlling the composition of the natural system and its response to natural and man-made disturbances. Includes major, trace element, and isotopic compositions of the atmosphere, surface and subsurface waters, and the rock/soil system. Prerequisites: Geol 1013, Chem 1021, and Chem 1023.

6563
Microanalysis
Theory and application of microanalytical techniques to the chemical and structural characterization of solid materials. Primarily electron beam imaging and X-ray microanalysis. Also, X-ray diffraction, micro-vibrational spectroscopy and optical microscopy. One lecture per week plus independent lab projects. Prerequisite: Permission of instructor.

6753
Marine Geology
A study of the rocks, sediments, geophysics, structure, and stratigraphy of the ocean basins and their margins. Prerequisites or corequisites: Geol 3153 or permission of instructor.

6813
Carbonate Sedimentology
Study of carbonate depositional environments and the description and classification of limestones. When field trips are required, a nominal fee over and above tuition will be assessed to cover expenses. Prerequisites: Geol 2003 and 3153 or permission of instructor.

6861-6 (1-6 hours)
Special Topics in Geology

Geophysics

6403
Exploration Geophysics
Detailed study of the theory and application of geophysical methods for petroleum and mineral exploration. Emphasis on recent advances in seismic, gravity, and magnetic techniques. Includes a laboratory to learn to solve exploration problems in gravity, magnetic, and seismic exploration. Prerequisites: Gphy 2053, Math 2024.

6433
Geophysical Signal Processing I
Fourier Transform theory in continuous and discrete time. Filter theory and the Z-transform, filter stability criteria, introduction to the wave equation. Prerequisites: Math 4123, 4133, 4143, Gphy 4004.

6443
Geophysical Signal Processing II
Deconvolution, FK techniques, optimum least-square filter theory, waves in layered media, migration of seismic exploration data through the wave equation, robust filters.

6463
Well Logging for Geologists and Geophysicists
Study of electrical, acoustic and radioactive properties of rocks. Introduction to well logging theory and interpretation of subsurface logs. Prerequisites: Geol 3153, Phys 2063.

6513
Environmental Geophysics
Introduces theories and fundamentals of non-invasive geophysical techniques applied to environmental and related problems. After an overview of all applicable geophysical methods, the topics of shallow reflection seismology and ground-penetrating radar are developed in detail. Discussion of specific areas of application include hydrology, contaminant plumes, shallow stratigraphy, buried objects and probing man-made structures. Prerequisite: Permission of instructor.

6861-6 (1-6 hours)
Special Topics in Geophysics

Supporting Courses for Graduate Geosciences Curricula
Chem 6303, Physical Chemistry I; Chem 6301, Physical Chemistry Lab I; Chem 6403, Trace Analysis; Chem 6413, Qualitative Organic Analysis; Chem 6423, Physical Chemistry II; Chem 6421, Physical Chemistry Lab II; Chem 6443, Inorganic Chemistry; Chem 6451, Instrumental Analysis Laboratory; Chem 6453, Environmental Chemistry; Chem 6454, Instrumental Analysis; Chem 6463, Advanced Physical Chemistry; Chem 6473, Advanced Inorganic Chemistry; Chem 6502, Advanced Organic Chemistry; Chem 6523, Modern Techniques of Chemical Separations; Math 6543, Introduction to Partial Differential Equations (Geology majors only); Phys 6403, Physical Mechanics; Phys 6413, Acoustics; Phys 6423, Introduction to Electromagnetics; Phys 6433, Modern Physics I; Phys 6443, Modern Physics II; Phys 6473, Light and Optics.

Applied Mathematics

Chair
William A. Coberly

Professors
Thomas W. Cairns
J.C. Díaz
Dale R. Doty
Robert W. Lawless
Richard A. Redner
Albert C. Reynolds, Jr.
Dale A. Schoenefeld

Associate Professors
William A. Coberly
Peyton J. Cook
Kevin A. O'Neil
Shirley B. Pomeranz

Assistant Professor
Jeffrey L. Hensley

The Department of Mathematical and Computer Sciences offers a program leading to the M.S. degree in applied mathematics, which is a professional mathematics degree designed to prepare students for work in industry. Students graduating from this program will be proficient with modern computation tools and will have experience in solving realistic industrial problems. The courses Mathematical Modeling, Professional Skills of Industrial Mathematics, and the Group Report ensure that students are prepared for work in industry.

Admission. An applicant must hold a baccalaureate degree from an accredited college or university in mathematics, computer science, engineering, or science, with a 3.0 grade point average in the major field of undergraduate study. Undergraduate courses required for official acceptance are Multivariable Calculus and Ordinary Differential Equations plus six hours of additional mathematics in addition to calculus. Some programming experience and an acceptable score on the General Test of the Graduate Record Examination are also required.

Requirements. A student who has been fully admitted to the Graduate School first meets with the graduate coordinator of the professional mathematics program to plan a program through to the completion of the degree requirements. The program of study must be approved by the mathematics Graduate Study Committee. The program is subject to change by mutual consent, but a current version remains on file. Students admitted to the program without adequate background in linear algebra will be required to take Math 6523, Linear Algebra and Matrix Theory.

Each student in the program is required to take Math 7013, Advanced Mathematical Modeling, Math 7033, Professional Skills of Industrial Mathematics, and Math 7913, Group Report. Students must also choose three courses from the following list of core courses:

Math 7023, Discrete Modeling
Math 7103, Advanced Differential Equations
Math 7243, Computational Linear Algebra
Math 7253, Optimization
Math 7533, Applied Regression

Other courses used to meet the total program requirement are elective, subject to approval by the graduate coordinator. Up to six hours may be non-mathematics courses. Total requirements for the degree are 30 hours.

The number of credits allotted a course is indicated by the last digit of the course number.

Mathematics

7013
Advanced Mathematical Modeling
The process of construction, analysis, and validation of dynamic and discrete mathematical models for the physical and life sciences. Computer implementation and subsequent assessment of mathematical models. Introduction to the Mathematica programming environment. Prerequisite: Math 3073 and Math 4123 or consent of instructor.

7023
Discrete Modeling
An introduction to the application of discrete mathematical models to the social, behavioral, biological, environmental, and physical sciences. The course will especially emphasize graph models and optimization strategies that are applied to engineering problems in communication and transportation. Prerequisite: Graduate standing.

7033
Professional Skills of Industrial Mathematics
Training in the non-mathematical skills necessary for work in an industrial setting. Written and oral communication, reports and presentations, teams, internal consulting skills, business economics and accounting, and other topics. The course will include group work and student presentations. Prerequisite: Graduate standing.

7103
Advanced Differential Equations
Fundamentals of ordinary and partial differential equations, initial value and boundary value problems, including numerical methods. Course includes an introduction to the Matlab programming environment. Prerequisite: Math 3073.

7243
Computational LinearAlgebra
Computational techniques for the solution of systems of linear and non-linear algebraic equations. Emphasis on the intelligent use of existing software packages. Laboratory exercises using matrix based computational environments required. Prerequisite: Math 4123.

7253
Numerical Optimization
An introduction to numerical techniques for unconstrained and constrained optimization. Applications to nonlinear regression and science and engineering problems.

7273
Numerical Differential Equations
Numerical analysis of engineering and scientific problems with special emphasis on discrete techniques for ordinary and partial differential equations and on problem formulation and solution. Prerequisites: Math 3073, CS 1043 or 2503 or consent of instructor.

7353
Discrete and Integral Transforms
Fourier, Laplace, Wavelet and other discrete and continuous transforms with applications to the analytical solution of partial differential equations, data compression, image processing and filtering.

7413
Mathematical Problems from Industry
Students explore the possible solution of mathematical problems postulated by visiting scientists and engineers from industrial and commercial concerns. Topics vary from term to term and may include issues from engineering, natural sciences, finance, insurance etc. May be repeated: maximum graduate credit six hours. Prerequisites: Mathematical Modeling and at least two core applied mathematics graduate courses, or consent of instructor.

7503
Stochastic Simulation and Queuing
Random number generation and stochastic simulation with applications. Prerequisite: Stat 3813, Stat 4413 or consent of instructor.

7533
Applied Regression
Methods for fitting deterministic models to data in the presence of noise. Least squares, statistical analysis, empirical response surface optimization in the presence of noise, and nonlinear models. Prerequisite: Stat 3813.

7913
Group Report
Students work in groups to analyze a realistic industrial problem using the complete modeling paradigm. Problem identification and analysis, model development, model solution method and implementation, solution assessment and evaluation. Group reports, presentation, and documentation.

7961
Residency
(See page 16.)

7971-3 (1-3 hours)
Mathematical Internship in Industry
Internship at an industrial or government facility. The internship culminates in a written report for evaluation by the instructor. Prerequisites: Advanced Mathematical Modeling and at least two core mathematical sciences graduate courses, or consent of instructor.

7981-6 (1-6 hours)
Research and Thesis

7991-3 (1-3 hours)
Independent Study

Approved Undergraduate Courses
Several undergraduate courses may be taken for graduate credit with approval from the program advisor. A student enrolling in these courses will complete assignments in addition to those completed by the undergraduate students in the courses.

Mathematics

6353
History of Mathematics
An overview of the history of mathematics from the time of the ancient Egyptians to the present day. Appropriate for undergraduate math and math education majors as well as students working toward master's degrees in math/science education. Prerequisite: Math 2014.

6403
Advanced Calculus I
Rigorous review of elementary calculus, real number system, continuous functions, Taylor's formula, infinite series, convergence criteria. Prerequisites: Math 3033, 3073.

6413
Advanced Calculus II
Coordinate transformations, vectors, multiple integrals, Green's theorem, theory of integration, Fourier series. Prerequisite: Math 4003.

6483
Introduction to Topology
An introduction to point-set topology. Sets, Cartesian products, relations, mappings, sequences, topological spaces, metric spaces. Prerequisite: Math 3033.

6523
LinearAlgebra and Matrix Theory
Systems of linear equations, eigenvalues, eigenvectors, finite dimensional vector spaces, and linear transformations with applications. Numerical solutions of systems of linear equations. Prerequisite: Math 2024. Note: Not allowed for M.S. program in applied mathematics.

6533
Introduction to Complex Functions
Algebra of complex numbers. Properties of complex functions, derivatives, complex integrals, Cauchy's integral formula. Conformal mapping with applications to potential theory. Prerequisite: Math 3073.

6543
Introduction to Partial Differential Equations
Continuation of Math 3073. Green's Theorems, Fourier series, Laplace transforms, partial differential equations including boundary conditions, exact solutions, classifications of equations, separation of variables, and solutions by transformation techniques. Prerequisite: Math 3073.

6603
Introduction to Numerical Methods
Error analysis of computer arithmetic, solution of nonlinear equations, roots of polynomials, interpolation and approximation methods, numerical differentiation and integration, initial value problems for ordinary differential equations. Prerequisites: Math 2073, CS 2503, or permission of instructor.

6633
Scientific Software Environments
Selected case studies from the sciences and engineering are used to discuss the interplay of mathematical modeling, scientific computing, and the applied sciences and engineering. Issues of high performance architectures, software engineering methodology for large-scale codes, and visualization of large data sets are discussed. Prerequisites: Math 3073 and either CS 2503 or CS 2003. Co-listed with CS 6693.

Statistics

6613
Probability I
Introduction to probability theory. Probability spaces, random variables, distribution functions, expectation, conditional probability, and conditional expectation. Prerequisite: Math 2073.

6813
Statistical Methods for Scientists and Engineers
Elementary probability, random variables and distributions, tests of significance, test of hypotheses, elementary experimental design, simple Regression, and correlation. Prerequisite: Math 2014.

Mechanical Engineering

Chair
Edmund F. Rybicki

Professors
Edmund F. Rybicki
John R. Shadley
Steven M. Tipton

Associate Professors
John M. Henshaw
Siamack A. Shirazi
James R. Sorem, Jr.

Assistant Professors
Brenton S. McLaury
Ram S. Mohan
Dale E. Schinstock

The graduate programs of study in the Department of Mechanical Engineering lead to the degrees of Master of Science in Engineering, Master of Engineering, and Doctor of Philosophy.

Master of Science and Master of Engineering Degree Programs in Mechanical Engineering

Graduate programs of study leading to the degrees of Master of Science in Engineering and Master of Engineering are offered. The objective of these programs is to enhance the student's professional skills through a deeper understanding of the principles of mechanical engineering and their applications. The Master of Science in Engineering degree requires a thesis and offers the opportunity for independent investigation and creative research. The Master of Engineering degree does not require a thesis, but requires nine more hours of course work than the thesis program.

Admission. An applicant must have a baccalaureate degree in engineering from an accredited institution and a minimum score of 600 on the Quantitative Section of the GRE General (aptitude) Test. Applicants must also satisfy the general admission requirements of the Graduate School. All applicants from non-English speaking countries who have not received B.S. degrees from U.S. universities must demonstrate English proficiency by making a TOEFL score of at least 550.

An undergraduate grade-point average of at least 3.0 is normally required. However, a student who does not satisfy this requirement but has at least a 3.0 grade-point average in his or her major field may be admitted on probation at the discretion of the Graduate School. Probationary status is removed by completing nine hours of approved graduate study with a 3.0 grade-point average within a specified time period.

General Requirements. All courses taken for graduate credit in these programs shall be selected from those listed in this bulletin and the choices are subject to the approval of the advisors.

Curriculum Requirements

Master of Science Thesis Program

Minimum semester hours in mechanical engineering, excluding thesis 12
Minimum semester hours outside mechanical engineering 6
Semester hours of thesis 6
Minimum semester hours of at least 7000-level courses (excluding thesis), including one graduate level Thermal/Fluids course and ME 7093 18
Minimum semester hours of 6000-level or 7000-level mathematics 3
Maximum semester hours of approved 6000-level courses 6
Maximum semester hours of independent study 3
Minimum total hours 30

Upon completion of the thesis, the student must pass a comprehensive oral examination. After consulting with the student, the advisor recommends, for the Graduate Dean's approval, an oral examination committee consisting of the advisor and two other graduate faculty members. At least one member of this committee must be from outside the mechanical engineering faculty and may be a qualified expert in the research area from outside the University. The comprehensive oral examination covers the student's entire graduate program with emphasis on the research work and content of the thesis.

Master of Engineering Non-Thesis Program

Minimum semester hours in mechanical engineering 18
Minimum semester hours outside mechanical engineering 9
Minimum semester hours of at least 7000 level including a required thermal/Fluids course and ME 7093 24
Minimum semester hours of 6000-level or 7000-level Mathematics 3
Maximum semester hours of approved 6000-level courses 9
Maximum semester hours of independent study 3
Maximum semester hours of project and report 6
Minimum total hours 33

Ph.D. Program

The principal objectives of the Ph.D. program are to provide students an opportunity to reach a thorough understanding of the scientific and engineering principles underlying their fields of interest, to develop the ability to apply these principles creatively to engineering problems, and to develop research skills.

Admission. Applicants are selected for admission to the Ph.D. program on a competitive basis. The number of qualified applicants selected each year depends on the number of students already in the program. Qualified applicants must meet the minimum requirements stated in the following.

An applicant must have a baccalaureate or master’s degree in engineering from an accredited institution. A student without a master’s degree must meet the requirements

for admission to the master's program. Qualification for the Ph.D. program requires at least a 3.5 grade-point average in the first 30 hours of graduate work and approval of the graduate faculty in the department and the Graduate Dean.

All applicants must take the General Tests of the Graduate Record Examination prior to admission. Applicants must make a minimum combined (quantitative and verbal) score of 1100, with a minimum quantitative score of 700. All applicants from non-English speaking countries who have not received B.S. degrees from U.S. universities must demonstrate English proficiency by making a TOEFL score of at least 550.

Applicants are selected for admission on March 1 and November 1.

Curriculum Requirements

Minimum total semester hours of graduate credit above the baccalaureate level 72
Minimum semester hours of research and dissertation (including master’s degree thesis) 24
Minimum semester hours of graduate course work and independent study distributed as follows: 42
Minimum semester hours in mechanical engineering including ME 7093 and one thermal/fluids course 24
Minimum semester hours outside mechanical engineering including 6 semester hours of 6000-level or 7000-level mathematics 12
Maximum semester hours of independent study 6
Maximum semester hours of 6000-level courses 15

Students may be required to complete prerequisite undergraduate courses without graduate credit, resulting in a program of more than 72 semester hours. Not more than 12 hours of transfer credit beyond the master's degree from an accredited institution may be counted toward the course requirements and must be approved by the mechanical engineering graduate coordinator.

Other Requirements

Language and Residence. There is no foreign language requirement for the Ph.D. in mechanical engineering. At least two consecutive semesters in residence at The University of Tulsa as a full-time student are required. For teaching fellows and research assistants, four consecutive semesters of eight or nine hours per term are required.

Advisory Committee. Students in the Ph.D. program are advised initially by the mechanical engineering graduate coordinator. The student should select a general research area and a research advisor or co-advisor for the dissertation within two semesters following enrollment in the program. The advisor or co-advisors, after consultation with the student, recommend the other members of the advisory committee to the Graduate Dean. The advisory committee must have at least four graduate faculty members, two of whom must be from outside the discipline of concentration, and one of whom may be a qualified expert in the research area from outside the university.

The student must present a research proposal for approval by the advisory committee before completion of the second year of study. The advisory committee approves the rest of the master's program of course work, reviews progress, approves program changes and the dissertation topic, recommends the student for candidacy upon completion of requirements, and administers the final dissertation oral examination.

Qualifying Examinations. A student must take a qualifying examination during the semester after completing nine hours toward the Ph.D. degree. If the student fails the examination, it can be taken a second time in the following semester. Examinations are given each year during the fall and spring semesters and are administered by the mechanical engineering graduate coordinator. The Mechanical Engineering graduate faculty determine whether a student passes or fails the qualifying examinations.

Candidacy. A student must apply for candidacy after a minimum of 45 hours of course work has been successfully completed, the qualifying examination has been passed, and the research proposal has been approved.

Dissertation. Each candidate must write a dissertation on the results of his/her research. The dissertation must demonstrate the candidate’s abilities in independent investigation in the area of interest and must contribute to some field of science or engineering. The dissertation must follow the Graduate School’s recommended procedures for submission to the student's advisory committee, and before final typing or reproduction must be presented to the full advisory committee for examination and review. The dissertation must be microfilmed and published in Dissertation Abstracts. The dissertation is graded on a pass-fail basis.

Final Oral Examination. Each candidate must pass a final oral examination before the advisory committee. The examination will consist of a public defense of the dissertation, the general field of the dissertation, and other parts of the program selected by the committee.

The advisory committee recommends the candidate to the Graduate Dean for the Ph.D. degree upon successful completion of the final oral examination and acceptance of the dissertation. Passing grades must be obtained in all the dissertation hours to fulfill degree requirements.

The number of credits allotted a course is indicated by the last digit of the course number.

Mechanical Engineering

7023
Conduction Heat Transfer
Theory of steady and transient heat transfer in solids. Analytical and numerical solution techniques. Prerequisite: Permission of instructor.

7033
Boundary Layer Theory
Fundamental equations of fluid motion, laminar and turbulent flows, transition, classical solutions, and numerical approaches. Prerequisite: Permission of instructor.

7043
Gas Dynamics
Fundamentals of compressible fluid flow. One-dimensional flows and normal shock waves. Introduction to two-dimensional supersonic flows including oblique shock waves, Prandtl-Meyer expansions, and the method of characteristics. Prerequisite: Permission of instructor.

7093
Introduction to Finite Element Methods
Introduction to theory and application of finite element methods in solid mechanics. Derivation of finite elements by direct and energy methods. Discussions of application to stress analysis, fracture mechanics, and heat transfer are included. Prerequisite: Permission of instructor.

7103
Theoretical Vibration
Multi-degree-of-freedom and continuous vibration systems. Introduction to the finite element method and approximation methods in vibration systems analysis. Prerequisite: Knowledge of one-degree-of-freedom systems or permission of instructor.

7123
Acoustics
The wave equation, plane wave reflection, transmission and excitation, sound sources, sound measurement and analysis. Prerequisite: Permission of the instructor.

7133
Turbulent Flow
Analysis of turbulent transport of momentum and heat. Linear stability theory, The Reynolds equations, dynamics of turbulence, boundary-free and wall-bounded shear flows, and turbulent boundary layer. Prerequisite: One intermediate or advanced class in fluid mechanics.

7143
Theory of Elasticity
Fundamental laws of the deformations of solids. Equilibrium, compatibility, and constitutive behavior are discussed. Numerical methods and problem solutions are reviewed. Prerequisite: Permission of instructor.

7163
Structural Fatigue
New and conventional fatigue design approaches. Crack initiation, mean stress effects, notch effects, cyclic stress-strain behavior, mean and residual stress effects, cumulative damage, crack propagation, multiaxial fatigue, environmental effects, fatigue of mechanical components (weld, springs, gears, bearings). Prerequisite: Permission of instructor.

7173
Experimental Stress Analysis
Review of elementary elasticity prior to experimental work. Strain measurements techniques are presented and then utilized in the laboratory. Major topics include: electrical resistance strain gages, photoelasticity, brittle coatings, and associated instrumentation. A final project is required and provides an opportunity for demonstration of acquired experimental skills. Prerequisite: Permission of instructor.

7223
Fracture Mechanics
Analysis of the behavior of materials containing flaws. Topics include the stress analysis of cracked bodies, crack tip plastic zones, energy and compliance methods, fracture toughness testing, crack opening displacement, microscopic aspects, and fatigue crack propagation. Prerequisite: ES 3023.

7283
Mechanics of Composite Materials
Stress-strain-temperature equations for orthotropic and anisotropic materials. Transformation of stress-strain equations to different coordinate systems. Extension-shear coupling. Mechanics of fiber reinforced lamina. Assumptions and formulation of Laminated Plate Theory. Behavior of symmetric and unsymmetric laminates. Off axis testing. Stresses in laminates. Fracture theories. Free-edge effects and delamination. Prerequisite: ES 3023.

7353
Plasticity
Review elasticity equations. Yield surfaces and associated plasticity flow rules, stress-strain equations of plasticity, applications to cylindrical and spherical problems, iterative methods. Effects of plasticity on stress distributions. Plastic strains and residual stresses. Orthotropic materials that behave differently in tension than compression. Prerequisite: Permission of instructor.

7543
Computational Fluid Mechanics
Formulation and numerical methods of solution of fluid dynamic problems in inviscid and viscous flows. Prerequisite: Permission of instructor.

7573
Convection Heat Transfer
Analysis of convection in laminar and turbulent flows. Forced and free convection in internal and external flow. Prerequisite: Permission of instructor.

7851-6 (1-6 hours)
Project and Report
Design, analysis, research, or other approved mechanical engineering project topics. Report required. Non-thesis master's program only. Prerequisite: Permission of instructor.

7861-6 (1-6 hours)
Special Topics in Mechanical Engineering
Content varies yearly. Topics may include a variety of mechanical engineering subjects selected for their relevance to current departmental research interest. Example courses: Experimental Stress Analysis, Mechanics of Composite Materials, Turbulent Flows, and Advanced Materials. Prerequisite: Permission of instructor.

7961
Residency
(See page 16.)

7971-6 (1-6 hours)
Seminar
Reports and discussions of advanced topics in mechanical engineering including invited guest speakers.

7981-6 (1-6 hours)
Research and Thesis
Directed research on some problem in an approved area. Examination and written thesis required. Pass-fail basis only. Thesis for master's program only.

7991-3 (1-3 hours)
Independent Study
Individual or group studies of advanced topics. Instruction and guidance is provided by faculty through individual or group appointment. Master's degree students.

9981-9 (1-9 hours)
Research and Dissertation
Original research at the Ph.D. level on some problem of interest and importance in the field of mechanical engineering. Prerequisite: Admission to the Ph.D. program. Pass fail basis only.

9991-6 (1-6 hours)
Independent Study
Individual or group studies of advanced topics. Instruction and guidance is provided by faculty through individual or group appointment. Ph.D. students.

Approved Undergraduate Courses
Certain undergraduate courses may be taken for graduate credit with approval from the program advisor. A student enrolling in these courses will complete additional assignments, as prescribed by the instructor, that are more advanced than those completed by the undergraduate students in the courses. In addition to the preceding courses, students may, with the approval of their advisor, take courses in other graduate programs that enhance their particular course of study.

6404
Machine Dynamics
Kinematic and force analysis of machines and machine elements. Vibration isolation, balancing, critical speed, flywheel design, and dynamic measurement. Design and computer problems. Safety. Three hours lecture and three hours laboratory per week. Prerequisite: ME 3212.

6453
Mechanical Control Design
Control system design of mechanical systems. Emphasis on thermal, fluid, and motion systems under feedback control. Classical control topics including Laplace transforms, system modeling, stability theory, s-plane and frequency-based design. Practical applications to professional practice. Prerequisites: Math 3073, ME 3053 and 4024.

6483
Advanced Mechanics of Materials
Multiaxial failure criteria. Energy methods, elastic deflection, statically indeterminate structures. Torsion and bending. Shear center. Curved beams. Flat plates. Thick-walled cylin-

ders. Stress concentrations. Contact stresses. Implementation of analysis into design applications emphasized with case studies. Prerequisites: Math 3073, ES 3023.

6503
Vibration
Forced and free vibrations of systems with one or more degrees of freedom. Vibration isolation and transmission applied to problems of rotating and reciprocating machinery. Design problems on vibration isolation systems and absorbers. Machine monitoring systems. Prerequisite: ME 4024 or equivalent.

6513
Mechatronics in Manufacturing
The application of microprocessor technology to manufacturing processes. Survey of digital theory, assembly language programming, computer communications, data acquisition, digital control, power interfacing, instrumentation design and actuation processes. Case studies of manufacturing-oriented problems. Prerequisites: ME 3053 and 4053 or permission of instructor.

6523
Quality Control and Manufacturing Technology
Survey of manufacturing processes; casting, molding, machining, and others. Computer integrated manufacturing including design for manufacturing, real-time process control, and computer vision. Emphasis on statistical methods and quality control applications in manufacturing. Prerequisite: Permission of instructor.

6533
Corrosion Engineering
Degradation of engineering materials (metals and polymers) due to their reaction with the environment. Fundamentals of corrosion thermodynamics and electrode kinetics. The many forms of corrosion and how they are controlled. Degradation of polymers. Emphasis on actual engineering failures caused by corrosion. Prerequisite: ME 3034 or ES 3013 or permission of instructor.

6653
Robotics
Modern robotics theory and techniques with emphasis on fundamental mathematical and mechanical principles. Design and performance analysis of robots and manipulators as applied to flexible manufacturing automation. Structural synthesis, kinematic and dynamic analysis, dexterity analysis. Independent joint control, multivariate control, force control and trajectory planning. Prerequisite: ME 4053 or permission of instructor.

6633
Gas Turbines
Design and performance of stationary and propulsion gas turbines. Prerequisites: ME 3014, 3043.

6443
Refrigeration and Air Conditioning
Principles of vapor compression and absorption refrigeration, heat pumps, psychrometrics. Principles of thermal comfort and environmental aspects. Determination of heating and cooling loads. Air conditioning system design and analysis. Prerequisite: ME 3043.

6663
Mechanical Engineering Design
Application of the engineering design process to the design of mechanical components, subsystems, and machines. Problem-solving techniques, ethics, patents, entrepreneurship. Prerequisites: ME 3034, 3053, 3212.

6861-3 (1-3 hours)
Special Topics in Design
Topics of current interest in mechanical engineering design. Prerequisite: Permission of instructor.

Petroleum Engineering

Chair
Stefan Miska

Professors
Jamal J. Azar
James P. Brill
Balmohan G. Kelkar
Stefan Miska
Albert C. Reynolds, Jr.
Ovadia Shoham

Associate Professors
Dean S. Oliver
Leslie G. Thompson

Assistant Professors
Mauricio G. Prado
Turhan Yildiz

The Department of Petroleum Engineering offers both master's and Ph.D. degrees as described below. The degree programs are designed to produce graduates with a high level of competence in the broad field of petroleum engineering. The curriculum covers the essential areas of drilling, production, and reservoir engineering. Graduate research is conducted in reservoir simulation, well test analysis, reservoir characterization, multiphase flow in pipes, mechanics of tubulars, cuttings transport, formation damage, artificial lift, and enhanced oil recovery.

Master's Program

The objective of the master’s program is to educate the student in both professional engineering and research.

Admission. Applicants must satisfy the general admission requirements of the Graduate School. They must also satisfy the following requirements:

(1) A 3.0 minimum overall grade point average in undergraduate study or approval by the discipline graduate coordinator and Graduate Dean.
(2) Minimum score of 600 on the GRE General (aptitude) Quantitative Test.
(3) All applicants from non-English speaking countries who have not received degrees from U.S. universities must also have a minimum TOEFL score of 550.

It is emphasized that the above requirements are minimum requirements. Although no minimum requirements are stated, scores on the verbal and analytical parts of the GRE exam are considered when an applicant's credentials are evaluated. The qualifications of students entering the program are expected to substantially exceed the minimum requirements. A student who meets only the minimum requirements in each of the above areas will normally be denied admission. Applicants are selected for admission throughout the year.

The total number of students pursuing graduate degrees will be limited. Applicants must designate their major fields of research interest. The non-thesis master's program will be required if a thesis advisor is not available.

General Master’s Degree Requirements. A 3.0 grade point average is the minimum norm for the master's degree program. A student must maintain a 3.0 overall grade point average and at least a 3.0 average in his major field of study.

Not more than six hours of C grades in course work are acceptable in the master's program. Thesis grades are recorded on a pass-fail basis and are not computed in grade point averages. A passing grade in thesis hours is required.

All non-thesis master's program students are initially advised by a graduate coordinator appointed by the chair of the department.

All courses taken for graduate credit in other programs shall be selected from those listed in this bulletin and the choices are subject to the approval of the advisor. No more than six semester hours of approved courses can be transferred.

Curriculum Requirements

Thesis Option Leading to Master of Science in Engineering Degree

Minimum semester hours outside major department 3
Semester hours of thesis 3-6

Minimum semester hours of at least 7000-level courses, excluding thesis 18
Minimum semester hours in major department including core courses
PE 7013, 7023 and 7063, excluding thesis 12
Maximum semester hours of approved 6000-level courses 6
Maximum semester hours of independent study 3
Minimum total 30

Non-thesis option leading to Master of Engineering Degree

Minimum semester hours outside major department 3
Semester hours of Master's Project (PE 7913)
Optional 3
Minimum semester hours of at least 7000-level courses, excluding
Master’s Project 24
Minimum semester hours in major department including core courses:
PE 7013, 7023, and 7063, but excluding Master's Project 18
Maximum semester hours of approved 6000-level courses 6
Maximum semester hours of independent study 3
Minimum total 33

Upon completion of the research, the student pursuing a thesis must pass a comprehensive oral examination. After consulting with the student, the advisor recommends, for the Graduate Dean’s approval, an oral examination committee consisting of the advisor and two other graduate faculty members. In addition to the advisor, at least one other committee member must be from the Petroleum Engineering Department. The remaining committee member may either be a University of Tulsa faculty member from a department other than petroleum engineering, or a qualified expert in the research area from outside the university. The comprehensive oral examination covers the research work and content of the thesis.

Ph.D. Program

The Ph.D. degree represents the highest degree awarded by universities in the United States. The Ph.D. degree usually requires course work beyond that required by a master's degree program in the same discipline but is primarily characterized by the Ph.D. dissertation requirement. The Ph.D. dissertation should contain significant original research and should contain material suitable for publication as a refereed manuscript, normally as a research journal article or articles. The recipient of a Ph.D. degree should possess a broad knowledge of his or her discipline and should be prepared for a lifetime of creative intellectual inquiry. The Ph.D. dissertation should establish the candidate's ability to read and comprehend the literature, to formulate a significant intellectual problem, to formulate the solution to the problem utilizing state of the art knowledge and creativity, and to communicate the findings in a lucid professional document, the Ph.D. dissertation.

Admission. An applicant must have a baccalaureate degree in engineering, physics, or mathematics from an accredited institution.

A student with a baccalaureate degree must meet the requirements for admission to a master's program within the division. Admission for Ph.D. work then requires at least a 3.5 grade point average in the first 30 hours of graduate work and approval of the graduate faculty in the department and the Graduate Dean.

All applicants must take the General Tests of the Graduate Record Examination prior to admission. U.S. citizens and applicants from English-speaking countries must make a minimum combined (quantitative and verbal) score of 1100, with a minimum quantitative score of 700. Applicants from other countries must make a minimum quantitative score of 700.

It is emphasized that the above requirements are minimum requirements. Although no minimum requirements are stated, scores on the verbal and analytical parts of the GRE exam are considered when an applicant's credentials are evaluated. It is expected that the qualifications of students entering the program will substantially exceed the minimum requirements. A student who meets only the minimum requirements in each of the above areas will, normally, be denied admission.

The number of candidates in this program, both part-time and full-time, is limited. Normally, part-time students are not admitted to this program. Applicants must designate their major fields of research interest.

Applicants usually are selected for admission on March 1 and November 1, but will be considered throughout the year.

All applicants from non-English-speaking countries who have not received B.S. degrees from U.S. universities must satisfy English proficiency requirements (TOEFL score of 550).

Curriculum Requirements. The Ph.D. program requires at least 90 approved semester hours of graduate credit above the baccalaureate level, generally distributed in the following manner:

(1) At least 20 semester hours of research and dissertation (including master's degree thesis).

(2) At least 54 hours of graduate credit in course work and independent study, including a maximum of 9 hours of approved 6000 level courses listed in this

bulletin for graduate credit. A maximum of six hours of independent study will be allowed. The core courses, PE 7013, 7023, and 7063, must be included in the first 30 hours of graduate work.

(3) At least 12 hours of course work must be taken outside the discipline.

Students working in the areas of reservoir simulation and well test analysis are expected to acquire necessary mathematical knowledge in differential equations and numerical analysis.

Students may be required to complete prerequisite undergraduate courses without graduate credit, resulting in a program of more than 90 semester hours. No more than 12 hours of transfer credit beyond the master's degree from an accredited institution may be counted toward the course requirements if acceptable to the advisory committee.

These requirements are not variable except under special circumstances and with permission of the students advisory committee and the Graduate Dean.

Other Requirements

Language and Residence. A candidate for the Ph.D. degree in engineering must demonstrate competence in a computer language and/or in foreign language (one) readings of material in his or her major field of study. Material for this requirement is selected with the approval of the candidate's advisory committee. At least two consecutive semesters in residence at The University of Tulsa as a full-time student are required. For teaching fellows and research assistants, four consecutive semesters of eight or nine hours per term are required.

Advisory Committee. A student in the Ph.D. program will be advised initially by a graduate faculty member recommended by the discipline graduate coordinator and approved by the Graduate Dean. The student should select a general research area and a research advisor or co-advisors for the dissertation by the end of two semesters after enrollment in the program. The advisor or co-advisors, after consultation with the student, recommend the other members of the advisory committee to the Graduate Dean.

The advisory committee must have at least four members, two of whom must be petroleum engineering graduate faculty members, at least one of whom must be a University of Tulsa graduate faculty member from a department other than Petroleum Engineering, and one of whom may be a qualified expert in the research area from outside the university.

The advisory committee assists with the student's program of course work, approves the dissertation topic, and administers the final dissertation oral examination.

Qualifying Examinations. The Ph.D. qualifying exams are designed to indicate whether a student has the intellectual creativity necessary to do Ph.D. research. Problems on a Ph.D. qualifying exam should be different from problems that the students taking the exam have seen before.

Questions on Ph.D. qualifying exams presume background knowledge normally held by the holder of a B.S. degree in petroleum engineering who has also taken undergraduate courses in partial differential equations and either linear algebra or

matrix theory. Questions may also assume that the examinee has taken the core courses, PE 7013, 7023 and 7063.

The Ph.D. qualifying exams consist of three four-hour exams. Each of the three exams consists of five questions and the examinee is asked to solve exactly four questions on each exam. Each full-time petroleum engineering faculty member will prepare two or three questions upon request of the department chair.

The Graduate Program Coordinator formulates the three exams at his discretion with the provision that no individual exam will contain more than one question prepared by an individual faculty member. Each question is graded on a zero to ten basis. Since each examinee is asked to solve a total of 12 problems, the maximum grade possible is 120.

(1) A grade of 75/120 or more shall constitute a passing grade.
(2) A grade less than 65/120 shall constitute a failing grade.

Any student who receives less than 65/120 will be dismissed from the program at the end of the fall semester immediately following the August qualifying exams. The faculty shall consider three options for a student who receives a grade on the qualifying exams less than 75/120 but greater than or equal to 65, namely,

(1) that the student shall be dismissed from the program at the end of the fall semester following the August qualifying exams;
(2) that the student shall be required to take the next scheduled Ph.D. qualifying exams;
(3) that the student will be awarded a passing grade. Option 3 is permissible only if the student has received a grade greater than 70/120.

Which option will prevail will be determined by a secret ballot of all full-time petroleum engineering graduate faculty members who attend the meeting at which the results of the Ph.D. qualifying exams are discussed. Options 2 and 3 require an absolute majority vote of the faculty. If option 2 or 3 is not selected by an absolute majority vote, the student shall be dismissed from the program. For students receiving a grade greater than 70/120, option 3 will be voted on first, then option 2. If neither option 2 or 3 is approved, option 1 shall prevail. Each student will be informed of the outcome by his or her advisor, or, in the absence of the advisor, by the department chair, who will also notify the Graduate Dean of all results.

Students wishing to take Ph.D. qualifying exams must so inform the department chair in writing four weeks prior to the exam week. The Ph.D. qualifying exams will be given only once per year, the week preceding the first week of the fall semester.

A student who enters the doctoral program directly from the M.S. program at The University of Tulsa must take the first set of Ph.D. qualifying exams given subsequent to the time at which he or she is admitted to the doctoral program. A student who enters the doctoral program after having completed an M.S. degree in petroleum engineering at another college of university must take the first set of Ph.D. qualifying exams offered after his or her first semester in petroleum engineering at The University of Tulsa. A student who enters the doctoral program after having completed a M.S. degree in a discipline other than petroleum engineering must take the first set of Ph.D. qualifying exams offered after his or her second semester in petroleum engineering at The University of Tulsa. Any exception to this policy must be approved

by a two-thirds majority of the full-time faculty by a secret ballot.

Research Proposal. For a student who has passed Ph.D. qualifying exams, the final step for admission to candidacy for the Ph.D. degree requires that he or she prepare a typed research proposal five to fifteen pages in length which outlines the research proposed for the Ph.D. dissertation. The student's advisor may provide general suggestions on the preparation of this proposal but should not write the proposal. The completed research proposal must be submitted to each full-time faculty member and members of the dissertation committee.

The advisor will convene a meeting with the student and the dissertation committee at which the student will present the research proposal. All faculty are invited to this presentation. This meeting should take place at least a year before the student's graduation. Subsequent to this meeting, the dissertation committee shall recommend one of the following:

1) The student shall be admitted to candidacy for the Ph.D. degree.
2) The student shall make committee-recommended revisions to the proposal prior to being admitted to candidacy for the Ph.D. degree.

The advisor will notify the department chair upon the student's successful completion of all requirements.

Candidacy. A student cannot apply for candidacy until the language requirement has been fulfilled, qualifying examinations have been passed, and the research proposal has been approved.

Dissertation. Each candidate must write a dissertation on the results of his research.

The dissertation must demonstrate the candidate's ability to conduct independent research in the area of interest and must contribute to some field of science or engineering technology.

The dissertation must follow the Graduate School's recommended procedures for submission to the student's advisory committee, and before final typing or reproduction, must be presented to the full advisory committee for examination and review.

A letter grade is not given for the dissertation; it is graded on a pass-fail basis.

Final Oral Examination. Each candidate must pass a final oral examination before the advisory committee. The examination will consist of a public defense of the dissertation, the general field of the dissertation, and other parts of the program which may be chosen by the committee.

The advisory committee recommends the candidate to the Graduate Dean for the Ph.D. degree upon successful completion of the final oral examination and acceptance of the dissertation. Passing grades must be obtained in all the dissertation hours to fulfill degree requirements.

The number of credits allotted a course is indicated by the last digit of the course number.

Petroleum Engineering

7003
Artificial Lift Systems
Design and comparison of present-day artificial lift systems including sucker rod pumping, gas lift, electrical submersible pumping, hydraulic pumping, jet pumping, plunger lift, and other lift methods. Prerequisite: PE 3073.

7013
Advanced Reservoir Engineering
Mathematical development of mass, momentum and energy balance equations; advanced petrophysics for multiphase flow in porous media. Fractional flow theory and displacement efficiency. Areal and vertical sweep efficiencies and recovery efficiency. Fundamental reservoir characterization concepts. Prerequisite: PE 3023, 4113 or permission of instructor.

7023
Advanced Production Design
Total system associated with production and transportation of oil and gas. Prediction of phase behavior and fluid physical properties, inflow performance relationships, flow through completions, steady state multiphase flow through pipes and restrictions. Comprehensive design project. Prerequisites: ES 3003 and PE 3073 or permission of instructor.

7033
Well Test Analysis I
Development and applications of solutions to the diffusivity equation. Pressure build-up, draw-down, and fall off; identification of wellbore storage and fractured wells using pressure derivatives; evaluation of stimulation treatments; pressure interference in multiple well reservoirs; and well deliverability. Prerequisites: PE 3023, Math 4143.

7043
Reservoir Simulation I
Development of the equations for multiphase, multidimensional flow in porous media and the mathematical procedures required for their solution using finite-difference methods. Prerequisites: Petroleum Engineering 3023, Math 4143, and proficiency in either Fortran, C, or C++ programming languages.

7053
Two Phase Flow Modeling
A theoretical treatment of two phase flow. Introduction to two phase flow phenomena and the recent modeling approach. Review of the early black box general models. Flow pattern transition prediction and flow pattern modeling for vertical, horizontal and inclined pipes. Unified Models. Application examples. Prerequisites: ChE 7003 or permission of instructor.

7063
Advanced Drilling
Drilling fluids rheology and hydraulics. Mathematical model of drilling rate and bit wear. Mechanics of BHA in vertical and directional holes. Directional well trajectory predictions and design. Modeling of drag and torque. Dynamics of drill string. Computer applications. Prerequisite: PE 3043 or permission of instructor.

7073
Geostatistics
Application of statistical methods to reservoir characterization. Several conventional, as well as new techniques to quantify reservoir data will be evaluated with major emphasis on definition of uncertainties in characterizing reservoirs. Prerequisites: Geol 1013, PE 3023, Stat 3813 or permission of instructor.

7083
Modern Reservoir Engineering
Advanced improved recovery processes with emphasis on CO2, polymer and steam flooding. Phase behavior analysis on ternary diagrams. Flow of non-Newtonian fluids. Design considerations for improved oil recovery processes by incorporating reservoir characterization. Prerequisites: PE 4113 or 7013.

7103
Advanced Formation Evaluation
Qualitative and quantitative analysis and interpretation of well logs involving shale formations and complex lithologies. Use of cross-

plots and computer models in comprehensive formation interpretations. Prerequisite: PE 4053 or equivalent.

7113
Drilling Optimization
Drilling economics, cost trends, and estimation. Factors affecting rate penetration. Theory and techniques of optimization. Applications of optimization techniques to drilling cost minimization. Lectures will be supplemented with current literature on optimized drilling. Prerequisite: PE 3043.

7123
Advanced Drilling Fluids
Drilling fluids fundamentals, clay chemistry and shale stabilization, drilling fluid rheology, surface chemistry of drilling fluids, hole stability mechanics, drilling problems related to drilling fluids, drilling fluids additives and chemicals, drilling fluids contaminants, and recent advances in drilling fluid systems. Prerequisite: PE 3043.

7813
Special Topics in Petroleum Engineering
Content varies depending upon student and faculty interests. Prerequisite: Permission of instructor.

7913
Master's Project
Directed project in petroleum engineering. Prerequisite: Permission of instructor.

7961
Residency
(See page 16)

7981-6 (1-6 hours)
Research and Thesis
Directed research on some problem within an approved area. Examination and written thesis required. Prerequisite: Permission of department. Pass-fail basis only.

7991-3 (1-3 hours)
Independent Study
Individual or group studies of advanced topics. Selected study is performed by appointment with the faculty.

8013
Reservoir Simulation II
Design and implementation of a multiphase flow reservoir simulator, including interphase mass transfer and variable fluid saturation pressure. Design of compositional reservoir simulators using a generalized Equation of State. Recent advances in reservoir simulation. Prerequisites: PE 7013 and 7043.

8033
Well Test Analysis II
Determination of wellbore pressure for a wide variety of conditions by analytical techniques and simulation methods. Transient flow of gas in reservoirs and analysis of gas well test data. Extension of single-phase flow systems to multiphase flow. Pressure behavior in anisotropic systems and heterogeneous reservoirs. Prerequisites: PE 7033 and 7043.

8053
Transient Two-Phase Flow
Detailed derivation of the two basic models for transient two phase flow in pipelines: The Two Fluid Model and the Drift Flux Model. Analysis of characteristics, well posed problems and stability, and review of numerical methods for both models. Presentation of the recent trend of simplified models for transient flow in pipelines. Prerequisites: PE 7023 or permission of instructor.

9981-9 (1-9 hours)
Research and Dissertation
Original research on some problem within the field of petroleum engineering on the Ph.D. level. Prerequisite: Admission to Ph.D. program. Pass-fail basis only.

9991-3 (1-3 hours)
Independent Study
Individual or group studies of advanced topics at the Ph.D. level. Selected study is performed by appointment with the faculty. Prerequisite: Admission to Ph.D. program.

Approved Undergraduate Courses
Some senior-level courses in the major and minor fields can be used for graduate credit. Such credit is limited to six semester hours on the master's level and an additional 3 semester

hours on the doctoral level. Permission of the student's graduate advisor is required to take and receive credit for these courses. A student enrolling in these courses will complete assignments in addition to those completed by the undergraduate students in the courses. The following are the approved senior-level petroleum engineering courses:

6413
Petroleum Economics and Property Evaluation
Time value of money; profitability measures; engineering analysis and prediction of cash flows in oil and gas properties; effect of depreciation and taxes on cash flow; international contracts; inflation; risk and uncertainty analysis. Prerequisite: PE 3023.

6453
Formation Evaluation
Study of electrical, acoustic, and radioactive properties of rocks. Introduction to well logging theory and interpretation of subsurface logs and computer logs. Prerequisites: PE 3023, Phys 2063, Geol 4063.

6463
Well Completion Design
Casing program, casing and tubing design, principles of cementing, completion added skin, well perforating, hydraulic fracturing and acidizing. Prerequisites: PE 3023, ES 3003, 3023.

6474
Production Engineering II
Surface processing of natural gas and crude oil; artificial lift methods including continuous and intermittent gas lift and sucker rod pumps. Laboratory experiments on metering, multiphase flow in pipes and separation. Prerequisite: PE 3073.

6483
Design of Surface Facilities
Analysis, design, and application of production and processing equipment, including separation problems, treating, and transmission systems. Prerequisites: PE 2112, 2123, 3073; ES 3003, 3053.

6513
Reservoir Engineering II
Oil trapping, capillary number correlations, fractional flow, displacement efficiency, areal and vertical sweep efficiencies, waterflooding design, gas injection, miscibility on ternary diagrams. Prerequisite: PE 3023.

6573
Artificial Lift Methods
Theory, application, and design of all artificial lift methods, including gas lift, beam pumping, hydraulic pumping, and electrical submergible pumping. Prerequisite: PE 3073.

6803
Oilfield Environmental Engineering
Environmental problems occurring in exploration, drilling, production and transportation operations; oilfield environmental regulations and their impact on the industry; water, air and soil pollutions and treatments; environmental control technology; environmental oilfield risk assessment and management. Prerequisite: Permission of instructor.

Interdisciplinary Programs

The following interdisciplinary programs are designed from courses that cross two or more separate programs.

- Master of Engineering and Technology Management
- Master of Science in Mathematics and Science Education

Master of Engineering and Technology Management

Program Coordinators
Rebecca Holland, Director of Graduate Business Programs
and a Graduate Program Advisor from an engineering or technology discipline specified by the student

The Graduate School, through the College of Engineering and Natural Sciences in cooperation with the College of Business Administration offers an interdisciplinary program leading to the Master of Engineering and Technology Management degree.

This program has been developed to meet the needs of graduates of Engineering and Natural Sciences programs who find themselves performing management related activities without the benefit of advanced technical or management education. The program is designed to build upon the technical expertise gained from formal technical education, as well as professional managerial experience.

Admission. An applicant must have a baccalaureate degree or its equivalent in engineering or applied sciences, satisfy the general admission requirements of the Graduate School, and have a minimum grade point average of 3.0 in undergraduate studies, a minimum score of 430 on the GRE verbal section, and a minimum score of 600 on the GRE quantitative section or equivalent performance on the GMAT. Students from non-English speaking countries must present a TOEFLscore of at least 575 (old scoring) or 232 (new scoring).

Applicants who do not satisfy the above GPA requirements but have a major field GPA or a junior- and senior-year GPA of 3.0 or greater may be considered for probationary status, or be required to complete additional undergraduate study before admission to the program.

Students must satisfy the prerequisite requirements for any graduate course enrollment. All admissions require the approval of the program coordinator and the Graduate Dean.

General Requirements. The students must complete a minimum of 36 credit hours, of which 18 will be taken in the College of Business Administration and 18 will be taken in the College of Engineering and Natural Sciences. Major areas of study in engineering are chemical engineering, electrical engineering, mechanical engineering, or petroleum engineering. Major areas of study in the applied sciences

are computer science, geosciences, or mathematics. No more than 18 hours may be taken in the College of Business Administration.

Foundation Courses Required by the College of Business Administration:
- Acct 0713 (or undergraduate equivalent) . . . . . .3 hours
- Econ 0713 (or undergraduate equivalent) . . . . . .3 hours

Required Courses in the College of Business Administration:
- Fin 6023 . . . . . .3 hours
- Mgt 6023 . . . . . .3 hours
- Mktg 6023 . . . . . .3 hours
- Mgt 7003 . . . . . .12 hours
- Electives (maximum of 6 hours) at the 7000 level from the College of Business Administration . . . . . .
- Minimum semester hours at the 7000 level in the College of Engineering and Natural Sciences selected from one major area . . . . .9 hours
- Electives taken in the College of Engineering and Natural Sciences . . . . .9 hours

Minimum total . . . . . .36 hours

A 3.0 grade point average is the minimum acceptable norm for the program and must be maintained for all courses applied toward the degree. Not more than six hours of C grades in total course work are acceptable. Grades for the optional report are recorded on a pass-fail basis and are not computed in grade point averages, although a passing grade is required.

College of Business Administration Requirements. The student takes no more than 18 hours of graduate work in the College of Business Administration. Of those 18 hours, 12 hours are required courses as specified previously. The six remaining hours will be elective and must be selected from the 7000-level offerings in the College of Business Administration.

The purpose of this arrangement is to provide the student with a direction and concentration, while allowing some flexibility to tailor a program to individual tastes. This curriculum provides a basic introduction to the functional business areas as well as depth in management.

College of Engineering and Natural Sciences Requirements. The students take 18 hours of course work in the College of Engineering and Natural Sciences. Nine hours must be 7000-level courses from one of the major areas available in the college. Students should consult their advisor to select those 7000-level courses appropriate to their professional development. A student who wishes to choose the option of writing a formal report should consult his or her advisor at least one semester before graduation. The topic for this report will be by independent study and will not apply toward the requirement of nine hours of 7000-level course work.

The remaining hours will be electives and can be taken in any of the areas available in the college. The student may wish to take elective courses in a second specialty.

A detailed course listing that shows all courses in each area can be found with the appropriate program descriptions in this bulletin.

Master of Science in Mathematics and Science Education

Program Coordinators
Robert E. Howard, Professor of Chemistry
Dale M. Johnson, Professor of Education

The Graduate School through the College of Engineering and Natural Sciences and the School of Education offer an interdisciplinary program leading to a Master of Science in Mathematics and Science Education. The program is designed to provide a solid background in mathematics and science principles and their presentation in the classroom. The program emphasizes the role of technology as an emerging tool in course delivery.

The program is intended for teachers who are certified at the primary, middle school, or secondary level. It includes a core of technology courses and electives in mathematics and science which may be selected based on the student's interests and background.

Degree Requirements. Students must complete a total of 30 hours for the degree. The total includes 15 hours of core courses which introduce techniques of educational research, provide in depth knowledge of applications of technology in the classroom, and explore contemporary problems in science and mathematics education. In addition, each student must complete an additional 15-hour option for either elementary/middle or for secondary teachers. The option provides content courses at a level appropriate for student audiences.

Core **15 hours**

Educational Research . . . . . .6 hours
- Educ 7153 Techniques of Research and Evaluation or EDUC 7183 Statistical Methods for Research I
- Educ 7973 Seminar

Technology . . . . . .6 hours
- MSE 7043 Classroom Computer Applications
- Educ 7053 Instructional Design and Curriculum Integration

Math/Science . . . . . .3 hours
- MSE 7973 Seminar: Problems in Modern Science and Mathematics

Options **15 hours**

Elementary/Middle
- Educ 7183 Statistical Methods for Research I
- MSE 7013-4 Contemporary Physical Science
- MSE 7113-4 Earth's Physical Environment
- MSE 7153-4 Concepts and Applications in Mathematics
- MSE 7213 Technology Project

Secondary

MSE 7283 Statistical Methods for Research II

12 hours of electives in science/mathematics courses selected in consultation with adviser.

Mathematics/Science Education (MSE)

7013-4 (3-4 hours)
Contemporary Physical Science
Current problems in chemistry, utilizing hands-on activities.

7043
Classroom ComputerApplications
Enables teachers to effectively use educational technology in the classroom. Topics include software evaluation, curriculum integration, simulation and modeling, multimedia applications, integrated applications, telecommunication and networking, and using information management systems.

7113-4 (3-4 hours)
Earth's Physical Environment
Major issues in earth science.

7123-4 (3-4 hours)
Concepts and Applications in Physics
Topics in Mechanics, light and sound appropriate for the elementary classroom.

7133-4 (3-4 hours)
Concepts and Applications in Biology
Environmental or cellular biology appropriate for the elementary classroom.

7143-4 (3-4 hours)
Concepts and Applications in Chemistry
Topics in atoms, molecules, chemical properties and reactivity appropriate for the elementary classroom

7153-4 (3-4 hours)
Concepts and Applications in Mathematics
Advanced topics in analysis, statistics, or discrete mathematics appropriate for the elementary classroom.

7163-4 (3-4 hours)
Concepts and Applications in Astronomy
Focuses on sun, moon, planets, eclipses, soar system, meteors, comets, stars, galaxies and big bang, based on the students' background and teaching interests.

7213
Technology Project
Project involving application of technology to curriculum implementation. Project will be developed in consultation with instructor and address a curriculum area appropriate for the student.

7283
Statistical Methods for Research II
Extension of EDUC 7183 including analysis of variance, multiple regression, multiple and partial correlation, analysis of covariance and some nonparametric methods. Prerequisite: completion of one elementary statistics class.

7383
Multivariate Methods for Research
Considers theoretical, computational, and interpretative issues of multivariate techniques using computer solutions. Topics include multiple analysis of variance (MANOVA) and covariance (MANCOVA), factor analysis, multiple discriminant analysis, regression, canonical correlation and other commonly encountered multivariate techniques. Prerequisite: completion of one or two statistics classes including ANOVA and multiple regressions.

7831-3 (1-3 hours)
Special Topics in Mathematics and Science

7973
Seminar: Problems in Modern Science and Mathematics
Discussion of major contemporary issues in science and mathematics as they pertain to the classroom.

7991-3 (1-3 hours)
Independent Study

Joint-Degree Programs

Juris Doctor/Master of Arts
Juris Doctor/Master of Science
Juris Doctor/Master of Business Administration
Juris Doctor/Master of Information Systems and Accounting
Juris Doctor/Master of Taxation

Juris Doctor/and Master's Degrees

These programs are designed to offer students an interdisciplinary degree which encompasses training in law plus expertise in a complementary field of study. At present, the J.D./M.A. is offered in anthropology, clinical psychology, history, industrial/organizational psychology, and English Language and Literature and a J.D./M.S. is offered in biology and geosciences. Additional complementary fields may become available.

Each J.D./M.A. and J.D./M.S. program is administered by a Joint Degree Committee, which consists of a faculty member from the College of Law and a faculty member from the complementary discipline, in cooperation with the Dean of the Graduate School.

Since the student may enroll in either college, financial aid must be applied for from the college in which the student holds current enrollment.

Students will be required to pay all fees of both programs. Tuition will be paid for each course at the rate currently in effect for the respective colleges.

By eliminating overlapping subject area courses and using electives of each program for work in the other, a candidate for the joint degrees can reduce the total requirements by 16 to 19 semester hours.

Joint degrees are also offered in the areas of business administration (J.D./M.B.A.), information systems and accounting (J.D./Master of Information Systems and Accounting, and taxation (J.D./Master of Taxation). The joint degrees are designed to provide legal education so that the business and information systems and accounting students' skills can be exercised with full knowledge of the legal environment in our society. Law students are provided further training in business and the more specialized fields of information systems and accounting so that their legal knowledge can be more effectively applied in current business situations. By eliminating overlapping subject area courses, and using the electives of each program for work in the other, a candidate for the joint degrees can reduce the total requirements by 16 credit hours.

Each program is administered by a Joint Degree Committee, which consists of the Director of Graduate Programs in the College of Business Administration and the Associate Dean of the College of Law in cooperation with the Dean of the Graduate School. The joint-degree student will be eligible to participate in all extracurricular

activities of both colleges.

Candidates for a joint degree must meet the academic standards of both the College of Law and the Graduate School. Class rank for the College of Law shall be computed for law courses only. At the conclusion of the program, the candidate will be awarded both the J.D. and the master's degree.

The joint-degree programs are accredited by the American Bar Association, American Association of Legal Services, and the proper accrediting agencies of the complementary disciplines, if any. All business programs are accredited by the AACSB – The International Association for Management Education.

Students in the joint program are permitted to terminate plans for a joint degree, and to opt for either one or the other of the degrees. Students will be obliged to satisfy the normal requirements of the college selected, which may include credit for some work done in the other college, as determined by the Dean of the College of Law or the Dean of the Graduate School.

Admission. Admission to the Joint Degree Programs requires two separate applications:

(a) a formal application to the College of Law

(b) a formal application to the Graduate School (please attach a formal letter requesting admission to the joint degree program and explaining the reasons for wanting to pursue the joint degree.)

Only after the respective colleges have acted affirmatively on the separate applications will action be taken to admit the student to the joint degree program. Admission to the joint degree program is under exclusive control of the respective Joint Degree Committees.

Normally, students will be admitted on a full-time basis only. The program is not open to students who have previously completed one of the degrees.

Residence Requirements. The student is expected to enroll full time. Due to the residency requirements of the College of Law, it is recommended that the first year of the program be taken in the College of Law. The student may take the first year in the complementary discipline with the understanding that any courses taken from the College of Law will be acceptable for the law degree only with prior approval of the College of Law faculty. The remaining semesters are spent pursuing both degrees within the limitations of residency of the College of Law which requires that in the final year the student must be enrolled in ten hours of law courses for both semesters.

The joint-degree program may be completed in three years and two summers and must be completed within six calendar years.

J.D./Master of Arts Degrees

J.D./M.A. in Anthropology

The curriculum consists of 78 semester hours of law courses, including all required subjects as established by the College of Law, 24 hours (thesis option) or 27 hours (non-thesis) of semester hours in the graduate anthropology program, and 18 to 24

hours of prerequisite undergraduate anthropology courses. The student must consult with the J.D./M.A. in Anthropology Joint Degree Committee in selecting elective courses and must agree to take all courses recommended by the committee.

This program eliminates 16 to 19 hours of course work which would be required if the programs in law and anthropology were taken separately.

J.D./M.A. in Clinical Psychology

The curriculum consists of 78 semester hours of law courses, including all required subjects as established by the College of Law and 39 semester hours of specific program requirements in the Graduate Clinical Psychology program as established by the Clinical Psychology Department.

The student must consult with the J.D./M.A. in Clinical Psychology Joint Degree Committee in selecting elective courses and must agree to take all courses recommended by the Committee.

This program eliminates 16 hours of course work which would be required if the programs in law and clinical psychology were taken separately.

J.D./M.A. in English Language and Literature

The curriculum consists of 78 semester hours of law courses, including all required subjects as established by the College of Law, 27 semester hours in the graduate English program, as approved by the graduate English adviser and the Graduate English Program Committee, and 18 to 24 hours of prerequisite undergraduate English courses stipulated by the Graduate English Program Committee.

The student must consult with the J.D./M.A. English Joint Degree Committee in selecting elective courses and must agree to take all courses recommended by the committee.

This program eliminates 19 hours of course work which would be required if the programs in law and English were taken separately.

J.D./M.A. in History

The curriculum consists of 78 semester hours of law courses as established by the College of Law, 24 hours (thesis option) or 27 hours (non-thesis) of graduate courses in history, and 24 hours of prerequisite undergraduate history courses.

The student must consult with the J.D./M.A. in History Joint Degree Committee in selecting electives and must agree to take all courses recommended by the committee.

This program eliminates 16 to 19 hours of course work which would be required if the law and history programs were taken separately.

J.D./M.A. in Industrial/Organizational Psychology

There are two curriculum plans. Option 1 consists of 30 credit hours of psychology and 81 credit hours of law. Option 2 consists of 33 credit hours of psychology and 78 credit hours of law. Both options include all required subjects as established by the College of Law for the Juris Doctorate degree and all required subjects in Industrial and Organizational Psychology as established by the Department of Psychology.

J.D./M.A. students are assigned academic advisers in each program and are expected to consult with those advisors prior to selecting elective courses. These advisors are members of the Joint Degree Committee in cooperation with the Dean of the Graduate School. This program eliminates 19 hours of course work which would be required if the programs in law and industrial/organizational psychology were taken separately.

J.D./Master of Science Degrees

J.D./M.S. in Biology

The curriculum consists of 78 semester hours of law courses, including all required subjects as established by the College of Law, 24 semester hours in the biological science program as approved by the graduate adviser, and prerequisite undergraduate courses as required by the faculty of the graduate program in biological science.

The student must consult with the J.D./M.S. in Biological Science Joint Degree Committee in selecting electives and must agree to take all courses recommended by the committee.

This program eliminates 16 hours of course work which would be required if the programs in law and biological science were taken separately.

J.D./M.S. in Geosciences

As litigation involving technical issues becomes more common, knowledge of the geosciences provides an important advantage in cases that involve energy, mining, water and environmental concerns. A candidate for the joint Law/Geosciences degree is able to complete the requirements for both degrees with 105 credit hours. This program eliminates 19 hours of course work, which would be required, if the programs in Law and Geosciences were taken separately.

The curriculum consists of 27 semester hours (including a three-hour technical report) in the graduate geosciences program as approved by the chairman of the geosciences department; prerequisite undergraduate courses as required by the faculty of the graduate program in geosciences; and 78 semester hours of law courses, including all required subjects as established by the College of Law.

The student must consult with the J.D./M.S. in Geosciences Joint Degree Committee in selecting electives and must agree to take all courses recommended by the Committee.

J.D. and Business Related Master's Degrees

J.D./M.B.A. Program

The curriculum consists of 78 hours of law courses, including all required courses established by the College of Law, and 24 semester hours at the graduate level in the

College of Business Administration, of which 21 hours are required courses and 3 hours are graduate electives in the College of Business Administration.

Students must satisfy 30 semester hours of Foundation M.B.A. courses before being fully admitted to the Second Year of the M.B.A. program. Foundation courses may be waived if the student has an undergraduate degree in business. The Foundation and Advanced courses of the M.B.A. program are listed on pages xx and xxx of this bulletin. The student must consult with the Joint Degree Committee in selecting elective courses and must take all courses specified by the Committee.

J.D./Master of Information Systems and Accounting

The curriculum consists of 78 semester hours of law courses, including all required courses established by the College of Law, and 24 semester hours of graduate-level courses in the College of Business Administration. The degree completion requirements are listed on pages xx-xxx of this bulletin. The student must consult with the Joint Degree Committee in selecting courses and must take all courses specified by the Committee.

J.D./Master of Taxation

The curriculum consists of 78 semester hours of law courses, including all required courses established by the College of Law, and 24 semester hours of graduate level courses in the College of Business Administration. The degree completion requirements are listed on page xxx of this bulletin.

The student must consult with the Joint Degree Committee in selecting courses and must take all courses specified by the Committee.

Special Opportunity

Air Force ROTC at The University of Tulsa

By agreement with the United States Air Force, eligible full-time students at The University of Tulsa may participate in Air Force ROTC and receive an officer's commission in the Air Force upon graduation. They are commissioned through the Air Force ROTC program at OSU-Tulsa but remain students at TU and graduate from TU.

Eligibility. TU students in any academic major, including graduate students, may participate. A cadet must be a full-time student, a U.S. citizen, less than age 30 in the year of commissioning (some exceptions apply), have a cumulative GPA of at least 2.00, and not be a single parent (some exceptions apply). Other eligibility requirements apply and are subject to change.

Scholarships. TU students may be eligible for AFROTC scholarships providing up to $7,500 per semester for tuition and fees, plus a book allowance, plus a $200 per month tax-free allowance. Some of the scholarships are targeted toward specific majors but others are available to students in any major. Juniors, seniors, and graduate students not on AFROTC scholarship who meet eligibility criteria may receive up to $1,725 per semester for tuition, books, and fees, plus a $200 per month tax-free allowance.

Obligation. In most cases, you may try AFROTC by taking the freshman or sophomore AFROTC courses without obligation. In most cases, you do not have to make a final decision whether to commit to ROTC until your junior year. Students who successfully complete the ROTC program become second lieutenants in the U.S. Air Force with a four-year active duty service obligation. Those selected for pilot training or navigator training incur a longer commitment.

The Air Force ROTC Curriculum. Air Force ROTC courses are listed in the OSU-Tulsa catalog as Aerospace Studies (AERO). Freshman and sophomore AFROTC classes are one credit hour each. Junior and senior AFROTC courses are three credit hours each.

All require the cadet to enroll in and attend a weekly leadership Laboratory (LLAB) period at which leadership and followership skills are taught and emphasized. Those selected for the Professional Officer Course attend a four- or five-week Field Training camp one summer, usually between the student's sophomore and junior years.

To Learn More. Call the Air Force ROTC unit at 405-744-7744 or call them toll free at 888-ROTC-OSU (888-768-2678), visit the website at www.afrotc.okstate.edu or send an e-mail to afrotc@okstate.edu

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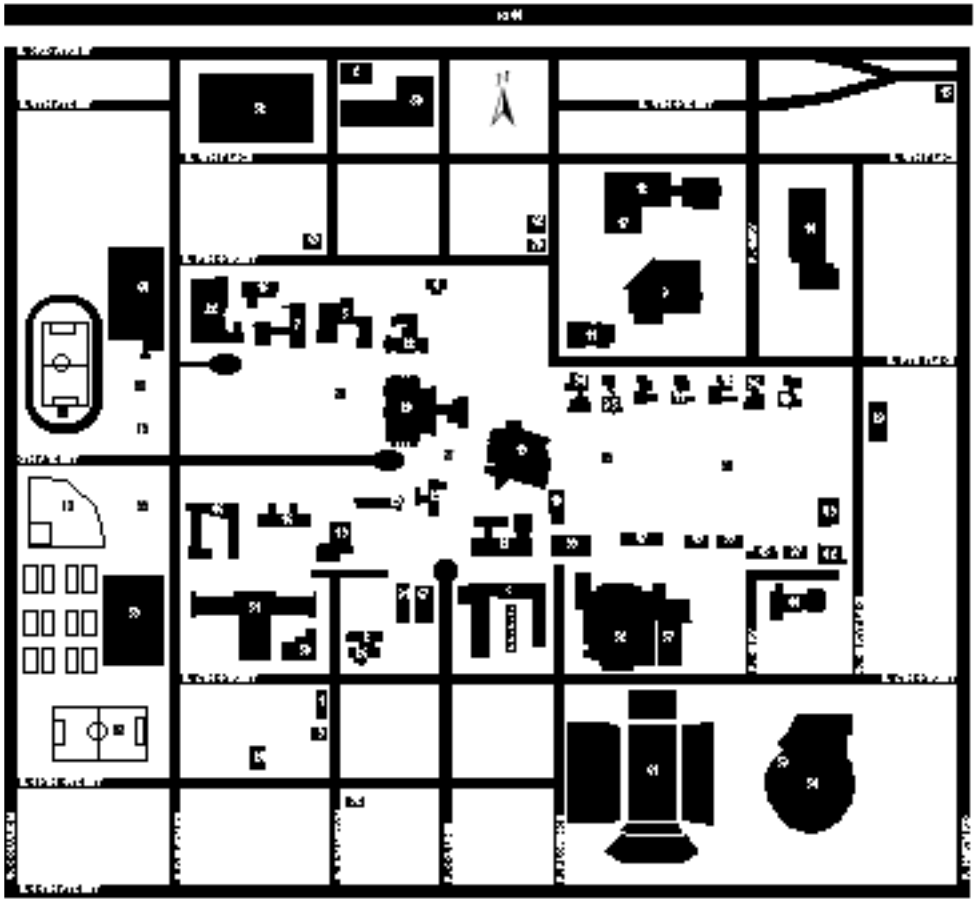

TU CAMPUS

1. Administrative Annex of Tucumcari
2. Administrative Wilfinty Hall
3. Alice Chapman Archive Central Boulevard
4. Alexander Hall Center
5. Tucker Administration Hall
6. Central Plaza
7. Chapman Hall
8. Child Development Center
9. English Institute
10. Harwell Hall
11. Holmes Institute Center
12. John Lupton Hall
13. Kendall Hall
14. Kipling Hall
15. Legal Clinic
16. Lorenz Hall
17. Mabee Legal Information Center
18. Mary E. Chapman Center
19. McClure Hall
20. Michael Library
21. Oliphant Hall
22. Phillips Hall
23. Phillips Theological Seminary
24. Ice Beyond Bearing
25. Henry Chapel
26. Howe Alumni Center
27. The Hoss
28. The Y
29. Tyrrell Hall
30. Tulsa Law School
31. Wesley Hall
32. Wanda's Studio Pendleton Journals
33. Zink Hall

STUDENT HOUSING

34. Chi Omega Sorority
35. Delta Delta Delta Sorority
36. Delta Gamma Sorority
37. Hanna Hall
38. John Mabee Hall
39. Kappa Alpha Institute
40. Kappa Alpha Theta Sorority
41. Kappa Delta Sorority
42. Kappa Kappa Gamma Sorority
43. Kappa Sigma Fraternity
44. LaFortune Hall
45. Lavella Chi Alpha Institute
46. Lovett Jean Mabee Hall
47. Pi Kappa Alpha Fraternity
48. Sigma Chi Fraternity
49. Sigma Nu Fraternity
50. Twin Sorel Hall
51. Twin Towers Hall
52. Tulsa Square Apartments

ATHLETIC FACILITIES

53. Athletic Tickets Office
54. Donald W. Reynolds Center
55. Dennis J. Healthy Sports and Lifestyle Complex*
56. Harwell Hall
57. Hurricane Athletic Building
58. Mabee Gym Pilliteri
59. Michael D. Cox Track Center*
60. Multi-Sport Field*
61. Shelby Stadium
62. Sports Field*
63. Sofitel Field*
64. Sudden Health and Fitness Center*
65. Track Center
66. Tuck Facility/Sports Field*

CAMPUS MINISTRIES

67. Baptist Student Center
68. Bowman Center
69. United Ministries Center
70. Wesley Foundation

*Under construction

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