The University of Texas at Arlington

Graduate Catalog

Vol. LXVII No. 2 May 1984

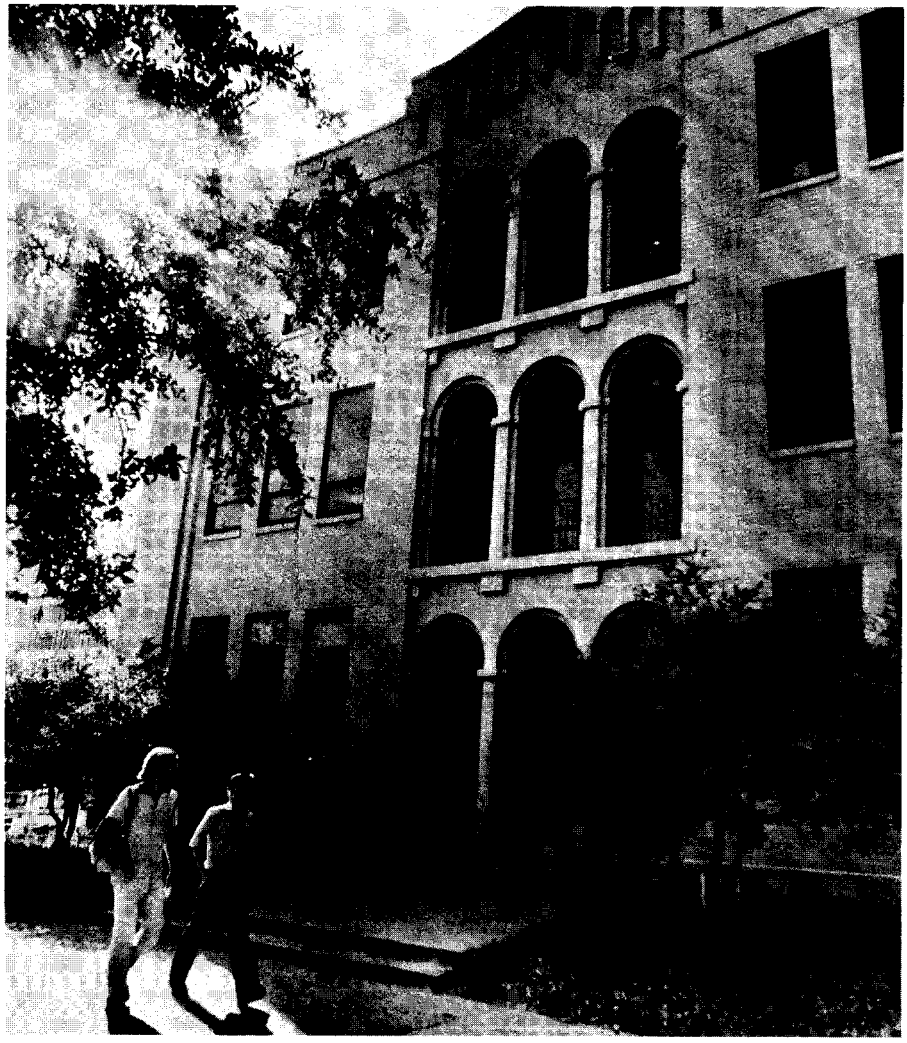
CAMPUS AND GRADUATE SCHOOL CALENDAR

Dates of particular importance to graduate students are shown in boldface type. Graduating students should see p. 34 for the final semester checklist. All Graduate School deadlines, unless otherwise stated, are final at 5:00 p.m. of the date specified (p. 34).

	FALL 1984	SPRING 1985	SUMMER SESSIONS 1985		
			1st 5 Weeks	2nd 5 Weeks	11 Weeks
Application Deadlines					
Application Deadline for **International Students**	**June 1**	**Oct. 12**	**March 1**	**April 12**	**March 1**
Application Deadline for **U.S. Students**	**July 13**	**Nov. 9**	**April 16**	**May 28**	**April 16**
Readmission Application Deadline	**August 3**	**Dec. 7**	**May 3**	**June 25**	**May 3**
Last Date to Apply for Thesis/Dissertation Tuition Reduction	**Aug. 15**	**Dec. 26**	**May 16**	**June 27**	**May 16**
REGULAR REGISTRATION*	Aug. 29-30	Jan. 9-10	May 30-31	July 12	May 30-31
First Day of Classes	Sept. 4	Jan. 14	June 3	July 15	June 3
Late Registration	Sept. 4-5	Jan. 14-15	June 3-4	July 15-16	June 3-4
Census Date: Final Date to Reserve Graduate Courses for Graduate Credit	Sept. 17	Jan. 28	June 6	July 18	June 6
Completion of "X" Grade from Previous Semester:					
Last date to submit work to instructor	Oct. 11	Febr. 22			
Last date to submit grade change to Dean of the Graduate School	Oct. 25	March 7			
Midsemester: Last Date to Drop or Withdraw (p. 31)	**Oct. 25**	**March 7**	**June 19**	**July 31**	**July 9**
Graduation Deadlines					
Deadline For GRADUATION: Last Date to File Application for Graduation, pay Diploma Fee, and **File Final Program of Work**	**Oct. 25**	**March 7**	**June 19**	**July 31**	**July 31**
Final Date for **Requesting Master's Exam/ Dissertation Defense,** and Submitting **Copy to Examining Committee**	**Nov. 12**	**March 28**	**June 13**	**July 26**	**July 26**
Final Date to **Hold Master's Examination/Dissertation Defense** and to Submit Copy of Thesis/Dissertation to Graduate School for **Mechanical Check**	**Nov. 26**	**April 11**	**June 27**	**Aug. 9**	**Aug. 9**
Final Date to **Submit Approved Thesis/Dissertation** to the Graduate School, and to Submit **Report of Final Master's Examination/Dissertation Defense**	**Dec. 3**	**April 18**	**July 5**	**Aug. 16**	**Aug. 16**
Final Exams	Dec. 17-21	May 4-9	July 10-11	Aug. 20-21	Aug. 19-20
End of Semester Deadline (See *In Absentia* Registration, p. 34)	**Dec. 21**	**May 9**	**July 11**	**Aug. 23**	**Aug. 23**
Graduation Exercises:	Winter: December 22, 1984		Spring: May 18, 1985		

HOLIDAYS: Labor Day—Sept. 3 Thanksgiving—Nov. 22-25 Spring Vacation—March 18-24 Easter—April 5-7 Indep. Day—July 4

*Advance Registration for Spring 1985: Nov. 27-30, Dec. 3-4; for Fall 1985: April 23-26, 29-30



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CONTENTS

Board of Regents 4
The University 5
The Graduate School 6
Directory of Offices 7
Facilities for Advanced Studies and Research
- The Library 8
- Televised Instruction 9
- Research Centers, Divisions, and Services 9
- Publications 16
- Short Courses, Conferences, and Special Programs 17

Advanced Degrees and Requirements
- Graduate Degrees and Certificates Offered 19
- Requirements for the Master's Degree 21
- Certificates 24
- Joint Degree Programs 24
- Requirements for the Doctor of Philosophy and Doctor of Science Degrees 24

General Graduate School Regulations and Information
- Student Responsibility 28
- Administration of the Advanced Degree Programs 28
- Registration and Orientation for International Students 28
- Reservation of Courses for Graduate Credit 28
- Course Grades 29
- Grade Requirements 30
- Course Auditing, Changes, and Load 31
- Course Designation System 32
- Course and Transfer Credit 32
- Extension Work and Correspondence Courses 33
- Registration Requirements and Credit for Thesis and Dissertation 33
- Graduation Procedures 33
- Graduate School Deadlines 34
- *In Absentia* Registration 34
- Change of Graduate Major or Program 35
- Petitions 35
- Grievances Other Than Grades 35
- Academic Dishonesty 35
- Graduate Assistantship/Associateship Policy 35
- Student Educational Records Policy 37

Admission Requirements and Procedures
- Admission of United States Students 38
- Admission of International Students 38
- Readmission 39
- Documentation Required 39
- Types of Admission 41
- Deferred Admission 42
- Graduate Student Advisement 42
- Registration Schedule 42
- Restrictions on Admission 42

Tuition and Fees
- Tuition and Mandatory Fees 44
- Concurrent Enrollment 46
- Fees 46
- Academic Common Market 48
- Residency Regulations 49
- Refunds 49

Student Services and Financial Aid
- Housing 51
- Student Health Services 51
- Student Health Insurance 51
- Counseling, Testing, and Career Placement 52

International Office ... 52
Minority Student Services ... 52
Handicapped Student Services ... 53
Students' Attorney ... 53
Student Conduct and Discipline ... 53
Bursar's Office ... 54
Student Financial Aid ... 54
Assistantships ... 56
Academic Programs and Courses of Instruction
Departmental Programs
Accounting ... 59
Aerospace Engineering ... 64
Architecture ... 68
Art ... 73
Biology ... 73
Chemistry ... 77
Civil Engineering ... 81
Computer Science and Engineering ... 88
Criminal Justice ... 93
Economics ... 95
Education ... 98
Electrical Engineering ... 99
English ... 104
Finance and Real Estate ... 110
Foreign Languages and Linguistics ... 111
Geology ... 119
History ... 122
Industrial Engineering ... 125
Landscape Architecture ... 129
Management ... 132
Marketing ... 134
Mathematics ... 136
Mechanical Engineering ... 141
Music ... 147
Nursing ... 147
Philosophy ... 151
Physics ... 152
Political Science ... 154
Psychology ... 157
Social Work ... 162
Sociology ... 173
Systems Analysis ... 176
Urban and Regional Affairs ... 178
Interdepartmental and Intercampus Programs
Administration ... 185
Biomedical Engineering ... 191
Business Administration ... 195
City and Regional Planning ... 202
Engineering: Interdisciplinary ... 205
Engineering Mechanics ... 206
Humanities ... 209
Interdisciplinary Studies ... 213
Materials Science ... 214
Mathematical Sciences ... 216
Radiological Physics ... 218
Administration and Faculty
Administration ... 220
Graduate Faculty ... 221
Campus Map ... 244
Index ... 246
Campus and Graduate School Calendar ... Inside Front Cover
1984-1985 Calendars ... Inside Back Cover

BOARD OF REGENTS
The University of Texas System

OFFICERS

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Robert B. Baldwin III, Vice Chairman
Janey Slaughter Briscoe, Vice Chairman
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(Terms Expire February 1, 1985)

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(Terms Expire February 1, 1989)

Robert B. Baldwin III ..... Austin
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GOVERNMENT

The government of UTA is vested in a nine-member Board of Regents of The University of Texas System, selected from different portions of the state, nominated by the Governor, and approved by the Senate. The Chancellor is the chief administrative officer of The University of Texas System; his office is located in Austin. The chief administrative officer for the operations of UTA is the University President, under the authority of the Chancellor of the UT System and the Board of Regents. A complete statement of the authority and duties of the Regents and of the several officers, together with an account of the organization of the system, is published in the **Rules and Regulations of the Board of Regents of The University of Texas System.**

EQUAL OPPORTUNITY POLICY

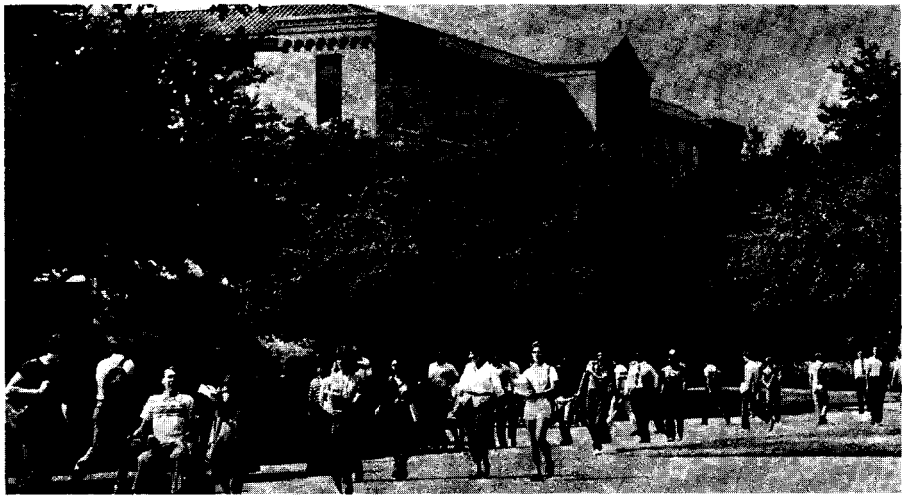
In accordance with the Equal Pay Act of 1963, Titles VI and VII of the Civil Rights Act of 1964, Executive Order 11246, the Age Discrimination in Employment Act of 1967, Title IX of the Educational Amendments of 1972, Sections 503 and 504 of the Rehabilitation Act of 1973, the Vietnam Era Veterans Readjustment Act of 1974, and the Rules and Regulations of the Board of Regents of The University of Texas System, it is the policy of The University of Texas at Arlington that no person shall, on the basis of race, color, national origin, religion, age, sex, handicap or Vietnam veteran status be denied employment or admission, be excluded from participation in, be denied the benefits of, or be subject to discrimination under, any program or activity which it sponsors or conducts. Any inquiries concerning the application of this policy should be directed to the University's Affirmative Action officers.

THE UNIVERSITY

The University of Texas at Arlington is located on a modern, 342-acre campus in the center of the Dallas/Fort Worth metroplex. A rapidly growing library, well-equipped engineering and science laboratories, several specialized research centers, and joint programs with other institutions of The University of Texas System as well as with other regional and national academic and research institutions provide the graduate student at the University with excellent opportunities for advanced study and research. The campus and metroplex area offer a wide variety of cultural and recreational facilities including art, historical, and science museums, operas, concerts, ballet, theater, amusement parks, professional sports, and several lakes for water sports.

The University of Texas at Arlington is one of the fourteen institutions in The University of Texas System. It is fully accredited by the Southern Association of Colleges and Schools and the Association of Texas Colleges and Universities. The University comprises the Colleges of Business Administration, Engineering, Liberal Arts, and Science, the Graduate School of Social Work, the School of Architecture and Environmental Design, the School of Nursing, the Institute of Urban Studies, the Center for Professional Teacher Education, and the Graduate School. The bachelor's and master's degree programs in accounting and business administration are accredited by the American Assembly of Collegiate Schools of Business. Baccalaureate programs in engineering are accredited by the Engineering Council for Professional Development. The graduate program in social work is accredited by the Council on Social Work Education. The professional Master of Architecture degree is accredited by the National Architectural Accrediting Board. The Master of Science in Nursing degree program is accredited by the National League for Nursing.

The University of Texas at Arlington was founded in 1895 as Arlington College, a private liberal arts school located "far from the temptations of city life." The college changed with the times and its surroundings, undergoing a succession of names and ownerships until 1917 when it became a state-supported junior college, named Grubbs Vocational College, in the Texas A&M System. It was renamed North Texas Junior Agricultural College in 1923 and Arlington State College in 1949. It was a successful junior college, building a reputation as a fine engineering and agricultural school. In 1959 it was elevated to senior college rank, and, in 1965, was transferred to The University of Texas System. The final name change came in 1967, when it became The University of Texas at Arlington. The student body has become increasingly diversified with students from 45 states and 65 foreign countries enrolled at the present time. Today the enrollment is over 20,000 undergraduate and 3,000 graduate students.



THE GRADUATE SCHOOL

The goal of graduate study is the development of a student's ability for creative research, critical evaluation, and scholarship in a particular discipline or in interrelated disciplines. Graduate study typically involves students actively in research. By sharing in investigations with their professors, graduate students are expected to acquire the spirit as well as the methods of creative scholarship. Achievement of the goal is demonstrated in reports, theses, and dissertations. In practice-oriented and teaching-oriented graduate programs, emphasis is on preparation for careers in application of existing knowledge in professional practice and teaching.

The Graduate School is the focus of advanced studies and research in the University and in that capacity has the dual but interdependent functions of training scholars and promoting varied research activities. A Graduate Faculty of more than 400 professors makes the Graduate School an important influence in creating high standards for academic accomplishment and in achieving an intellectual environment of highest quality for the University community.

The Graduate School of The University of Texas at Arlington was established in 1966 with the initiation of six master's degree programs. Doctoral degree programs were begun in 1969 with a Ph.D. program in engineering. Today the University offers master's degrees in 38 disciplines or interdisciplinary programs and 16 doctoral degree programs.

DIRECTORY OF OFFICES

All of the offices listed below, unless otherwise indicated, are located in Davis Hall. The telephone numbers are Dallas-Fort Worth metroplex numbers. The area code for all numbers is 817. The University postal zip code is 76019.

Graduate Admissions: Rm. 333, 273-2688.

International Student Admissions and Student Visas: Rm. 333, 273-2688.

Graduate School (Office of the Dean): Rm. 333, 273-2681

Graduate Advisor: See departmental and program description.

Counseling, Testing and Career Placement: Rm. 216, 273-3671 or 3672

Financial Aid: Rm. 260, 273-3561

International Office: 705 Summit, 273-2355

Handicapped Student Services Office: Rm. B13 University Center, 273-3364

Health Center: 605 S. West Street, 273-2771

Housing: 801 S. Davis, 273-2706

Minority Student Services: B08, University Center, 273-2099

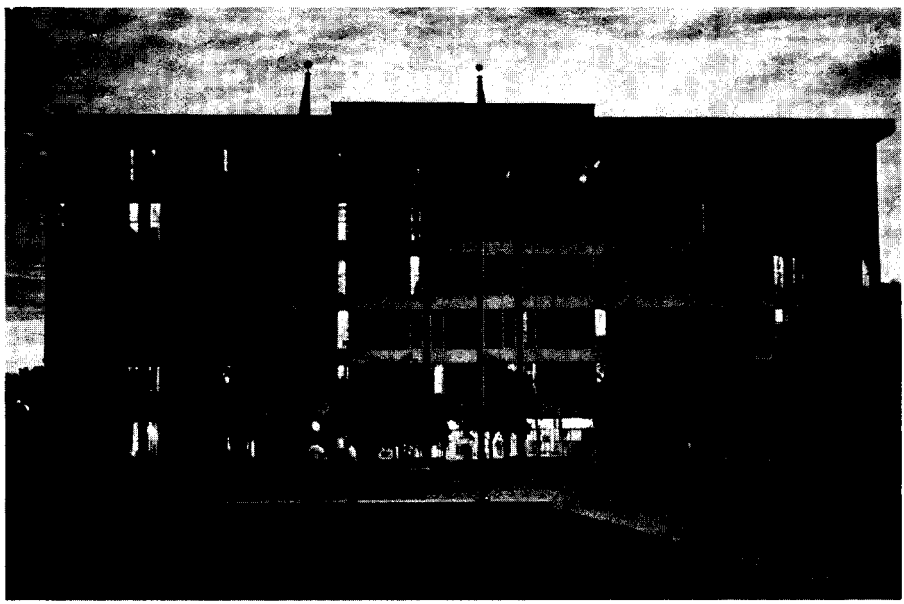
Special Services for Disadvantaged: Rm. 345, University Hall, 273-3783

Student Affairs: Rm. 241, 273-3361

Students' Attorney: B-09 University Center, 273-3771.

Transcripts and Records: Rm. 129, 273-3372

Veterans' Administration Representatives: Rm. 129, 273-3373



FACILITIES FOR ADVANCED STUDIES AND RESEARCH

THE LIBRARY

The Library, housed in a seven-story building in the center of the campus, contains a rapidly expanding collection of more than 850,000 books, including government documents and technical reports. In addition, the Library subscribes to more than 3,500 periodicals and newspapers and maintains a collection of recorded tapes, discs, microfilms, motion pictures, film strips, slides, maps, and video tapes. Books are on open shelves, making it possible for students to locate research materials easily and to browse through related books. Seating is provided for more than 1,700 students, including about 1,000 at individual carrels. A limited number of private research cubicles are available to faculty members and graduate students. Applications for these cubicles may be obtained at the first floor information desk.

Each of the public service departments—Humanities-General, Science-Engineering, Business-Social Science, Users' Services, and Government Publications—is staffed with professional librarians and experienced assistants.

The Library is particularly strong in several specialized areas. For example, the collection of American fiction of the late nineteenth century is one of the finest collections of its type in the country. Special collections described below contain valuable resources for graduate and advanced research.

The Division of Special Collections and Archives, housed in specially designed quarters on the sixth floor of the Library, is open 8-5 Monday through Friday and 10-2 Saturdays. Its collections of rare and unique materials provide many opportunities for advanced and graduate research in primary sources.

The Jenkins Garrett Library is a basic Texas history collection containing thousands of books, manuscripts, newspapers, broadsides, pamphlets, government documents, and graphic items. Its specialization in the Colonial and Mexican War periods was recently augmented by the addition of materials from the famous Eberstadt Collection, making it one of the world's strongest collections of Mexican War materials. The Cartographic History Collection is a new emphasis of the Division of Special Collections, and it is a unique facility in libraries in this region. Focusing on the history of cartography in general, the center specializes in the discovery and exploration of North America, with special emphasis on Texas and the American West. It consists of hundreds of rare maps and atlases dating from 1493, coupled with an extensive collection of related reference works and a representative sample of the primary works on exploration and discovery. The Division of Special Collections also contains the prestigious "Papers of the Robertson Colony", the records and manuscripts of one of the most important empresarios in the Anglo colonization of Texas.

The Department of Archives and Manuscripts contains the Texas Labor Archives, a major repository of primary source materials documenting the history of the labor movement in Texas. It houses records representing hundreds of local unions and labor councils, statewide labor organizations, union political groups, and district and regional offices of international unions, as well as theses, dissertations, and monographs on the history of the labor movement. The Texas Political History Collection is one of the state's leading depositories of twentieth century political records. Containing the papers of current and former elected officials, of political groups, and of private citizens who have influenced the course of Texas politics and government, the Collection presents many opportunities for original research.

Another major collection housed in the Department of Archives and Manuscripts is the Yucatan Archives, which includes over 1,050 reels of microfilmed copies of the state, notarial, and ecclesiastical archives of the Yucatan, as well as almost all extant Yucatecan newspapers. The library presently has an archives microfilming project in Honduras, Central America.

The Library also contains the University's Minority Cultures Collection which provides support materials to the instructional programs related to the American Indians, Blacks, and Chicanos. The expanding collection includes circulating and reference books in addition to periodicals, newspapers, government documents, pamphlets, audio text cassettes and recorders.

The following library facilities are located outside the main library: the Architecture Library in the Fine Arts Building, the Mathematics/Nursing reading Room in the Nursing Building, the

Arthur Young Graduate Tax Library and the Accounting Alumni Association Accounting Library (both located in the College of Business Administration Building). The Architecture Library is a branch library offering the full range of library services and materials in the areas of architecture, city planning, and environmental design. The Mathematics/Nursing Reading Room contains the most recent issues of journals in each of the two subjects, a core of reference materials, and reserve materials. The Arthur Young Graduate Tax Library and the Accounting Alumni Association Accounting Library contain research and professional materials as well as other publications which are available to faculty and certain students under faculty supervision.

To supplement the library collection, the Inter-Library Loan Section attempts to locate and borrow research materials not in the Library. As a member of the Association of Higher Education (AHE) of the North Texas area, the Inter-Library Loan Section can make inquiries to locate materials and to obtain much of it very quickly, often saving the student travel time to other campuses. As a member of the Center for Research Libraries, more than three million volumes, thirteen thousand journal subscriptions and numerous special research collections are available on inter-library loan to the students and faculty of the University.

As an additional service to graduate students, the Association of Higher Education (AHE) Library Courtesy Card will enable such students to go directly to the libraries of universities in North Central Texas and to borrow materials needed in connection with their research. This card may be obtained by application to the Head of Circulation.

The Library now provides the University campus with online access to computerized information retrieval. This system makes available more than 100 data bases in the areas of Science, Social Sciences/Humanities, Technology/Engineering and Business/Economics. The Library houses on the fifth floor a regional affiliate of the Texas Data Center Program which provides access to computerized census information.

Coin-operated photocopy machines are located on the first, second, third, fourth, and fifth floors, and a photocopy center is located on the fifth floor along with rental typewriters.

Fall and Spring Library hours are:	
Monday-Thursday	7:00 a.m. - 11:45 p.m.
Friday	7:00 a.m. - 10:00 p.m.
Saturday	10:00 a.m. - 10:00 p.m.
Sunday	1:00 p.m. - 11:00 p.m.
Summer Library hours are:	
Monday-Thursday	7:00 a.m. - 11:00 p.m.
Friday	7:00 a.m. - 10:00 p.m.
Saturday	10:00 a.m. - 6:00 p.m.
Sunday	2:00 p.m. - 10:00 p.m.

TELEVISED INSTRUCTION

The University of Texas at Arlington is a member of a consortium of colleges and universities in the north Texas area called the Association for Higher Education (AHE). UTA utilizes a closed-circuit television network operated by AHE to transmit and to receive a limited number of graduate and undergraduate courses. Currently UTA transmits engineering courses to selected industrial sites and business locations in the Dallas/Fort Worth area and to the campuses of certain members of AHE. Selected courses not offered by UTA but which are offered by neighboring colleges and universities can be received via the AHE network.

For further information or for a bulletin of courses available via the AHE closed-circuit television network (formerly TAGER), contact the UTA Engineering Instructional Office, Rm. 204 Engineering Building, Box 19019, Arlington, TX 76019, or (metro) 273-2571.

RESEARCH CENTERS, DIVISIONS, AND SPECIAL FACILITIES

ACADEMIC COMPUTING SERVICES

Academic Computing Services provides computing facilities and services for the academic and research needs of the University and is separate from the administrative computing facility.

FACILITIES

The Academic Computing Services hardware consists of an IBM 4341/M02 with 8 MB of memory and a DEC 2060 with 768K words of memory plus three remote batch terminals and a large number of interactive terminals. A Tektronix Graphic Terminal and plotter, a CALCOMP drum plotter, a high-print-quality Diablo terminal, and a page scanner are also available. Most of the major programming languages and packages are available on one or both of the computers. Other micro-computers and mini-computers are available in various departments and laboratories.

ART COLLECTIONS AND MUSEUMS

The Department of Art hosts an ongoing series of public lectures, films, workshops, and special events. The University is located within a metropolitan area which attracts major artists and performers from all over the country providing a very stimulating environment for all of the arts. Chairman: Vincent J. Bruno, Rm. 144 FA, 273-2891

BUSINESS AND ECONOMIC RESEARCH CENTER

The Center for Business and Economic Research was established in 1971 to conduct research projects for interested businesses and governmental agencies. Since then, several funded projects have been conducted through the Center with the assistance of graduate and undergraduate students in the College of Business Administration. Rm. 334 B, 273-2881

CENTER FOR COMPARATIVE URBAN STUDIES

Recognizing the worldwide growth of urban areas with its attendant problems of congestion, environmental pollution, high crime rates and a variety of additional economic and social pathologies, the Center for Comparative Urban Studies was established. Objectives of the Center are to serve as a forum for research and exchange of ideas and information designed to improve urban policy making; to provide training opportunities for students interested in comparative urban issues; to create, publish, and disseminate materials related to the work of the Center; and to provide an organizational framework within which scholars from within and without the University may carry out their own work on comparative urban issues. Director: James V. Cornehls, Rm. 545 UH, 273-3347

CENTER FOR CRIMINAL JUSTICE RESEARCH AND PLANNING

The Center for Criminal Justice Research and Planning was established in 1977. Its main objectives are to conduct research and training, and provide technical assistance to law enforcement agencies and other governmental agencies and citizen groups concerned with the administration and operation of criminal justice services.

The Center responds to agency requests for evaluation of program effectiveness, offers staff opportunities to enhance current skills or develop new ones, and assists various units of government at the local, county, state, and federal levels to develop and implement appropriate criminal justice policy.

As a part of the Institute of Urban Studies, the Center works cooperatively to develop effective community crime prevention models and to enhance community awareness of needed changes for the solution of crime problems. Director: James W. Stevens, Rm. 523 UH, 273-3071

CENTER FOR ENVIRONMENTAL DESIGN RESEARCH

CEDR was established on June 22, 1979 as the consolidation of research activities of the School of Architecture and Environmental Design. Its objectives are to develop investigative programs and stimulate research related to architecture, landscape architecture, interior architecture, and planning. Areas of concentration include design theory, architectural history, low-cost housing, building materials and systems, and the socioeconomic factors that bear on modification of the existing environment. The staff of the Center works in close concert with local and regional developers, builders and contractors, design professions, and government agencies. The CEDR assists students in the study of theoretical and practical problems and issues, working within a framework for interdisciplinary cooperation with the other professions. Interested graduate students may serve as research staff and/or receive graduate credit for special projects upon approval of the Graduate Studies Committee and the Graduate Dean. Director: Ernest L. Buckley, Room 209 SC, 273-3083

CENTER FOR POSITRON STUDIES

The Center for Positron Studies was established in 1979 as an outgrowth of the positron physics, chemistry, and materials science research programs in the University. The objective of the Center is to conduct wide-ranging experimental and theoretical studies in the rapidly growing field of low-energy positron research. The full potential of the positron as an extremely powerful, useful and sensitive probe of matter is only now being generally recognized.

The Center has been the site of positron annihilation studies of gases, liquids, liquid crystals and metals, and measurements of positron scattering by gas molecules and at solid surfaces. Much of this work is supported in part by external funds and in many cases is at the frontiers of the field.

Members of the Center include full-time and visiting faculty, post-doctoral research associates, and graduate and undergraduate students. The Center organized the Sixth International Conference on Positron Annihilation, hosted by the University in 1982. Director: Suresh C. Sharma Rm. 120J SH 273-2266

CENTER FOR SOCIAL RESEARCH

The Center for Social Research was established in 1977 as a research component of the Department of Sociology. Participants in the Center have doctoral or professional degrees. The purpose of the Center is to stimulate research, especially that which will be both of significance to the field of sociology and of service to various institutions, agencies, and organizations in the community and the state. The Center is the channel through which grants for research can be obtained. It provides funding to support faculty research and graduate student training. Areas of on-going research activity include: marketing research, welfare policy and research evaluation, substance abuse, crime and corrections, health care delivery systems, and studies in family violence. Director: William A. Stacey, Rm. 443 UH, 273-2661

CITY AND REGIONAL PLANNING CENTER

The City and Regional Planning Center was established in 1980 to provide the public and private sectors with professional planning services—including research, publications, training, and professional consultation and advice—on such matters as planning administration, comprehensive planning, land use, housing, transportation, demographic analysis and projections, fiscal capacity and impact analysis, as well as computer graphics, modeling and quantitative analysis.

The professional experience offered to students and faculty through interaction with private corporations, real estate and development interests, and with public officials and planning practitioners, contributes to the quality of teaching and helps keep students and faculty current in both planning practice and theory. Director: Ard Anjomani, Room 222 UH, 273-3366

CONSTRUCTION RESEARCH CENTER

The Construction Research Center is engaged in research and educational activities that support the construction industry. The research programs generally include the departments or colleges of Civil Engineering, Architecture, Mechanical Engineering, Industrial Engineering, Geology, Economics, and Business Administration. The specified areas of study range from light foundations to the econometrics of the construction industry. Seminars, special courses, and special programs are held for their educational values and for the purposes of disseminating research.

The Center is supported by the Construction Research Advisory Committee, which is composed of general contractors, home builders, financial institutions, building material manufacturers and suppliers. Director: John H. Matthys, Rm. 206 E, 273-3701

DAN GOULD, SR. CENTER FOR REAL ESTATE AND URBAN DEVELOPMENT

The Center was established in 1979 with the goal to promote and develop the real estate program within the College of Business Administration. A direct corollary goal is the development of practical real estate-related research and services for the industry. The Center provides an organizational entity around which several student-related programs have been built.

FACILITIES

These programs are aimed at facilitating a student's acquisition of real world experience, as well as a strong theoretical education.

The Center seeks to support the academic program by encouraging excellence among students and faculty. The Center promotes and assists in course development and research endeavors for students, providing opportunities for practical application of theoretical concepts. Faculty research, publishing, and professional consulting are encouraged by the Center in the belief that such endeavors contribute to quality teaching by keeping the faculty current in both theory and practice. Acting Director: Vincent P. Apilado, Rm 107 B, 273-3705

ECONOMIC EDUCATION CENTER

The Center for Economic Education was established in 1972 with the aid of a grant from the Texas Council on Economic Education. Its purpose is to offer training in economics to elementary and secondary teachers through special summer institutes, inservice programs, off-campus programs, and the dissemination of appropriate curriculum materials. Director: Lawrence F. Ziegler, Rm. 306 B, 273-3061

ELECTRONIC MATERIALS AND DEVICE ENGINEERING RESEARCH LABORATORY (EMDERL)

EMDERL is engaged in research in the areas of active and passive electronic devices and circuits, noise characteristics of these devices, and microwave systems and their applications. Since the Laboratory was established in 1974, an international reputation has been gained in the area of microwave and millimeter wave magnetic devices and materials. The Laboratory is also actively involved in silicon and GaAs FET device research. Ten full-time graduate students, five full-time faculty members, and several advanced undergraduate students conduct research in the Laboratory. Facilities are available for photolithographic mask production, vacuum evaporation and sputtering, P and N channel MOS processing, liquid phase magnetic garnet epitaxial growth, GaAs vapor phase epitaxial growth, ion implantation, noise measurements and time and frequency domain microwave evaluations (0.1-100GHz). The Laboratory also operates a mobile controlled frequency and polarization radar system for use in backscatter measurements of material and man made targets. Graduate assistantships and fellowships are available for qualified candidates. For information contact Dr. J. M. Owens, Dr. R. L. Carter, Dr. L. M. Rucker, Dr. A. Blanchard, or Dr. A. Davis at (817) 273-2671, P.O. Box 19016, Arlington, Texas 76019.

ENERGY SYSTEMS RESEARCH CENTER

The Energy Systems Research Center sponsors research in procedures and problems in electrical power generation, transmission, and distribution, and focuses primarily on the planning and operation of practical power systems. The Center's research is pertinent to the utility industry and is readily applicable to the daily concerns of all practicing engineers. Established in 1968, the ESRC is the largest center of its type and is recognized as one of the most important research centers of its kind in the United States. The ESRC offers a three-phase program of study to serve undergraduate, graduate, and continuing education students. On the undergraduate level, six new power courses have been devised and added to the electrical engineering curriculum. The well-established graduate program supports thirty-five full-time students and ten full-time staff members. The ESRC also supports a relatively large post-doctoral program that requires at least some industrial experience for candidacy. Post-doctoral fellows may assist ESRC students in thesis or dissertation and in graduate seminars; fellows may be asked to perform limited teaching on the graduate level. The ESRC also accepts international exchange scholars from programs such as the Fulbright and IREX. Each year, researchers from different countries join the ESRC to aid in the research effort and to share their knowledge and experience in graduate seminar discussions. These researchers also contribute to the ESRC's special non-degree graduate programs as well as the in-plant and on-campus continuing education programs for practicing power system engineers. In addition, the ESRC sponsors a Distinguished Lecture Series and informal industrial seminars to further enrich the graduate and post-graduate programs. Graduate assistantships, fellowships, and post-doctoral fellowships are available for qualified candidates. Director: Mo-Shing Chen, Rm. 507 Car H, 273-2691 or 273-2268

FORT WORTH FEDERAL RECORDS CENTER

The Fort Worth Federal Records Center, a branch of the National Archives, is a valuable resource center for faculty and students in the Department of History. It has voluminous primary sources concerning the Bureau of Indian Affairs, government agencies, and Federal Courts. The Center also has a comprehensive microfilm collection of government records located at the National Archives in Washington, D.C. For other research centers valuable to history students, see the section on the Library, especially the descriptions of the Jenkins Garrett Collection, the Regional Historical Resource Depository, the Division of Archives and Manuscripts, and the Minority Cultures Center. For information contact: Kenneth R. Philp, Rm. 313 UH 273-2861

FRANK E. LOZO CENTER FOR CRETACEOUS STRATIGRAPHIC STUDIES

The Frank E. Lozo Center for Cretaceous Stratigraphic Studies was established as a research center devoted to the study of Cretaceous stratigraphy, especially in the Gulf and Caribbean Basin. The Center maintains a large reference collection of publications, unpublished field notes, published and manuscript maps, and fossils. The personal collection of these types of materials made by Frank E. Lozo during his life-long career of Cretaceous stratigraphic research forms the nucleus of the Center's resources. The Center will gladly accept materials of significance to these studies as additions to the permanent collection.

Faculty, graduate students, and others conducting research on Cretaceous problems are invited to use the collection at the Center. Space is available for reading and map study. The Center is located in room 106, Geoscience. Director: Bob F. Perkins, Rm. 115, Geoscience, 273-2987

HUMAN RESOURCE CENTER

The Human Resource Center at The University of Texas at Arlington's Graduate School of Social Work offers non-credit short courses on a variety of topics of interest to human service professionals and community groups. Participants from Texas and surrounding states take advantage of these continuing education opportunities which are delivered on campus throughout the year. The Center also develops contracts with agencies and organizations to design and implement training at the agency site, tailored to the particular needs of the agency staff. HRC CC, 273-3607

INTERNATIONAL LINGUISTICS CENTER

The International Linguistics Center conducts linguistic training and research in cooperation with the linguistics faculty. It is administered by the Summer Institute of Linguistics, Inc. and located near Arlington, one mile west of Duncanville on Camp Wisdom Road. Its purpose is to provide facilities for linguistic training and research. Investigations are conducted pertaining to the world's languages for use by translators, linguists, missionaries, anthropologists, bilingual educators, government officials, and others. A number of competitive graduate Fellowship Grants are provided by the Center each semester. Director: George L. Huttar, Rm. 330 HH, 298-3331 (ext. 4622).

INVESTMENT ANALYSIS CENTER

The Investment Analysis Center is located within the Department of Finance and Real Estate in the College of Business Administration. The Center's primary purposes are: to provide the facilities and services required in order that graduate and undergraduate students of business can, predicated upon their own initiative and motivation, develop a thorough understanding of current financial theory, practices, and methodology; and to provide a computerized financial data base covering the spectrum of all publicly held corporations in the Dallas/Fort Worth area, in sufficient depth, in order that a sophisticated research tool can be made available to the students and faculty of the University. Acting Director: Vincent P. Apilado, Rm. 107B, 273-3705

INTER-UNIVERSITY CONSORTIUM FOR POLITICAL AND SOCIAL RESEARCH

The Inter-University Consortium for Political and Social Research (ICPSR) is a data collection and dissemination service sponsored by the University of Michigan and supported by over two hundred American and twenty-eight foreign universities and archives. The University's membership in the Consortium provides faculty and students access to the largest accumulation of computer-processed and retrievable data available anywhere in the world. The data resources of the Consortium are developed and maintained by three archival sections. The Survey Research Archive continually adds new data sets from both foreign and domestic studies, permitting longitudinal, cross-cultural analyses that have heretofore been impossible. The Historical Archive contains computer-processed data of an aggregate nature drawn largely from official and semi-public records, both in the United States and abroad. Likewise, the International Relations Archive provides data from numerous sources for research in this specialized area. In addition to the survey and aggregate data sets, the Consortium makes available to both faculty and students many computer support services, including the development of and instruction in the use of computer programs. For information contact: Luther W. Odom, Rm. 404 UH, 273-2991

REHABILITATION ENGINEERING RESEARCH CENTER

The Rehabilitation Engineering Research Center (RERC) was established in 1983 to consolidate a major component of biomedical engineering research activities. Its objective is to improve the quality of life for individuals with physical and mental handicaps. At present, the Center maintains laboratories or liaison with the University of Texas Health Science Center at Dallas, the Dallas Rehabilitation Institute, the Veterans Administration Medical Center at Dallas, the Center for Computer Assistance to the Disabled, the Association for Retarded Citizens, and the Dallas Center for Independent Living. Faculty, staff, and students conduct collaborative research in engineering laboratories at UTA and in laboratories at several of the above named facilities, which are located within the Dallas-Ft. Worth Metroplex. Areas of concentration include development of devices and systems to assess the functions of handicapped individuals; evaluation of drugs, surgical procedures, exercise regimens, and assist devices in controlled clinical trials; and development of devices to reduce the duration and extent of disability following trauma. Planning is under way to apply computers to assist the handicapped by improving communications and independent living. Research funding for the Center's activities support graduate student assistantships, post doctoral fellowships, visiting and adjunct scientists and engineers, as well as staff, laboratory equipment, and supplies. Director: Alfred R. Potvin, 229, Engineering Lab Bldg., (817) 273-2249

RESEARCH CENTER FOR ADVANCED STUDY

The objectives of the Research Center for Advanced Study are: to provide necessary freedom to identify and engage in highly significant and broadly applicable research programs and workshops for advanced studies; to provide a forum for professors and graduate students to share ideas in areas of research that require theory and practice of mathematical sciences; to be a vehicle for communication and collaboration between professors and graduate students of different disciplines (interdisciplinary research and study is an integral function of the Center); to have workshops for advanced study, seminars, symposia and colloquia leading to unlimited educational benefits; to combine its members' expertise on projects that may be beneficial to industry, government, and local community by attempting to solve problems arising on a local, national, or international scale; to initiate an outstanding visitors' program, bringing distinguished scholars to UTA for the benefit of many departments and schools of the University; and to indicate and consolidate the analysis and synthesis capabilities of UTA's various faculty groups. Director: V. Lakshmikantham, Rm. 469 Nursing, 273-3261

THE RYAN-REILLY CENTER FOR URBAN LAND UTILIZATION

The Center was established in 1983 with the aid of a grant from John Ryan, chairman, and Michael Reilly, president, of the Ryan Companies. The Center develops and markets real estate and financial seminars for students, faculty, industry members, and the community at large. It

sponsors audio-visual programs covering all aspects of real estate and financial matters. The Center assists in the development of real estate courses emphasizing the operational skills involved in property management, asset management, commercial development, construction management and commercial leasing. Opportunities for interaction (such as research and consulting) between the faculty of the College of Business Administration and financial and real estate groups are encouraged. The Center provides graduate placement services to students seeking jobs with real estate and financial firms. The Center also supports Rho Epsilon, a national real estate fraternity, in its endeavors. Director: Alex Bul, Room 111 B, 273-3828

SOLAR ENERGY RESEARCH FACILITY

The College of Engineering Solar Energy Research Facility (SERF) includes a three-bedroom residential structure of contemporary architectural style with a living area of 1550 square feet. An enlarged mechanical room accommodates much of the heating and cooling equipment including the absorption cooling machine, the heat pump, the fan/coil air handler unit, a commercial water heater, and the domestic water heater. A two-car garage attached via a breezeway houses the thermal storage system, data acquisition equipment, and the remaining mechanical equipment. A cooling tower is located under an exterior stairway to the roof where the concentrating solar collectors and the weather station are located. The building makes extensive use of passive energy conservation measures such as: double-paned insulating windows, architectural window shading, insulated doors with face seals, excellent wall and ceiling insulation.

The solar collectors, two banks of Northrup concentrating solar collectors (21 collectors in each bank with a total area of 420 square feet), are located on the flat roof. The concentrating collectors were designed to operate at temperatures well over 200° F and hence provide adequate input to the absorption cooling machinery. The collectors are facing due south and are tilted at 27° from the horizontal. A tracking mechanism is required to continuously point the collectors toward the sun in order to receive the direct solar radiation. A flat-plate solar collector array subsystem was installed in 1978 for direct solar heating and solar-assisted heat-pump heating of the SERF house. The flat-plate collector subsystem consists of 550 square feet of flat-plate collectors located on the lawn of the house and has an adjustable tilt angle. A 110 square meter 8 Kw pk photovoltaic system is used to supply the electric demands of the SERF house. Excess photovoltaic energy is fed back to the utility during peak demand hours. Director: David Y. S. Lou, Rm. 335 E, 273-2561

TEXAS URBAN DATA SERVICE

The Texas Urban Data Service, a regional extension of the Texas Data Management Program, has been established by the Institute of Urban Studies in order to provide U.S. Census and other statistical information and data analysis for both public and private sectors within a thirty-eight county area. In addition, it is the intent of the Institute to utilize these data for research and analysis of public policy affecting the populace of the State of Texas.

UTA faculty members and students are encouraged to use the wealth of computerized information available through this service in their respective research efforts. The Texas Urban Data Service itself is located in the UTA Library. A limited number of Graduate Research Assistantships are available periodically. Coordinator: Rae Blakeney, 273-2346

UNIVERSITY ART GALLERY

The University Art Gallery serves the entire University. The Gallery program of exhibitions and related events has University-wide ramifications for students, faculty and staff. Exhibitions draw on all cultures and all periods. Cooperation is continual with neighbor institutions as well as the Amon Carter Museum, Dallas Museum of Fine Arts, Fort Worth Art Museum, and the Kimbell Art Museum. The goal of the Gallery is to bring first quality works of art to the campus. Director: Max W. Sullivan, Rms. 142, 2105 B&C, FA, 273-2790

URBAN STUDIES RESEARCH AND SERVICE PROGRAMS DIVISION

The objective of the Institute's Urban Studies Research, Training, and Service Programs, is to draw on the knowledge and skill of Institute faculty and staff to provide guidance and assistance to Texas public agencies and other community groups striving to deal with changing political,

economic, and social conditions. A small staff of professionals provides a variety of services directly to agencies or other groups requesting assistance, and facilitates the work of other Institute faculty and staff members while engaged in research, conducting training, or delivering services. Director of Research Program: Frank Anderson, Rm. 501B UH, 273-3302; Director of Training and Service Program: David Tees, Rm. 501A UH, 273-3304

PUBLICATIONS

ALLEGORICA

Allegorica is a journal of comparative literature devoted to Medieval and Renaissance studies; it is published by the Department of English. *Allegorica* makes available to scholars and students works previously unknown in translation. The texts are printed bilingually with the original and a modern translation on facing pages. In addition, reviews of books relevant to the material in the journal appear in each issue. The publication will be particularly helpful to students interested in the problems of translation. Student clerical positions are usually available. Editors: Simone F. Turbeville, Rm. 202 Car H, 273-2701, Richard B. Zacha, Rm. 622 Car H, 273-2782, and Dolores Holder, 312 HH, 273-3161

AMERICAN LITERARY REALISM, 1870-1910

American Literary Realism, 1870-1910 is a scholarly semi-annual publication. Established in 1967, ALR has won international recognition for its annotated bibliographies and checklists and for its willingness to treat minor as well as major American writers of the designated period. Students' contributions may be considered for publication. ALR is published by the Department of English. Editor: James M. Moffett, Rm. 609 Car H, 273-2695

THE HAROLD FREDERIC EDITION

The Harold Frederic Edition is a research community comprised of Department of English professors, researchers, and student assistants. With financial support from the University, it has for more than a decade collected and analyzed the works of this nineteenth-century American author in order to construct reliable critical editions of his works. The technical advice and the specialized equipment of the Edition are available to students and other faculty members who might desire to work in this field. Graduate research assistantships and associateships are available from time to time; students awarded these grants work closely with the editors. Editor: Stanton Garner, Rm. 604 Car H, 273-2782

NONLINEAR ANALYSIS—THEORY, METHODS, AND APPLICATIONS and STOCHASTIC ANALYSIS AND APPLICATIONS

These two international journals, *Nonlinear Analysis—Theory, Methods and Applications* (Pergamon Press) and *Stochastic Analysis and Applications* (Marcel Dekker), afford students and faculty the opportunity of a role in an important area of mathematical sciences. The Department of Mathematics also publishes faculty and student research results as technical reports. Approximately 250 American and foreign institutions receive copies of these reports. Editors: V. Lakshmikantham, and G. S. Ladde, 273-3261

PAPERS CONCERNING ROBERTSON'S COLONY IN TEXAS

Beginning in 1974, one volume of the *Papers Concerning Robertson's Colony in Texas* has been published each year. In 1976 The University of Texas at Arlington acquired most of the manuscripts that were still in private hands concerning this colony, which occupied an area 100 miles wide and 200 miles long in the heart of Texas, centering around Waco. UTA built a special Robertson Colony Room on the sixth floor of the Library to preserve these documents and provided facilities for editing them. They are published by The UTA Press, Box 929, The University of Texas at Arlington, Texas 76019-0929. Editor: Malcolm D. McLean, Room 650, Library, 273-3391, Ext. 4957

PRE/TEXT

An Inter-disciplinary Journal of Rhetoric is a quarterly publication. Its objectives are to provide a forum for the rediscovery of rhetoric as historically an inter-disciplinary, "architechtonic productive art," informing such fields today as philosophy, linguistics, art, mathematics, psychology, law, music, artificial intelligence, anthropology, and the sciences in general, and to publish particularly exploratory articles and working papers on the inter-disciplinary nature of rhetorical theory and meta-theory. P/T is supported by a grant from the Graduate School and editorial assistance is provided by the Department of English. Graduate student clerical positions may be available. Editor and publisher: Victor J. Vitanza, Rm 401 Car H, 273-2704

SCHATZKAMMER

Schatzkammer is an annual journal published in part by the Department of Foreign Languages and Linguistics. It is devoted to the discussion of innovative teaching techniques at all levels of German instruction, to research in contemporary German linguistics, and to historical and cultural contributions to America by German-speaking people. Creative writing of contemporary interest is solicited occasionally. Consulting Editor: Duane V. Keilstrup, Rm. 313 HH, 273-3161

SUMMER INSTITUTE OF LINGUISTICS PUBLICATIONS IN LINGUISTICS

The *Summer Institute of Linguistics Publications in Linguistics* is a joint University of Texas at Arlington-Summer Institute of Linguistics monograph series published approximately six times a year. The series was begun in 1958 primarily as a publishing outlet for linguistic field workers who collect data concerning heretofore unwritten or undescribed languages and has been expanded to include a wide range of content within the field of descriptive linguistics. Monographs range from descriptive studies of the linguistic structures of little known languages to occasional comparative studies of some of the major languages. Editor: Virgil L. Poulter, Rm. 321 HH, 273-3161

WALTER PRESCOTT WEBB MEMORIAL LECTURES

The lectures, now in their twentieth year, are delivered each spring in honor of Texas' most distinguished historian, Walter Prescott Webb. Now considered among the most prestigious history lecture series in the country, the Webb Memorial Lectures give graduate students and others the opportunity to meet and to hear some of the nation's outstanding historians. Chairman: Sandra Myres, Rm. 346 UH, 273-2861

SHORT COURSES, CONFERENCES, AND SPECIAL PROGRAMS

INTERNATIONAL CONFERENCE ON THERMOELECTRIC ENERGY CONVERSION

An international conference is held once every 18 to 24 months for bringing together experts from industry, research labs, and universities to review the state-of-the-art, research, and development of thermoelectrics for applications in various areas. The conference is sponsored by the Graduate School and the Electrical Engineering Department of UTA and is attended by scientific, technical, and industrial communities representing all continents. Coordinator: K. R. Rao, 317D-E, 273-2671

POWER SYSTEMS SHORT COURSE

"The Modeling and Analysis of Modern Power Systems" short course has been offered each summer since 1964. More than 800 students from as many as 24 states, 21 countries, and 58 companies have attended the short course for an intensive two-week schedule of study. The course has become increasingly popular to foreign participants and to professors and graduate students from other institutions, particularly those offering fewer courses in power systems

engineering. This course is continually updated to reflect the most advanced concepts and practices in planning, design, and operation of electrical power systems. Dr. Mo-Shing Chen, Professor of Electrical Engineering and Director of the Energy Systems Research Center, is responsible for the short course and is aided by members of the Electrical Engineering Department and the Energy Systems Research Center staff. Director: M. S. Chen, Rm. 507 Car H, 273-2268

SCIENCE CAREER FACILITATION PROGRAM

The Science Career Facilitation Program is designed to aid students in their preparations to re-enter academic or industrial science careers after an extended absence. The program emphasizes the design of individual curricula within existing graduate degree programs that will help the student prepare for changing career objectives, new professional opportunities, or re-entry into science as a profession. Seminars on time management, study skills, professional writing, career exploration, resume preparation, and job interviewing, along with a full curriculum of master's level graduate courses in the sciences, are included in the program. Preparation of women for re-entry into professional science careers is a principal objective of the program. Director: Ann Benham, Rm. 105 Life Science, 273-2805

SOUTHWESTERN GRADUATE RESEARCH CONFERENCE IN APPLIED MECHANICS and SOUTHWESTERN GRADUATE RESEARCH CONFERENCE IN THERMAL SCIENCE

Approximately once every four years these conferences are hosted by The University of Texas at Arlington. Graduate students from universities throughout the southwest present papers based on their current research. Support for the Conferences comes from the UTA Organized Research Fund, the College of Engineering, and private industry. Participants include students and faculty from many universities as well as representatives from industry. Awards are given to the students who present the best research papers. For information, contact the Department of Mechanical Engineering, 273-2561.

ADVANCED DEGREES AND REQUIREMENTS

The University of Texas at Arlington offers the following graduate degrees and certificates in the areas of study and through the departments and programs indicated.

DEPARTMENTS AND PROGRAMS	AREAS OF STUDY	DEGREES AND CERTIFICATES
Accounting	*Accounting*	M.P.A., M.S.
	Taxation	M.S.
	Administration	PH.D.
Administration	*Business Administration*	PH.D.
	Social Work	PH.D.
	Urban Affairs	PH.D.
Aerospace Engineering	*Aerospace Engineering*	M.S., PH.D.
Architecture and Environmental Design	*Architecture*	M.ARCH.
	Landscape Architecture	M.L.A.
Biology	*Biology*	M.S.
	Mathematical Sciences	PH.D.
Biomedical Engineering	*Biomedical Engineering*	M.S.,PH.D.
	Clinical Engineering	
		CERTIFICATE OF INTERNSHIP
		CERTIFICATE OF RESIDENCY
Business Administration	*Business Administration*	M.B.A.
	Administration	PH.D.
Chemistry	*Chemistry*	M.S.
	Applied Chemistry	D.SC.
	Mathematical Sciences	PH.D.
City and Regional Planning	*City and Regional Planning*	M.C.R.P.
Civil Engineering	*Civil Engineering*	M.S.,M.ENGR., PH.D.
Computer Science	*Computer Science*	M.S., M.C.S., PH.D.
	Computer Science and Engineering	M.S., M.ENGR., PH.D.
	Mathematical Sciences	PH.D.
Biology	*Biology*	M.S.
	Mathematical Sciences	PH.D.
Biomedical Engineering	*Biomedical Engineering*	M.S.,PH.D.
	Clinical Engineering	
		CERTIFICATE OF INTERNSHIP
		CERTIFICATE OF RESIDENCY
Business Administration	*Business Administration*	M.B.A.
	Administration	PH.D.
Chemistry	*Chemistry*	M.S.
	Applied Chemistry	D.SC.
	Mathematical Sciences	PH.D.
City and Regional Planning	*City and Regional Planning*	M.C.R.P.
Civil Engineering	*Civil Engineering*	M.S.,M.ENGR., PH.D.
Computer Science	*Computer Science*	M.S., M.C.S., PH.D.
	Computer Science and Engineering	M.S., M.ENGR., PH.D.
	Mathematical Sciences	PH.D.

DEGREE OFFERINGS/REQUIREMENTS

Criminal Justice	*Criminal Justice*	M.A.
Economics	*Economics*	M.A.
Electrical Engineering	*Electrical Engineering*	M.S., M.ENGR., PH.D.
Engineering	*Engineering Interdisciplinary*	PH.D.
Engineering Mechanics	*Engineering Mechanics*	M.S., PH.D.
English	*English*	M.A.
	Humanities	M.A., M.A.T., Ph.D.
Finance and Real Estate	*Business Administration*	M.B.A.
	Administration	PH.D.
Foreign Languages and Linguistics	*French, German, Spanish*	M.A.
	Linguistics	M.A.
	Humanities	M.A., M.A.T., Ph.D.
Geology	*Geology*	M.S.
History	*History*	M.A.
	Humanities	M.A., M.A.T., Ph.D.
	Archival Administration	CERTIFICATE OF ARCHIVAL ADMINISTRATION
Humanities	*Humanities*	M.A., M.A.T., PH.D.
Industrial Engineering	*Industrial Engineering*	M.S., M.ENGR., PH.D.
Interdisciplinary Studies	*Interdisciplinary Studies*	M.A., M.S.
Landscape Architecture	*Landscape Architecture*	M.L.A.
Management	*Business Administration*	M.B.A.
	Administration	PH.D.
Marketing	*Business Administration*	M.B.A.
	Administration	PH.D.
Materials Science	*Materials Science*	M.S., PH.D.
Mathematics	*Mathematics*	M.S.
	Mathematical Sciences	PH.D.
Mathematical Sciences	*Mathematics, Applied Mathematics*	PH.D.
Mechanical Engineering	*Mechanical Engineering*	M.S., M.ENGR., PH.D.
Nursing	*Nursing*	M.S.N.
Physics	*Physics*	M.S.
	Radiological Physics	M.S.
	Mathematical Sciences	PH.D.
Political Science	*Political Science*	M.A.
	Humanities	M.A., M.A.T., Ph.D.
Psychology	*General Experimental Psychology*	M.S., PH.D.
	Mathematical Sciences	PH.D.
Radiological Physics	*Radiological Physics*	M.S.
Social Work	*Social Work*	M.S.S.W.
	Administration	PH.D.
Sociology	*Sociology*	M.A.
	Humanities	M.A., M.A.T., Ph.D.
Systems Analysis	*Business Administration*	M.B.A.
	Administration	PH.D.
	Mathematical Sciences	PH.D.
Urban and Regional Affairs	*Urban Affairs*	M.A.
	City and Regional Planning	M.C.R.P.
	Administration	PH.D.

REQUIREMENTS FOR THE MASTER'S DEGREE

The following minimum requirements apply to all master's degrees including the MA, MS, MArch, MAT, MBA, MCRP, MCS, MEngr, MLA, MPA, MSN, and MSSW offered by The University of Texas at Arlington. Additional requirements may be imposed for specialized or professional degree programs, or by individual departments or interdepartmental or intercampus graduate studies committees. The additional requirements are given in the descriptions of the individual degree programs.

UNDERGRADUATE PREPARATION

The minimum undergraduate preparation acceptable for graduate concentration in most areas is 12 semester hours of advanced undergraduate work in that area; however, this requirement varies widely, and the individual department and program descriptions should be consulted for specific requirements. The appropriate Committee on Graduate Studies may administer an oral, written, or both oral and written examination to an applicant in order to assess his undergraduate preparation for graduate work in his chosen area. The committee may require the student to eliminate deficiencies in undergraduate preparation before he may be granted unconditional acceptance into the graduate program.

RESIDENCE

Master's degree candidates are expected to spend the equivalent of two semesters of full-time study in residence at The University of Texas at Arlington.

SUPERVISING COMMITTEES

The Dean of the Graduate School will assign each master's program student a supervising committee upon the recommendation of the Graduate Advisor and the appropriate Committee on Graduate Studies. The committee will consist of at least three members or associates of the Graduate Faculty and is responsible for the design of the student's program. The supervising committee conducts the final thesis examination for thesis degree plan candidates and determines the scope, content, and form of the final master's comprehensive examination for thesis substitute and non-thesis degree plan candidates.

DEGREE PLANS AND HOURS REQUIRED

Three degree plans (thesis, thesis substitute, and non-thesis) leading to the master's degree are available. All programs except Business Administration offer the thesis degree plan. In certain departments and programs a student may follow a thesis substitute or non-thesis degree plan upon the recommendation of the appropriate Committee on Graduate Studies and the approval of the Dean of the Graduate School. The plans available in each department or program are listed in the catalog section on departmental and program descriptions.

The *thesis degree plan* requires a minimum of 30 semester hours of which at least 24 hours must be in coursework and six hours in thesis courses. The thesis must be approved by the thesis advisor and by a supervising committee of three or more members appointed by the Dean; the thesis is subject to final approval by the Dean. A student receiving advice and assistance from a faculty member in the preparation of his thesis must register for the appropriate course even if the student is not present on the campus. Each semester after consulting with his Graduate Advisor, the student should register for the amount of thesis credit commensurate with the effort to be expended by the student and the thesis advisor in the preparation of the thesis. The degree candidate must defend the thesis in a final oral examination open to all members of the faculty.

The *thesis substitute degree plan* requires a minimum of 33 semester hours of which at least 27 hours must be in coursework and three hours in an appropriate project or research course. The thesis substitute may include (1) internship reports in programs in which the internship has been determined by the Dean to be an essential component or (2) reports prepared in certain graduate seminar, conference, or research courses. The internship substitute requires a minimum of six semester hours in the internship course.

DEGREE OFFERINGS/REQUIREMENTS

The *non-thesis degree plan* requires a minimum of 36 semester hours of coursework, of which at least 24 hours must be in the major area(s) of study.

The *thesis substitute* or *non-thesis degree plans* are available in all departments or programs with the exceptions of Geology, Economics, English, Sociology, and Radiological Physics.

APPROVAL OF PROGRAM OF WORK

A Tentative Program of Work listing all transfer courses, courses in progress, and courses required by the student's committee or department must be filed in the Graduate School during the student's first semester of full-time work on the master's program, but not later than the completion of the first 12 hours of graduate work. If the student desires to apply nine semester hours of transfer credit to his degree program, the Program of Work must be filed during the student's first semester whether or not he is engaged in full-time graduate work.

In all degree plans the entire degree program must be approved by the appropriate Committee on Graduate Studies and the Dean of the Graduate School.

CANDIDACY

A student will be admitted to candidacy for the master's degree only when the requirements listed previously have been met. The student must file a Final Program of Work and Application for Candidacy with the Dean of the Graduate School no later than the midsemester date of the semester in which he plans to receive his degree (see Graduate School calendar for date).

FINAL MASTER'S EXAMINATION

A final program examination is required for all master's degree candidates. For *thesis degree plan* candidates the examination will be an oral defense of the thesis. The examination will be conducted by all members of the student's supervising committee, but will be open to all members of the faculty. The thesis examining committee must have copies of the thesis at least two weeks prior to the thesis defense.

For *thesis substitute* or *non-thesis degree plan* candidates the final examination will be a comprehensive examination that is written, oral, or both written and oral. The scope, content, and form of the examination(s) shall be determined and administered by all members of the student's supervising committee. Students in the Master of Business Administration program fulfill the comprehensive examination requirement upon the successful completion of Business Administration 5333.

The student's Graduate Advisor must submit a request for the thesis defense or comprehensive examination to the Graduate School no later than two weeks before the proposed examination date. The request must indicate the time, place, and form (oral and/or written) of the examination and the signatures of the examining committee, confirming each member's intention to be present at the indicated time and place.

The Final Master's Examination Report must be filed in the Graduate School no later than three weeks before the date on which the candidate expects the degree to be conferred. Thesis degree plan candidates and thesis substitute plan candidates must deposit three unbound copies of the final approved thesis or internship report with the Graduate School on that date and pay the required thesis or report binding fee.

MASTER'S THESIS AND INTERNSHIP REPORT

The final copies of the master's thesis must be prepared according to the regulations described in the current edition of *An Illustrated Guide to the Preparation of Theses and Dissertations* available from the UTA Bookstore. When an internship report is submitted in lieu of a thesis, the report must conform in all aspects to the same format specifications as are required by the Graduate School for theses. A copy of the *Guide* has been deposited in the reference section of the Library. Thesis and internship report binding fees are listed in the Tuition and Fees Section of this catalog.

Each semester the Graduate School offers to all students enrolled in thesis or dissertation the opportunity to attend a seminar on thesis and dissertation preparation. The requirements described in the *Illustrated Guide to the Preparation of Theses and Dissertations* are explained and general Graduate School procedures of particular importance to degree candidates are outlined.

The Assistant Dean of the Graduate School examines each thesis and determines whether or not the thesis meets Graduate School requirements for format and mechanical presentation. In order to reduce the number of last minute inconveniences for the student, the student is required to submit the master copy of the final draft of the thesis before having additional required copies prepared. The master copy must be received no later than one week in advance of the final deadline to allow at least two days for Graduate School examination, time for the student to make necessary corrections, and time to have the final required copies made. After the Graduate School receives the master copy of the final draft the student will be given a written format evaluation 48 hours later (excluding weekends, holidays, and registration periods).

TIME LIMIT

Programs for the master's degree must be completed within six years (time in military service excluded) from initial registration in the Graduate School.

FOREIGN LANGUAGE REQUIREMENT

A reading knowledge of at least one foreign language (classical or modern) is required by some departments or programs for master's degree candidates. Specific language requirements, if any, are given in the individual departmental and program degree descriptions.

MASTER OF ARTS (MA)

The University of Texas at Arlington offers the MA degree in the following areas:

Criminal Justice
Economics
English
French
German
History
Humanities
Interdisciplinary Studies
Linguistics
Political Science
Sociology
Spanish
Urban Affairs

MASTER OF SCIENCE (MS)

The University of Texas at Arlington offers the MS degree in the following areas:

Accounting
Aerospace Engineering
Biology
Biomedical Engineering
Chemistry
Civil Engineering
Computer Science
Computer Science and Engineering
Electrical Engineering
Engineering Mechanics
Geology
Industrial Engineering
Interdisciplinary Studies
Materials Science
Mathematics
Mechanical Engineering
Physics
Psychology
Radiological Physics
Taxation

SPECIALIZED AND PROFESSIONAL MASTER'S DEGREES

The University of Texas at Arlington offers the following specialized and professional master's degrees:

Master of Architecture
Master of Arts in Teaching (see Humanities program)
Master of Business Administration
Master of City and Regional Planning
Master of Computer Science
Master of Engineering
Master of Landscape Architecture
Master of Professional Accounting
Master of Science in Nursing
Master of Science in Social Work

Requirements for each of these degrees, with the exception of the Master of Engineering described below, are listed under the appropriate department or program.

MASTER OF ENGINEERING DEGREE REQUIREMENTS

The Master of Engineering degree is offered by the Departments of Civil, Electrical, Industrial, and Mechanical Engineering. The degree is a 36 semester hour design-oriented program in which a maximum of six semester hours may be earned by an acceptable thesis, design project report, internship, or additional course work.

The required distribution of course work is as follows:

One-third of total credit hours—engineering design, analysis, synthesis courses.

One-third of total credit hours—combination of advanced mathematics, basic science, engineering science or design.

One-third of total credit hours—to complement the specified portions of the program and provide a meaningful total program in keeping with the educational objectives of the student and the College.

CERTIFICATES

The University of Texas at Arlington offers the following certificates through the Graduate School:

Archival Administration (History)

Internship in Clinical Engineering (Biomedical Engineering)

Residency in Clinical Engineering (Biomedical Engineering)

Requirements for each of these certificates are described under the department or program specified in parentheses after the certificate title.

JOINT DEGREE PROGRAMS

Students may pursue joint degree programs other than those specifically defined in the catalog with prior approval of the appropriate Committees on Graduate Studies and the Dean of the Graduate School. Students in joint degree programs must meet the admission requirements of each program concerned. Students wishing to pursue joint degree programs other than those specifically defined in the catalog should contact the Office of the Dean of the Graduate School for details.

REQUIREMENTS FOR THE DOCTOR OF PHILOSOPHY AND DOCTOR OF SCIENCE DEGREES

The Doctor of Philosophy (PhD) and Doctor of Science (D.Sc.) are the highest degrees offered by The University of Texas at Arlington. The degrees are awarded only for academic work of distinction through which the student demonstrates superior scholarship and a capacity for original work. The general requirements for the doctoral degree listed below set the minimum standards required by the Graduate School. The meeting of all of these requirements does not result automatically in the awarding of the doctoral degree. Most departments and programs have additional requirements and high level of scholarly achievement that must be met by successful doctoral candidates. In all doctoral programs the basic requirements are that a student (1) attain mastery of a field of knowledge as determined by the appropriate Committee on Graduate Studies and demonstrated in a general examination and (2) give evidence of a capacity to complete a significant program of original research by preparation of a dissertation.

RESIDENCE

Residence requirements vary widely among the doctoral programs. For specific requirements, consult the Degree Requirements section under the individual departments and programs offering the doctoral degree.

COURSES AND SEMESTER HOUR REQUIREMENTS

The doctoral degree cannot be earned solely on the basis of passing a certain group of courses and accumulating a specified number of hours; however, a department or program may require a core group of courses for all of its doctoral students. Coursework is generally concentrated in the student's major field, but some work is normally taken in one or more complementary minor fields. In interdepartmental programs the major work may be divided among two or more primary fields.

The Graduate School imposes no specific semester hour requirements for the doctoral degree except the residence requirements given in the individual degree program descriptions.

FOREIGN LANGUAGE REQUIREMENT

Prior to scheduling the doctoral comprehensive examination the Graduate School requires satisfactory evidence that the student has a reading knowledge of one foreign language applicable to the student's field of study or has attained proficiency in a research-tool area such as computer sciences or experimental statistics or other suitable foreign language substitute approved by the Dean of the Graduate School. Foreign language competency is specifically required for the PhD degree program in Humanities and the Doctor of Science degree program in Chemistry, but a substitute is permitted in the PhD program in Psychology. There is no foreign language requirement for the PhD in the various engineering fields but a research tool may be required as determined by the student's committee. There is no foreign language requirement for the PhD in Administration except when knowledge of a foreign language is appropriate for the dissertation research.

The foreign language requirement may be met by (1) successfully passing an examination prepared by an appointee of the Dean of the Graduate School, (2) making an acceptable score on the Educational Testing Service Graduate School Foreign Language Test, or (3) earning a grade of B or better in French, German, or Russian 4331 and 4332, or equivalent. The foreign language substitute requirement may be met by a method determined by the appropriate Committee on Graduate Studies and approved by the Dean of the Graduate School.

DIAGNOSTIC EVALUATION

During the student's first year of doctoral program work, the student must demonstrate that he has the potential to pursue and successfully complete a degree program. The method of assessing the student's potential will be determined by the appropriate Committee on Graduate Studies and may be in the form of a written or oral examination, personal interviews with faculty members, successful completion of certain courses in the first semester of his residence, or by any combination of these methods. The result of the diagnostic evaluation may be (1) approval to continue in the doctoral program, (2) approval to continue with specified remedial work, (3) failure but with permission for assessment through a second diagnostic evaluation after a specified period, or (4) failure and termination in the program.

The diagnostic evaluation report must be filed in the Graduate School by the student's Graduate Advisor during the student's first year of doctoral program work but no later than the completion of the first 18 semester hours of course work beyond appropriate master's level course work or the equivalent.

DOCTORAL COMMITTEES

After the student passes the diagnostic evaluation, the Dean of the Graduate School will assign the student an advisory committee upon the recommendation of the Graduate Advisor and appropriate Committee on Graduate Studies. The committee will consist of at least five members. Four of the members must be from the student's major area and at least one from each minor field. In interdisciplinary programs at least two members must represent each field concerned, but in no case is the committee to consist of fewer than five members; the PhD in Administration committee will include one or more representatives from each of the five academic areas included in the student's program. The committee is responsible for design and direction of the student's program. After the student has successfully completed the comprehensive examination (see next paragraph) the doctoral committee may be altered or expanded to accommodate the dissertation research needs of the student, but the committee must continue to include at least five members.

DEGREE OFFERINGS/REQUIREMENTS

COMPREHENSIVE EXAMINATION

A student is eligible to take the comprehensive examination after giving evidence to his doctoral committee of adequate academic achievement by having completed all or most of the coursework requirements and by having met the language or language substitute regulation if required in his degree program. The comprehensive examination usually marks the end of formal coursework and the beginning of a period of concentrated work on dissertation research and preparation. The student must be enrolled in the Graduate School in the semester in which he takes the comprehensive examination.

The comprehensive examination may be written or oral or both written and oral. Its scope, content, and form shall be determined by the student's advisory committee with the approval of the appropriate Committee on Graduate Studies. The student's Graduate Advisor must submit a Request for the Comprehensive Examination to the Graduate School no later than two weeks before the proposed examination date. The request must indicate the time, place, and form (oral and/or written) of the examination and include the signatures of the examining committee.

In some departments and programs the comprehensive examinations are given semi-annually, and in these areas students should consult the Graduate Advisor in that program for regulations and procedures governing the comprehensive examinations.

The comprehensive examination may result in (1) approval and recommendation to proceed to the next phase of the program, (2) approval to remain in the program but meet certain specified additional requirements, (3) failure but with permission to retake the examination after a certain period as specified by the examining committee, or (4) failure with recommendation not to continue in the program.

ADMISSION TO CANDIDACY

Upon passing the comprehensive examination the student becomes eligible for admission to candidacy. The Application for Candidacy must be filed in the Graduate School and approved by the Dean of the Graduate School at least one semester prior to awarding of the degree.

TIME LIMIT

All requirements for the doctoral degree must be completed within four years after passing the comprehensive examination.

DISSERTATION

The dissertation represents the culmination of the student's academic efforts and so is expected to demonstrate original and independent research activity and be a significant contribution to knowledge.

The final copies of the doctoral dissertation must be prepared according to the regulations described in the current edition of *An Illustrated Guide to the Preparation of Theses and Dissertations* available from the UTA Bookstore. A copy of the Guide has been deposited in the reference section of the Library. The catalog section on Tuition and Fees lists dissertation binding, microfilming, and copyrighting fees.

Each semester the Graduate School offers to all students enrolled in thesis or dissertation the opportunity to attend a seminar on thesis and dissertation preparation. The requirements described in the *Illustrated Guide to the Preparation of Theses and Dissertations* are explained and general Graduate School procedures of particular importance to degree candidates are outlined.

The Assistant Dean of the Graduate School examines each dissertation and determines whether or not the dissertation meets Graduate School requirements for format and mechanical presentation. In order to reduce the number of last minute inconveniences for the student, the student is required to submit the master copy of the final draft of the dissertation before having additional required copies prepared. The master copy must be received no later than one week in advance of the final deadline to allow at least two days for Graduate School examination, time for the student to make necessary corrections, and time to have the final required copies made. After the Graduate School receives the master copy of the final draft the student will be given a written format evaluation 48 hours later (excluding weekends, holidays, and registration periods).

DISSERTATION DEFENSE

An application for the dissertation defense must be filed in the Graduate School by the student no later than three weeks before the final date for submission of approved dissertations and dissertation defense reports. The dissertation examining committee must have copies of the dissertation at least two weeks prior to the dissertation defense.

The dissertation defense will be oral and open to all members (faculty, students, and invited guests) of the University community. The questioning of the candidate will be generally directed by the student's dissertation advisory committee, but any person attending the defense may participate in the examination.

Although the defense is concerned primarily with the dissertation research and content, the examining committee may explore the student's knowledge of areas interrelated with the core of the dissertation problem.

The dissertation defense report must be filed along with three unbound copies of the final approved dissertation in the Graduate School no later than three weeks before the date on which the degree is to be conferred. When the final copies are deposited with the Graduate School, the student must pay the required binding and dissertation microfilming fees listed in the catalog section on Tuition and Fees.

GENERAL GRADUATE SCHOOL REGULATIONS AND INFORMATION

STUDENT RESPONSIBILITY

Graduate students assume full responsibility for knowledge of all Graduate School and University rules, regulations, and deadlines published in the Graduate Catalog and of all departmental and program requirements concerning their degree programs.

ADMINISTRATION OF THE ADVANCED DEGREE PROGRAMS

COMMITTEES ON GRADUATE STUDIES

Each graduate program is governed by a Committee on Graduate Studies. The committee is composed of all the members of the graduate faculty in the program. Graduate faculty from allied fields may serve on the committee, when appropriate.

GRADUATE ADVISORS

Each graduate program has a Graduate Advisor. The Graduate Advisor represents the Dean of the Graduate School and the Committee on Graduate Studies in matters pertaining to advising graduate students about their academic areas. Specifically, the Graduate Advisor's functions include: registering graduate students and acting upon requests for drops, adds, section changes, and special examinations; keeping graduate student records; and advising graduate students about their degree plans and programs of work. The name, office location, and telephone number of each Graduate Advisor is listed at the beginning of each departmental or program description in this catalog.

REGISTRATION AND ORIENTATION FOR INTERNATIONAL STUDENTS

International graduate students are required to purchase The University of Texas at Arlington Student Health Insurance Plan or show proof of owning equal or better insurance coverage than that provided by the UTA plan. International students will be expected to show proof of the insurance coverage at the time of each registration or to purchase insurance coverage at that time.

All entering international graduate students are required to attend an orientation program at the beginning of their initial semester of attendance at The University of Texas at Arlington. Those who do not attend the International Student Orientation on the Monday before registration will not be allowed to register during the regular registration period and must attend a make-up orientation program before registering during late registration.

RESERVATION OF COURSES FOR GRADUATE CREDIT

Students previously dismissed from or denied admission to the Graduate School may not reserve courses for graduate credit.

An undergraduate at The University of Texas at Arlington needing no more than 12 hours in one semester (six semester hours in one summer session) to complete all of the requirements for a bachelor's degree may register for graduate courses for graduate credit under the following conditions:

1. All work for undergraduate credit must be completed during that semester or summer session.
2. Total registration for all work may not exceed 15 semester hours in a semester (or 12 semester hours in the summer sessions).
3. The student must submit to the Graduate Advisor a "Reservation of Courses for Graduate Credit by Undergraduate Students" (available in the Graduate School Office). The reservation must be approved by the Graduate Advisor and the Dean of the Graduate School, and the Registrar must certify that the reserved credit is not to apply to the student's undergraduate degree requirements.
4. Credit is officially accepted for application to a graduate program only upon achievement of unconditional admission to graduate school.

A student who is enrolled as an undergraduate but who does hold a bachelor's degree may also reserve graduate courses for graduate credit upon approval of the Graduate Advisor and the Dean of the Graduate School. Such a student may reserve graduate courses by completing and submitting to the Graduate Advisor a "Reservation of Graduate Courses by Student Holding an Undergraduate Degree" (available in the Dean's Office). Credit is officially accepted for application to a graduate program only upon achievement of unconditional admission to the graduate school.

In order for graduate courses to be reserved, completed reservation forms, with the approval of the Graduate Advisor, must be submitted to the Dean of the Graduate School by the Census Date of the semester or session in which the student registers for graduate courses to be reserved. A maximum of 12 hours of credit may be reserved and may be applied to a graduate degree only if approved as part of the degree program. Only grades of A and B may be so applied, although all grades in reserved courses will be considered in computing a student's grade-point average. The student should consult with the Graduate Advisor before registering for graduate courses he or she wishes to reserve for graduate credit.

COURSE GRADES

GRADES OF SCHOLARSHIP

Subject to the following conditions, graduate credit will be given for grades of A, B, or C (as well as P) for work done at The University of Texas at Arlington:

(1) The student must maintain a B average on all work in the major.

(2) The student must maintain a B average on all work in the minor or minors.

(3) The student must maintain a B average on all advanced work.

With the exception of research, thesis, and dissertation courses, only those courses so designated are offered on a pass-fail (P/F) basis. The grade P is not included but the F grade is included in calculation of grade-point average.

No student will be allowed to repeat a course in order to change a passing grade. A student may repeat a course only if that course is specifically designated in this catalog as one that can be repeated for credit. A student who fails to receive credit (grade of D or F) may repeat a course in order to obtain credit, in which case both grades will count on the student's average.

For work completed at other institutions, graduate credit may be granted only for grades of A or B. Courses taken on a pass/fail basis, or for which a grade lower than B was assigned, may not be considered for transfer to a graduate degree program at The University of Texas at Arlington. Courses with grades of A or B from other institutions may be submitted for approval as transfer work according to the procedure described in this Catalog under the section entitled "Transfer Credit." Grades received in transfer courses are not included in the calculation of the graduate grade point average.

"N" DESIGNATION (NO GRADE ASSIGNED)

The "N" designation on the grade report indicates "No valid grade assigned by instructor." A student who receives an "N" on a grade report should contact the instructor immediately.

INCOMPLETE GRADE

A graduate student who has been unable to complete all the class or laboratory assignments in a regular semester or summer session may, at the discretion of the instructor, receive an X

designating a temporary grade. The following deadlines for completing an incomplete grade (X) apply to all graduate students regardless of the level of the course in which the incomplete grade is received: an incomplete grade (X) must be removed no later than the official midsemester date of the following regular semester; an incomplete grade received in the Fall semester must be removed by the following Spring midsemester date; an incomplete grade received in the Spring semester or Summer sessions must be removed no later than the following Fall midsemester date. See the official Graduate School Calendar printed inside the front cover of this catalog for midsemester dates. An incomplete grade not removed by the specified deadline will be changed automatically to an F. All incomplete grades must be removed from the student's record before the degree will be awarded.

CREDIT FOR RESEARCH, INTERNSHIP, THESIS, OR DISSERTATION COURSES

All research, internship, dissertation, and thesis courses will be graded on a pass-fail basis. If a student undertakes a research, internship, thesis, or dissertation course and does not complete the course in the semester for which he is registered in the course, a grade designation of R (work in progress) will be given instead of an X. A student who receives a grade of R in a research, internship, thesis or dissertation course must re-register for the course and complete with a grade of P in order to obtain academic credit. See paragraph below on "R" Grade.

"R" GRADE

The grade of R (work in progress) is a permanent grade, but it is not included in any academic evaluation and does not carry any credit value. This grade may be issued to students only for research, internship, thesis, dissertation or other specifically designated courses. For these courses which carry R as the valid grade for incomplete progress (rather than the temporary grade of X), the student may receive a final grade only when completing the work within a semester in which the student is enrolled in the course. In order to receive academic credit in an R-graded course, a student must re-register for the course and successfully complete the course with a grade of P or a letter grade, whichever is the designated valid passing grade for the course.

GRIEVANCE RELATED TO GRADES

In attempting to resolve any student grievance regarding grades, it is the obligation of the student first to make a serious effort to resolve the matter with the individual with whom the grievance originated. Individual course instructors retain primary responsibility for assigning grades. The instructor's judgment is final unless compelling evidence shows discrimination, differential treatment, procedural irregularities, or conflict with University or Graduate School policies. If evidence warrants appeal, the normal academic channels are these: department chairman or program director, academic dean, Vice-President for Academic Affairs, President. However, before considering a grievance, the department chairman or program director may refer the issue to a departmental or school committee of faculty and students. If the committee cannot reach a solution acceptable to the parties involved, the matter will follow the remaining academic channels. (For grievances other than those related to grades, see instructions under "Grievances Other Than Grades.")

GRADE REQUIREMENTS

GOOD STANDING

A graduate student is considered to be in *good academic standing* and making satisfactory progress in a degree program if he (1) is absolving any admission conditions within the time required and (2) maintains a 3.0 grade-point average on all coursework undertaken while in Graduate School.

ACADEMIC PROBATION

If a graduate student fails to maintain an overall 3.0 grade-point average on his or her first six hours of graduate coursework taken as a graduate student, he or she must during the subsequent six semester hours of graduate coursework raise his or her grade-point average to a 3.0 on all graduate work taken as a graduate student. During the period following the first six hours of graduate coursework in which the student failed to meet the 3.0 grade-point average the student will be placed on *academic probation.* The student's record will be evaluated at the completion of each semester while on probation. Failure to meet the grade-point requirement at the completion of the first 12 hours of graduate coursework taken as a graduate student will result in automatic dismissal from the Graduate School. If a student's overall grade-point average falls below 3.0 at any time after the completion of the first 12 hours of graduate work, the student will be placed on *academic probation* and must achieve an overall 3.0 GPA at the end of the following semester. Failure to meet the 3.0 grade-point average at that point will result in automatic dismissal from the Graduate School. A student who has been dismissed from the Graduate School for failure to meet the 3.0 grade-point average requirement may be readmitted for further graduate study in the same or in a different program only if a petition (accompanied by a complete record of all college or university work previously taken) has been approved by the appropriate Committee on Graduate Studies and the Dean of the Graduate School.

GRADUATION

A student must have at least a 3.0 grade-point average on all coursework taken which is applicable to the degree program and on all coursework taken as a graduate student in order to receive a graduate degree from The University of Texas at Arlington.

COURSE AUDITING, CHANGES, AND LOAD

AUDITING

Any person who has credit in a particular course or who has a demonstrated need for the course content may be eligible for auditing that course if space is available. An auditor has the privilege of hearing and observing only; no University credit is granted for auditing. Audit applications may be secured from the Registrar's Office. A student may audit a graduate course only with the permission of the instructor and approval of the Registrar and Dean of the Graduate School. When the form has been completed and approved, the applicant, if currently enrolled, pays a fee of $5 per course; if not enrolled, the applicant pays $25 per course.

ADDING AND DROPPING COURSES

A graduate student who wishes to change a schedule by either dropping or adding a course must first consult with his Graduate Advisor. The following regulations pertain to adds and drops:

(1) A student may not add a course after the end of late registration.
(2) A graduate student dropping a course after the Census Date but on or before the midsemester date will receive a grade of W only if at the time of dropping the student is passing the course (has a grade of A, B, or C); otherwise an F will be received.
(3) A graduate student who desires to drop all courses for which he or she is enrolled is reminded that such action constitutes a withdrawal from the University. The graduate student should indicate the intention to withdraw and drop all courses by filing a properly executed resignation form in the Office of Student Administration.
(4) In most cases, a graduate student may not drop a course or withdraw from the University after midsemester. Under extreme circumstances, the Dean of the Graduate School may consider a petition to withdraw after midsemester, but in no case may a graduate student drop a course after midsemester and remain enrolled in any other courses.

WITHDRAWAL

A student who wishes to withdraw (resign) voluntarily from the University before the midsemester date must execute the proper resignation form in the Office of Student Administration. After

midsemester, a graduate student is not permitted to withdraw; however, in exceptional cases, a graduate student may submit to the Dean of the Graduate School a petition to withdraw after midsemester. If the petition is not approved, the student remains responsible for all coursework requirements. Therefore, a student should not discontinue class attendance or course assignments unless the student has been notified in writing that the Dean of the Graduate School has approved the petition to withdraw.

COURSE LOAD

The maximum course load for full-time graduate students is 15 semester hours in a semester or 12 hours in the summer sessions; registration in excess of this maximum will be approved by the Dean of the Graduate School only in exceptional circumstances. International students must be enrolled for a minimum of nine semester hours.

COURSE DESIGNATION SYSTEM

The course listing shown below will serve as an example for the following explanation of the course numbering system, credits, and theory and practice hours at The University of Texas at Arlington.

5342 PALEOBIOLOGY (2-3)

1. The four digit number (5342) is the departmental unique numerical designation for the specific course listed.
   a. The first digit (5) in the above example denotes the level of the course. Graduate courses are designated 5 or 6.
   b. The second digit (3) denotes the semester hour credit of the course.
   c. The third and fourth digits (4 and 2) are departmental designations and may or may not have sequential significance.
2. The first number in parentheses following the course title indicates the clock hours per week devoted to lecture and the second number indicates the clock hours per week devoted to laboratory, practice or field work for the fall or spring semester.

Each department or program has been assigned a unique two or four character prefix for use in course designations on registration documents, transcripts, and other University records. For example, the Paleobiology 5342 course described above is taught in the Department of Geology and appears on student records as GEOL 5342. The two or four character prefix is given in parentheses after the department or program name in the catalog section describing the academic departments and programs.

COURSE AND TRANSFER CREDIT

MAXIMUM UNDERGRADUATE CREDIT

No more than nine hours of advanced baccalaureate course work may be used for graduate degree credit. Such work may be applied to a graduate degree program only with the approval of the appropriate Committee on Graduate Studies and the Dean of the Graduate School.

APPLICABILITY OF COURSES TO MORE THAN ONE DEGREE

No course applied to any one degree, graduate or undergraduate, may be applied to any other degree, either directly or by substitution.

TRANSFER CREDIT

Transfer credit for no more than nine hours of equivalent coursework completed at other institutions of recognized standing may be accepted in a master's degree program, upon evaluation and approval by the appropriate Committee on Graduate Studies and the Dean of the Graduate School. Transfer credit can be accepted only for organized courses in which the student received a grade of B or higher; however, grades received in transfer courses are not included in the calculation of a student's graduate grade point average. Transfer work completed prior to a student's admission into a UTA graduate program will be reviewed and its applica-

bility to a graduate degree will be determined by the Committee on Graduate Studies and the Dean of the Graduate School at the time the student submits a program of work.

Transfer work taken after a student has been admitted into a graduate program at UTA must be approved in advance by the appropriate Committee on Graduate Studies and the Dean of the Graduate School. Prior to enrolling in transfer courses, the graduate student must file an approved Program of Work listing the proposed transfer work, or a Request to Change Program of Work if the transfer work represents an amendment to the approved Program of Work on file with the Dean of the Graduate School.

All work submitted for transfer credit must have been completed no more than five years before enrollment in a graduate program at The University of Texas at Arlington.

EXTENSION WORK AND CORRESPONDENCE COURSES

Extension—Work done in extension classes may be applied toward an advanced degree under the same conditions as apply to transfer work, except that credit for extension work is limited to six credit hours.

Correspondence courses—Courses done by correspondence are not accepted for graduate credit.

REGISTRATION REQUIREMENTS AND CREDIT FOR THESIS AND DISSERTATION

A student may not register for dissertation or thesis unless he or she is in good standing academically. After initial enrollment in the thesis or dissertation course, a student must maintain continuous enrollment in thesis or dissertation (summers excluded) until the thesis or dissertation has been accepted by the Dean of the Graduate School. Failure to maintain continuous enrollment may invalidate any previous thesis or dissertation work.

Thesis and dissertation courses will be graded on a Pass/Fail basis. A grade designation of "R" (Research in Progress) will be given for thesis or dissertation courses prior to the semester in which the thesis or dissertation is accepted by the Dean of the Graduate School. The grade of "R" does not carry any credit value; therefore, the student must register for a six-semester hour course in thesis or a nine-semester hour course in dissertation for the semester in which the student expects to submit the final thesis or dissertation.

GRADUATION PROCEDURES

GRADUATION

Each graduate student must complete degree requirements in accordance with the catalog in force at the time the student entered the graduate program in which the degree will be awarded or, at the student's option, the catalog of any subsequent year in which the student was a resident graduate student. If a student chooses to complete degree requirements in accordance with the catalog of a year subsequent to that in which he entered the graduate program, he must indicate that intention by filing a petition with the Dean of the Graduate School before the beginning of registration for the semester in which he expects to receive the degree. A special petition form is available in the Office of the Dean of the Graduate School and should be used for this purpose.

Changes in graduate school regulations and policies become effective for all enrolled students in the year for which the catalog is in force, regardless of the year of initial enrollment. Therefore, each candidate for graduation must observe graduate school regulations and follow graduation procedures prescribed in the graduate catalog in force in the intended semester of graduation.

Degrees are awarded at the end of the Fall semester and the Spring semester. Formal commencement cermonies are held within the college, school, or institute in which the degree is earned. Candidates should contact the office of the dean of their appropriate unit for instructions concerning participation in the commencement ceremonies.

No honorary degree will be conferred by The University of Texas at Arlington.

FINAL SEMESTER REQUIREMENTS

The student must be enrolled in the Graduate School for the semester in which he expects to graduate. In addition, the following items must be filed in the Graduate School and the required fees paid by the **deadlines given in the Graduate School calendar** published inside the front cover of this catalog:

1. **All** graduating students must file an Application for Graduation and pay the Diploma Fee in the Office of the Dean of the Graduate School. The application is not transferable to a subsequent semester; therefore, if a student does not graduate at the time indicated in the initial application, that application will be cancelled and a new one must be filed for the semester of graduation. The Diploma Fee also is non-transferable and non-refundable.
2. **Master's program students** must:

   file

   a. the Application for Candidacy;
   b. three unbound copies of the final approved thesis or internship program and a completed Thesis and Dissertation Data Sheet (not applicable for non-thesis degree plan);
   c. a request for the final master's examination;
   d. the Final Master's Examination Report; and

   pay

   e. the thesis binding fee.

3. **Doctoral degree candidates** must:

   file

   a. the Application for Candidacy;
   b. three unbound copies of the final approved dissertation and a completed Thesis and Dissertation Data Sheet;
   c. a request for the dissertation defense;
   d. the Dissertation Defense Report;
   e. the University Microfilm agreement;
   f. the Copyright authorization (optional); and
   g. the National Research Council Survey of Earned Doctorates form; and

   pay

   h. the dissertation binding, microfilming, and (optional) copyright fees.

For more information about the submission of acceptable theses, internship reports, and dissertations, consult *An Illustrated Guide to the Preparation of Theses and Dissertations* available from the UTA Bookstore.

GRADUATE SCHOOL DEADLINES

All Graduate School deadlines, as indicated on the calendar or in explanation of policies and procedures, unless otherwise stated, are final at 5:00 p.m. of the date specified, by which time all transactions must be completed and documents received in the Office of the Dean of the Graduate School. Transactions and documents requiring the action or approval of graduate advisors, committees, instructors, department chairmen, academic deans, or others prior to receipt by the Graduate School should be initiated by the appropriate person (student, instructor, graduate advisor, or other) sufficiently in advance of the Graduate School deadline for the required actions to be taken and approvals made before the deadline.

IN ABSENTIA REGISTRATION

A candidate for a degree who has completed *all* requirements for graduation by the last date to qualify for *in absentia* registration (see Graduate School calendar inside front cover) and who needs to register in the University for the sole purpose of having a degree conferred must register *in absentia* in the semester or summer session consecutive to his last enrollment in coursework and/or thesis/dissertation. A student registered *in absentia* may not enroll for courses. No refund is made for the cancellation of an *in absentia* registration. In addition to paying the

cost of *in absentia* registration, the candidate must file an application for graduation and pay the diploma fee for the semester of graduation.

CHANGE OF GRADUATE MAJOR OR PROGRAM

A student wishing to change his graduate major or program to one other than that in which he is enrolled currently or in which he was enrolled during his most recent semester at UTA must initiate the change by completing the appropriate form available in the Office of the Dean of the Graduate School. Students are encouraged to consult the Graduate Advisor of the new program regarding program admission and degree requirements before requesting a program change.

PETITIONS

Students may request exceptions to published rules by filing a proper petition to the Dean of the Graduate School explaining the basis for the request. Limited exceptions to some rules may be approved if the facts presented by the petitioner fully justify that exception, as regarded by the appropriate Committee on Graduate Studies and the Dean of the Graduate School. All petitions must be submitted on the Petition Form available in the Graduate School Office.

GRIEVANCES OTHER THAN GRADES

In attempting to resolve any student grievance, it is the obligation of the student first to make a serious effort to resolve the matter with the individual with whom the grievance originated. Grievances involving matters other than grades are appealed to the department chairman or office director, the Dean of the Graduate School (except in personnel matters unless questions regarding a Graduate Assistant or Graduate Associate are involved), then to the Vice-President for Business Affairs, Vice-President for Academic Affairs, Vice-President for Student Affairs, or the Dean of Student Administrative Services. If the matter remains unresolved at this level, the student may appeal to the President. (For grievances involving grades, see instructions under "Grievance Related to Grades.")

ACADEMIC DISHONESTY

All students are expected to pursue their academic careers with honesty and integrity. Academic dishonesty includes, but is not limited to, cheating on a test or other course work, plagiarism (offering the work of another as one's own) and unauthorized collaboration with another person. Students found guilty of dishonesty in their academic pursuits are subject to penalties which may include suspension from the University.

Institutional procedures regarding charges of academic dishonesty are outlined in Part II, Chapter 2, of the *Handbook of Operating Procedures* of The University of Texas at Arlington. Copies of the *Handbook* are available at over 75 locations on campus including the Student Congress office, the Library, and departmental offices.

GRADUATE ASSISTANTSHIP/ASSOCIATESHIP POLICY

Graduate Teaching and Research Assistantships and Associateships are funded through state appropriations and federal, state, local, and private grants for at least three principal reasons. First, the employment of graduate students in teaching and in research positions during their graduate education encourages and supports their participation in these two major functions of a University and thereby strengthens the quality of the students' educational experience. Second, assistantships and associateships provide direct financial support to those outstanding students who are essential to the development of quality graduate programs. Third, graduate students provide valuable and necessary services to the University in their roles as teaching and research assistants and associates.

REGULATIONS/INFORMATION

In order to assure the appointment of the most highly qualified students available to the positions of Graduate Research Assistant and Graduate Teaching Assistant and in order to realize best the principal objectives for which Graduate Assistants are employed, The University of Texas at Arlington has adopted the following policies and regulations, all provisions of which apply to both Graduate Assistantships and Graduate Associateships.

The University of Texas at Arlington supports the "Resolution Regarding Graduate Scholars, Fellows, Trainees, and Assistants" of The Council of Graduate Schools in the United States. A copy of the resolution and list of signatory institutions is available in the Office of the Dean of the Graduate School.

ADMISSION STATUS

A student must have an unconditional admission status in order to be eligible to hold a Graduate Assistantship.

CONTINUATION OR RENEWAL OF APPOINTMENT

Although a student may be appointed to a Graduate Assistantship for a full academic year initially, continuation of the appointment beyond the first semester is subject to the following conditions:

1. The student must be in good standing in the University. A student on academic probation is not in good standing and, therefore, is not eligible to hold an assistantship.
2. The student must be progressing toward an advanced degree in a satisfactory manner.
3. The student must have performed assigned assistantship duties satisfactorily in the preceding semester(s) as determined by the department in which the assistantship is held.

Reappointments and renewal of assistantships are also subject to the above conditions.

A department may limit the number of semesters during which a graduate student may hold an assistantship.

TUITION RATES

Graduate Teaching and Research Assistants employed at least 20 hours per week in positions related to their degree programs are entitled to Texas resident tuition rates. Eligibility for the resident rate must be certified by the Dean of the College in which the assistantship is held prior to registration; otherwise, full tuition will be assessed.

Non-resident or international students holding less than full assistantships (full = 20 hours employment per week), i.e., one-half assistantship (10 hours employment per week) or one-quarter assistantship (5 hours employment per week), are not eligible for Texas resident rates.

COURSE LOAD

Graduate Assistants may register for and must complete no more than 12 semester hours and no less than nine semester hours per semester. They may register for and must complete no more than 12 semester hours and no less than six semester hours for the three summer sessions. Upon written recommendation of the department and approval of the Dean of the Graduate School the minimum registration limit may be reduced to six semester hours for students who have completed all course work, are registered for thesis or dissertation only, and have filed an approved program of work. A load greater than 12 semester hours must be approved in advance by the Dean of the Graduate School.

ADDITIONAL EMPLOYMENT

In accepting a Graduate Assistantship, a student agrees to devote his effort to his graduate studies and assistantship responsibilities and therefore agrees to hold no employment other than the assistantship.

In very rare circumstances additional employment may be justified. Any Graduate Assistant wishing to hold employment in an off-campus job or in any University position outside the assistantship appointment is required to file a Request for Approval of Outside Employment, available in the office of the Dean of the Graduate School.

A graduate student cannot hold an assistantship or a combination of assistantships or other University positions in excess of one-half time employment (20 hours per week) without permis-

sion of the department or program in which the student is enrolled and written approval of the Dean of the Graduate School.

ASSIGNMENT OF DUTIES

Graduate Assistants are under the direction of the department chairman with regard to assistantship responsibilities and assignments.

STUDENT EDUCATIONAL RECORDS POLICY

Students may have access to their own educational records during regular office hours by contacting the person or the office that maintains these records. A student must appear in person or mail directly to the Dean through the U.S. mail a written request for a copy of the record. Another person may not see a student's educational records unless written permission has been given by that student. One exception to that rule allows a parent or guardian who is providing one-half or more of the student's financial support to obtain the educational record. Faculty and staff members of the University have access to student educational records in the performance of their regular duties. If an educational record contains information on more than one student, then a student desiring access may review only such parts relating to that student.

Students may have official copies of their UTA transcripts mailed to other institutions or they may obtain copies for their own use. A student must sign a request form in the Registrar's Office or mail a signed, written request to release the transcript. Requests will not be accepted by telephone or from persons other than the student without that student's written permission by mail.

The "Family Rights and Privacy Act of 1974" provides that a university may release directory-type information about students. The information released may include the following items: the student's name, address, telephone number, date and place of birth, major field of study, participation in officially recognized activities and sports, weight and height if a member of an athletic team, dates of attendance, degrees and awards received, and the last educational institution attended. Each semester UTA publishes a Student Directory that is available to students and the public. It contains the following information: the student's name, classification, major field of study, address and telephone number. The Act states that a student has the right to withhold this information from the public and other students. A form to withhold this information is available in the Registrar's Office; unless this form is completed before the Census Date of the semester, the data about a student will be released as public information.

Students have the right to challenge the content of their educational records to insure that the records are not inaccurate, misleading, or in violation of other rights of the students. This allows students an opportunity for the correction of inaccurate or misleading information, or permits written explanation from students concerning the content of the records. Any evidence regarding an inaccurate or misleading record should be presented to the individual in charge of the office where the record is maintained.

For admission, an applicant must submit his Social Security number which serves as the basis for identification of various University records. The usage will vary according to the requirements of the office in which the record is located.

ADMISSION REQUIREMENTS AND PROCEDURES

The requirements set forth in the following pages are minimal for admission to the Graduate School. Meeting them does not necessarily insure acceptance into a departmental degree program because most departments have established admission standards more stringent than the minimum. Applications for admission must be made on the official forms available upon request from the Office of the Registrar and Director of Admissions and from the Office of the Dean of the Graduate School. In addition to the following requirements, most departments recommend that potential applicants arrange a personal interview with the appropriate Graduate Advisor before applying to the Graduate School.

The University reserves the right to withdraw courses at any time, change fees, rules, calendar, curriculum, degree programs, degree requirements, graduation procedures, and any other requirements affecting students. Changes will become effective whenever the proper authorities so determine and will apply to both prospective students and those already enrolled. The provisions of this catalog do not constitute a contract, express or implied, between any applicant, student, or faculty member and The University of Texas at Arlington Graduate School or The University of Texas System.

ADMISSION OF UNITED STATES STUDENTS

Admission into the Graduate School requires: (1) a bachelor's degree from an accredited college or university with a satisfactory grade-point average; (2) satisfactory academic standing at the last institution attended; (3) an acceptable score on the aptitude tests of the Graduate Record Examination or the Graduate Management Admission Test, as specified by the department or program to which application is being made; (4) demonstration through previous academic performance of the potential for graduate work in the chosen field; (5) acceptance into a departmental program. Some departments have additional requirements such as a score on the advanced portion of the Graduate Record Examination or an additional test such as the Miller Analogies Test; see the departmental requirements for this information.

An applicant holding a degree or degrees from a United States university should file an application form (available from the Dean of the Graduate School) and the following credentials at least 60 days prior to the beginning of the semester or summer session in which he plans to register: (1) *official transcripts* (as defined in the paragraph below) of all undergraduate and graduate college work previously taken [an applicant who has attended UTA previously as an undergraduate or special student must submit in person or by mail a request to the UTA Registrar to forward to the Graduate School an official UTA transcript and copies of all previous college transcripts which are on file in the Registrar's Office]; (2) scores on the aptitude tests of the Graduate Record Examination, or Graduate Management Admission Test if required in place of the GRE; and (3) three letters of recommendation completed according to the instructions accompanying the official application form.

ADMISSION OF INTERNATIONAL STUDENTS

An applicant who does not hold a bachelor's degree from an accredited U.S. college or university must provide the following at least 90 days prior to the beginning of the semester or summer session in which he plans to register: (1) a complete and accurate chronological outline of all previous college-level work; (2) authorized school or university records including transcripts, rating sheets, and certificates of degrees or diplomas showing all courses taken and all grades received; (3) a bachelor's degree or its equivalent from an accredited college or university, with a satisfactory grade-point average; (4) an acceptable score on the aptitude tests of the Graduate Record Examination or Graduate Management Admission Test, as specified by the department or program to which application is being made; (5) if his native lan-

guage is *not* English and he does *not* hold a bachelor's or master's degree from an accredited U.S. institution, an acceptable score (normally, at least 550) on the Test of English as a Foreign Language (TOEFL); (The University of Texas at Arlington subscribes to the TOEFL Examinee Identification Service;) (6) acceptance into a departmental program; (7) certification on an official Graduate School Financial Statement form (available from the Dean of the Graduate School) that the student has adequate funds to finance his graduate studies; (8) an affidavit supporting the Financial Statement completed by parents, guardian, financial sponsor or bank and submitted with the Financial Statement; and (9) an application evaluation charge of $50.00 (U.S.) submitted with the original application. The application evaluation charge must be in the form of an International Money Order made payable in U.S. dollars to The University of Texas at Arlington. This evaluation charge is required and is not refundable.

International applicants should consult the section on Registration and Orientation for International Students in this catalog and the International Student Advisor in the UTA International Office for registration regulations applicable to international students.

READMISSION

A student previously enrolled in The University of Texas at Arlington Graduate School and wishing to resume graduate work after an absence of one semester or longer should file through the Graduate Advisor in his program an application for readmission at least 20 days before the beginning of registration for the semester in which he wishes to resume graduate work. If the student has taken any course work at another institution during concurrent enrollment at The University of Texas at Arlington or during the time he was not enrolled in the Graduate School, official transcripts of all such courses must be submitted. Former students wishing to change graduate major or program upon readmission should consult the section entitled "Change of Graduate Major or Program" in this catalog.

DOCUMENTATION REQUIRED

GRADUATE RECORD EXAMINATION (GRE)

A student applying for admission to The University of Texas at Arlington Graduate School is required to submit scores on the aptitude tests of the Graduate Record Examination unless the Graduate Management Admission Test is required in place of or as a substitution for the GRE (see below). Some departments also require a score on the GRE advanced test in the major field; this requirement, if applicable, is stated under the individual departmental or program requirements included in this catalog.

Information bulletins and test application blanks can be obtained from Educational Testing Service, Box 955, Princeton, New Jersey 08541 U.S.A. or from the Office of Counseling, Testing, and Career Placement of The University of Texas at Arlington. The GRE is administered several times each year (usually in January, February, April, June, October, and December) at testing centers in the United States and abroad. The University of Texas at Arlington is an approved testing center. Applications must be received by Educational Testing Service approximately one month in advance of each test; therefore an applicant should secure the information bulletin and application blank at least six weeks in advance. A minimum of six weeks should be allowed for the examination results to reach the University.

GRADUATE MANAGEMENT ADMISSION TEST (GMAT)

The Graduate Management Admission Test score is required for admission to graduate work in Business Administration and to the Master of Professional Accounting program. Information bulletins and test application forms can be obtained from Educational Testing Service, Box 966, Princeton, New Jersey 08541 U.S.A. or from the Office of Counseling, Testing, and Career Placement of The University of Texas at Arlington. The GMAT is administered four times a year (usually in November, January, March, and July). The University of Texas at Arlington is an approved testing center for the GMAT. The GMAT application procedures are the same as those described above for the GRE.

TEST OF ENGLISH AS A FOREIGN LANGUAGE (TOEFL)

An applicant whose native language is not English must submit a score of at least 550 on the Test of English as a Foreign Language (TOEFL). The graduate program in biology requires a minimum score of 575 on the TOEFL. Official TOEFL scores more than two years old are not released by the Educational Testing Service; therefore, an applicant who has taken the TOEFL more than two years before the semester for which he is applying must retake the TOEFL in order to provide a valid current score. TOEFL score reports bearing the designation "Applicant's Copy" are not considered official scores for admission purposes. In some departments an applicant holding a bachelor's or a master's degree from an accredited college or university may not be required to submit a TOEFL score. The waiver of the TOEFL score requirement must be recommended by the applicant's Graduate Advisor and approved by the Dean of the Graduate School. The TOEFL is administered at various centers in the United States and abroad at least four times each year. Application forms and information bulletins may be obtained from the Educational Testing Service, Box 899, Princeton, New Jersey 08541 U.S.A., from American embassies and consulates and offices of the United States Information Service, or from the Office of Counseling, Testing, and Career Placement at The University of Texas at Arlington. The application procedure is the same as that described above for the GRE. The University of Texas at Arlington is an approved testing center for the TOEFL.

The University of Texas at Arlington subscribes to the TOEFL Examinee Identification Service.

OTHER ADMISSION TESTS

Other tests such as the Miller Analogies Test (MAT) and the Test of Spoken English (TSE) are required in addition to the GRE, GMAT, or TOEFL for admission to certain graduate programs. Individual departmental and program descriptions should be consulted for this information.

OFFICIAL TRANSCRIPTS, RECORDS, AND TEST SCORES

An applicant must report any and all studies attempted at another college, university, or professional school prior to actual enrollment at The University of Texas at Arlington. This information must be submitted whether or not credit was earned, and no portion of an applicant's previous academic record can be disregarded.

Official transcripts of the applicant's academic record must be received by the Graduate School before the application can be reviewed. Official transcripts are those issued by the Registrar or responsible head of the institution at which the work was attempted or completed and forwarded directly to the Graduate School by that official. In those rare instances in which international applicants are unable to provide official transcripts, documents certified as true copies are acceptable.

Official test score reports for the Graduate Record Examination, Graduate Management Admission Test, and Test of English as a Foreign Language are those issued by Educational Testing Service (ETS) and sent by ETS directly to the Graduate School.

Uncertified or notarized copies of transcripts or other academic records or of test score reports and copies of records or test score reports bearing the designation "student copy", "issued to student", "applicant's copy", "unofficial copy", or other similar designations are not acceptable. Hand-delivered transcripts, records, and score reports or copies received from a third party regardless of the origin are not acceptable.

RETENTION OF APPLICATION RECORDS

All application materials upon submission become the property of The University of Texas at Arlington and cannot be returned to the applicant. Completed applications, transcripts, test scores, and all application records for applicants who do not register in the semester for which they are accepted are retained by the Graduate School for one year only. An applicant failing to enroll in the semester for which he was accepted may request a form from the Graduate School entitled "Request to Change Admission Date" for use at any time within one calendar year from the registration date for which the applicant was initially accepted.

TYPES OF ADMISSION

After evaluation of an applicant's credentials by the Graduate Advisor in the applicant's major area and by the Dean of the Graduate School, the applicant will be notified by letter from the Dean of the Graduate School that (1) he has been accepted under one of the categories of admission listed below, or (2) his application has been denied, or (3) a decision has been deferred for reasons listed in the notice. A registration permit will be issued by the Dean of the Graduate School stating the conditions of admission and period of validity for the permit. Admission letters and registration permits are not mailed to U.S. addresses during the last week prior to the registration period. Therefore, an applicant who has not received an admission, denial, or deferral notice 48 hours prior to the beginning of registration should contact in person the Graduate School for information concerning the review and status of his or her application.

UNCONDITIONAL ADMISSION

An applicant who meets all the requirements stated above is normally granted unconditional admission.

PROBATIONARY ADMISSION

An applicant who does not meet all of the admission requirements listed above nevertheless may show promise for successful graduate study and upon the recommendation of the appropriate Committee on Graduate Studies and approval of the Dean of the Graduate School may be granted probationary admission. Special course requirements or other conditions may be imposed by the Committee on Graduate Studies in the student's major area and/or the Dean of the Graduate School. A student in probationary status may not hold an assistantship or be admitted to candidacy for any graduate degree without first achieving unconditional admission status.

PROVISIONAL ADMISSION

An applicant unable to supply all of the required documentation prior to the admission deadline but who otherwise appears to meet the admission requirements may upon the recommendation of the appropriate Committee on Graduate Studies and approval of the Dean of the Graduate School be granted provisional admission. Complete and satisfactory credentials must be received by the Graduate School before the end of the semester in which the student has registered in a provisional status. *A student will not be permitted to enroll in the Graduate School with a provisional status for more than one semester.* Provisional admission does not guarantee in any way subsequent admission on an unconditional basis. A student admitted on a provisional basis may not hold an assistantship until unconditional admission status has been achieved. International students not residing in the United States at the time of application may not be admitted on a provisional basis.

SPECIAL STUDENTS

A person who wishes to take graduate courses at The University of Texas at Arlington but who does not plan to pursue a graduate degree program may be admitted as a *special student* with the approval of the Dean of the Graduate School and the concurrence of the Committee on Graduate Studies in the area in which the applicant wishes to study. In most cases, admission as a special student will be granted only for the purpose of participating in special graduate course offerings, or for taking courses to transfer to another institution. Under normal circumstances, a student who has been denied admission to or dismissed from the Graduate School will not be permitted to enroll as a special student.

An applicant for special student admission must submit a completed "Special Student Application" form available from the Graduate School, and official transcripts of previous college work showing evidence of an undergraduate degree and graduate degree if applicable. Special student admission status is granted for the semester for which the application is submitted. Any further enrollment as a special student must be approved on a semester-by-semester basis. Special students may not hold graduate assistantships or enroll in research, thesis, internship, or dissertation courses.

ADMISSION

A former or currently enrolled special student who wants to apply for admission to a graduate degree program must submit a regular Graduate School Application for Admission and all supporting documents as listed in this catalog under the section "Admission Procedures, New Students." Admission as a special student in no way guarantees subsequent unconditional admission into a graduate program or into the Graduate School. Credit earned as a special student may be applied to a degree program only with the approval of the appropriate Committee on Graduate Studies and the Dean; however, no more than nine semester hours of work earned as a special student may be applied to a graduate degree at The University of Texas at Arlington and only grades of A and B may be so applied, although a grade in any course taken as a special student will be considered in computing a student's grade-point average.

DEFERRED ADMISSION

If an applicant does not present adequate evidence of meeting the admission requirements, the admission decision may be deferred until the records are complete. The applicant will be sent an Admission Deferral Notice specifying the data that must be provided or the work that must be completed before the application will be reconsidered. The application may be reactivated within one calendar year from the date for which the original application was submitted by returning the Request to Reactivate Application sent to the applicant with the Admission Deferral Notice.

GRADUATE STUDENT ADVISEMENT

After being admitted, the student should confer (preferably in person) with the Graduate Advisor of the proposed major area in order to become acquainted with specific departmental regulations, particularly in areas that require additional examinations upon entrance. After receiving registration materials, the student should consult with the Graduate Advisor in the proposed major area at the time and place indicated in the registration instructions concerning the details of registration, course program, and other procedures. It is important that a student wishing to take courses for graduate credit consult with the appropriate Graduate Advisor before registering, as each student's program of work for an advanced degree must be approved eventually by the Graduate Advisor, the student's supervising committee, and the Dean of the Graduate School. Failure to consult with the Graduate Advisor could result in the student's enrolling for courses which are not applicable toward the degree.

REGISTRATION SCHEDULE

Students should be familiar with all dates on the Graduate School calendar printed inside the front cover of this catalog. Specific registration instructions are published by the Registrar each semester and summer session.

ADVANCE REGISTRATION

Graduate students who have an unconditional admission status and who are not on academic probation are eligible to advance register for the Fall and Spring semesters on the dates listed in the Graduate School Calendar. Applicants who have received unconditional admission permits prior to the start of Advance Registration may also participate in advance registration. Applicants who are admitted after the start of advance registration and students on conditional admission status or academic probation may not enroll until the regular registration period.

RESTRICTIONS ON ADMISSION

GENERAL RESTRICTION

In certain areas the University may need to limit the number of students accepted for graduate work if the number of applicants exceeds the capacity of available facilities.

FACULTY MEMBERS

Members of The University of Texas at Arlington faculty holding an appointment at the rank of instructor or above may not pursue a graduate degree at The University of Texas at Arlington.

TUITION AND FEES

The tuition rates and fees listed in this section are in effect at the time of compilation; however, due to conditions which may arise beyond the control of The University of Texas at Arlington, tuition rates and fees may be changed at any time without advance notice. The University reserves the right to modify any fee in accordance with unforeseen conditions.

TUITION AND MANDATORY FEES

REGULAR SESSIONS AND 11-WEEK SUMMER SESSION

The tuition and mandatory fees given below include $8 per capita Building Use Fee, plus a $6 per semester hour General Fee, a $5 per semester hour Student Services Fee (up to a $60 maximum), and a $3.25 per semester hour Student Union Fee (up to a $39 maximum).

Semester Hours	Texas Residents	Non-Texas Residents
1	$ 72.25	$ 62.25
2	86.50	116.50
3	100.75	170.75
4	115.00	225.00
5	129.25	279.25
6	143.50	333.50
7	157.75	387.75
8	172.00	442.00
9	186.25	496.25
10	200.50	550.50
11	214.75	604.75
12	229.00	659.00
13	237.00	705.00
14	247.00	751.00
15	257.00	797.00
16	267.00	843.00
17	277.00	889.00
18	287.00	935.00
19	297.00	981.00
20	307.00	1027.00
Each Additional Hour	10.00	46.00

5-WEEK SUMMER SESSIONS

The tuition and mandatory fees given below include $4 per capita Building Use Fee, plus a $6 per semester hour General Fee, a $5 per semester hour Student Services Fee (up to a $30 maximum), and a $3.25 per semester hour Student Union Fee (up to a $19.50 maximum).

Semester Hours	Texas Residents	Non-Texas Residents
1	$ 43.25	$ 58.25
2	57.50	112.50
3	71.75	166.75
4	86.00	221.00
5	100.25	275.25
6	114.50	329.50
7	123.50	375.50
8	133.50	421.50
Each Additional Hour	10.00	46.00

TUITION EXCEPTIONS

State law provides for several exceptions to the tuition rates. Students qualified for a reduced rate in any of the following categories *must have that eligibility certified prior to registration.*

1. Teaching assistants and associates, research assistants and associates, and certain other employee categories employed at least half-time in positions which relate to their degree programs will be charged the same rate as a Texas resident.
2. Holders of certain competitive scholarships in the amount of $200 per year or more awarded through The University of Texas at Arlington scholarship committee will be charged the same rate as a Texas resident.
3. Certain non-resident students age 18 or under who have been classified as Texas residents at previous registrations will be charged the same rate as a Texas resident.
4. Nursing students will be charged $4 per semester hour with a $20 minimum and $50 maximum.
5. Students registered for thesis or dissertation credit only, in those instances where such credit is the final credit hour requirement for the degree in progress, will be entitled to a tuition rate not to exceed $12 for resident students or $50 for non-resident and international students. This maximum rate applies to tuition only. Thesis and dissertation students are still subject to all hourly fees. To qualify for the thesis-only or dissertation-only tuition reduction the student is required to:
   a. have an approved Application for Candidacy and Program of Work (degree plan) on file in the Graduate School at least ten working days prior to registration for the semester in which he is applying for the reduction;
   b. have passed the comprehensive examination, if a doctoral student;
   c. be maintaining a 3.0 GPA, and have no incomplete grades on his record whether or not the courses apply to the degree plan;
   d. have completed all coursework on the degree plan; and
   e. notify the Graduate School of intention to request tuition reduction at least ten working days prior to the first day of registration.
6. Non-Texas residents may be eligible for tuition exception as described under the Academic Common Market entry in this Tuition and Fees section.
7. Texas Veterans Exemption (Hazelwood Act):
   Article 2654b-1, Vernon's Texas Civil Statutes, provides an exemption from tuition and some fees. Texas veterans may qualify for this exemption provided they:
   a. Had Texas resident status at the time they entered the service and are currently on Texas resident status for tuition assessment;
   b. Had active military duty (for purposes other than training) for more than 180 days beginning after 1 February, 1955; or they served between 7 December, 1941 and 31 January, 1955;
   c. Are honorably discharged from active service; and,
   d. Have exhausted veterans' educational benefits under federal legislation.
   Some types of discharges are excluded from eligibility. Application forms and instructions are available at the undergraduate admission counter.

SCHEDULE CHANGES (ADDS)

A student must obtain the add form from the Department and present it along with the regular registration fee receipt to the Bursar's Office (Add Cashier) for payment on the same day.

IN ABSENTIA REGISTRATION FEE

A candidate for a degree who has completed *all* requirements for graduation by the last date to qualify for *in absentia* registration (see Graduate School calendar inside front cover) and who needs to register in the University for the sole purpose of having a degree conferred must register *in absentia.* A student registered *in absentia* may not enroll for courses. The *in absentia* registration fee is $15; no refund is made for the cancellation of an *in absentia* registration. In addition to paying the cost of *in absentia* registration, the candidate must file an application for graduation and pay the diploma fee for the semester of graduation.

CONCURRENT ENROLLMENT

UNIVERSITY OF TEXAS COMPONENTS

A student concurrently enrolling at two or more of the three University of Texas North Texas components (UTA, UT Dallas, and UT Health Science Center at Dallas) may register and pay tuition and fees for all courses through the student's home campus. Detailed procedures may be obtained from the Registrar of the student's home campus. The concurrent enrollment agreement and waiver of specified fees applies only to students following the concurrent enrollment procedures specified by the Registrar of the home campus.

The charges for the following will be assessed and collected at the home institution for the other institution:

1. Tuition at an appropriate rate;
2. Applicable laboratory fees; and
3. General fees at the rate of $6 per semester credit hour for courses taken at UTA.

Student services at the second institution will be made available to concurrently enrolled students paying the appropriate student services fees at the second institution.

The three institutions have a reciprocal agreement for honoring parking permits. Details may be obtained from the police office of the home campus.

Concurrently enrolled students should report any problems concerning registration, payment of fees, or other matters related to concurrent enrollment procedures to the Registrar of the home institution.

OTHER PUBLIC INSTITUTIONS OF HIGHER EDUCATION

When a student registers at more than one public institution in Texas, he shall pay the full tuition charges to the first institution at which he is registered. A student who is first registered at another institution must present a copy of the fee receipt from that institution when registering at UTA. Tuition and fees at UTA as the second institution will be assessed as follows:

1. If the minimum tuition at the first institution is the *same* or *greater* than the UTA minimum, the amount charged for tuition will be the UTA hourly rate, i.e., $4 per hour for residents and $40 per hour for non-residents.
2. If the minimum tuition at the first institution is *lower* than the UTA minimum, the amount charged for tuition will include the difference in the minimum charges; in no case will the amount charged for tuition be less than the UTA hourly rate.
3. All other applicable fees will be charged.

FEES

In addition to the tuition and mandatory fees in the preceding section students must pay the following fees, if applicable:

1. General Property Deposit
2. Photo Identification Card Fee
3. Parking Fee
4. Laboratory Fees for courses as indicated in course descriptions.

Graduation fees are paid in the semester in which the student graduates and include those listed below. Deadlines for paying these fees are listed in the Graduate School calendar printed inside the front cover of this Catalog.

1. Diploma Fee
2. Thesis, Dissertation, or Internship Report Binding Fee
3. Dissertation Microfilming Fee
4. Dissertation Copyright Fee (optional)

GENERAL PROPERTY DEPOSIT

Every student registering at The University of Texas at Arlington will be required to make and maintain a property deposit of $10. The records will be reviewed periodically, and if charges

have been made against the deposit, the student will be required to bring the deposit up to $10.

The deposit is refundable upon request to the Bursar's Office when the student withdraws from school or graduates. The refund will be mailed as soon as possible. Property deposits which are dormant for a period of four years are forfeited into the General Property Deposit Scholarship Fund.

PHOTO IDENTIFICATION CARD FEE

Each student registering at The University of Texas at Arlington is required to pay an annual $4 Photo Identification Card Fee renewable at the beginning of the Fall Semester each year. A valid Photo Identification Card is needed along with the Permanent Student Academic Use Card, issued at the time of initial registration in the University, for identification when checking books from the library, or when cashing checks at the University Bookstore, University Center, or Bursar's Office, and for admission to various University activities such as athletic events, and other situations in which personal identification is required. The replacement charge for lost Photo Identification Cards is $4.

PARKING FEE

Students will register their cars in a single payment for the entire school year or the balance of the school year in which they register, whichever is applicable (school year is September 1 through August 31). The following fees will be charged for autos at the initial period of registration:

	Automobile		**Motorcycle**	
	Day	Night	Day	Night
Fall Semester	$27	$15	$15	$ 7
Spring Semester	15	9	8	4
First Summer Session	8	7	4	3
Second Summer Session	6	4	3	2

Commuting students may choose to car pool. However, if the car pool rotates cars, each vehicle must be registered with The University of Texas at Arlington Police Department and only one of the pool's vehicles may be parked on campus at any given time.

In the event that a student wishes to register two motor vehicles in his or her own name, proof of ownership of both vehicles, plus a receipt from the Business Office for the required amount of registration for the first car and a receipt for $1 for registration of the second vehicle must be presented. The campus police office is open Monday through Thursday from 7 a.m. to 9 p.m. and from 7 a.m. to 5 p.m. on Friday. Complete parking regulations are available at the office.

Students who graduate at the end of the Fall Semester or who terminate their enrollment for other reasons at the end of the Fall Semester or beginning of the Spring Semester may receive a partial refund of the parking fee provided they turn in the remnants of their decal and that the transaction be made on or before the Spring Semester Census Date.

LABORATORY FEES

Laboratory fees are charged for various science and engineering laboratory courses. Courses for which laboratory fees are charged and the amounts of the fees are listed in the course description section of this catalog.

STUDENT SERVICES FEE

The Student Services Fee is compulsory. It provides free copies of the campus newspaper and either free admission or reduced fees to intercollegiate events at home, formal convocation events, activity programs, and services of the Student Health Center (does not cover charges for medication, laboratory, or X-rays, if needed).

STUDENT UNION FEE

The Student Union Fee is compulsory. Its sole purpose is financing, constructing, operating, maintaining, and improving the student union building.

INTERNATIONAL STUDENT HEALTH INSURANCE

International graduate students are required to purchase The University of Texas at Arlington Student Health Insurance Plan or show proof of owning equal or better insurance coverage than that provided by the UTA plan.

LATE REGISTRATION FEE

There shall be a compulsory fee for late registration of $5 for the first day, plus $2.50 for each additional late day, with the maximum amount being $15 for any one semester or session.

DIPLOMA FEE

Upon application for graduation each student will be required to pay a $10.00 Diploma Fee. If a student fails to receive the degree in the semester for which he has filed the Diploma Application and paid the Diploma Fee, the fee must be paid again in the semester in which the student does graduate.

BINDING FEE

Students who write theses, internship reports, or dissertations are required to pay a $16.50 Binding Fee at the time the three copies of the final approved thesis, internship report, or dissertation are submitted to the Graduate School. If the thesis, report, or dissertation is larger than one volume, an additional $16.50 per volume of three copies each will be charged. One copy of the thesis, internship report, or dissertation is deposited in the University Archives, one in the Library, and the third in the departmental or college library.

MICROFILMING FEE

The $35 Microfilming Fee includes the cost of microfilming one official copy of the dissertation by University Microfilms, Ann Arbor, Michigan, and the publication of the dissertation abstract in *Dissertation Abstracts International.* University Microfilms deposits one positive microform copy of the dissertation in the Library of Congress.

DISSERTATION COPYRIGHT FEE (optional)

If the student wishes to secure copyright of his dissertation in his own name, copyright arrangements will be completed for a total fee of $20 payable at the time the final dissertation copies are submitted to the Graduate School.

THE ACADEMIC COMMON MARKET

Thirteen Southern states participate in the Academic Common Market, an interstate agreement for sharing uncommon programs. Residents of these states who are accepted for admission into selected out-of-state programs can enroll on an in-state tuition basis. In order to qualify, an applicant must (1) be accepted in a program to which his or her state has made arrangements to send its students, and, (2) submit proof to that university of legal residence in the home state.

The following degree programs at The University of Texas at Arlington are available through the Academic Common Market at in-state tuition rates for qualified applicants of the states indicated: Master of Architecture (Alabama, Arkansas, Kentucky, Mississippi, Tennessee, West Virginia); Master of City and Regional Planning (Arkansas); Master of Arts in the Humanities (Tennessee); Doctor of Philosophy in the Humanities (Kentucky, Tennessee, Virginia); Master of Arts in Teaching in the Humanities (Kentucky, Tennessee, Virginia); Doctor of Philosophy in Mathematical Sciences (Kentucky, Virginia, West Virginia); Master of Science in Radiological Physics (South Carolina, Tennessee); Master of Arts in Urban and Regional Affairs (Kentucky).

Further information on the Academic Common Market may be obtained from the Texas State Coordinator for the Academic Common Market: Frances Phillips, Director of Program Development Division of Senior Colleges and Universities, Coordinating Board, Texas College and University System, Box 12788, Capitol Station, Austin, Texas, 78711.

RESIDENCY REGULATIONS

All students attending The University of Texas at Arlington who are not residents of Texas will be charged non-resident tuition in accordance with the state law.

All residence determinations will be made pursuant to Sections 54.052 *et seq.* of the *Texas Education Code* and the "Rules and Regulations for Determining Resident Status" of the Coordinating Board, Texas College and University System. Generally, the following information pertains: "An individual under eighteen (18) years of age, living away from his family, and whose family resides in another state or has not resided in Texas for the 12-month period immediately preceding the date of registration shall be classified as a non-resident student; or an individual eighteen (18) years of age or over who resides out of the state or who has come from outside Texas and who registers in an educational institution before having resided in Texas for a 12-month period shall be classified as a non-resident student."

A non-resident student classification is presumed to be correct as long as the presence of the individual in the state is primarily for the purpose of attending an educational institution. After living in Texas for at least twelve (12) months, it is possible that a non-resident student may be reclassified as a resident student as provided in the rules and regulations adopted by the Coordinating Board. The student must demonstrate an unequivocal intent to remain indefinitely in Texas and must demonstrate financial independence.

Two exceptions to the payment of nonresident tuition are included in the *Texas Education Code* as follows: (1) A non-resident who marries a resident of Texas is entitled to pay the resident tuition fee regardless of the length of time lived in Texas; proof of marriage must be submitted to the Registrar's Office prior to registration. (2) Usually, a member of the United States Military Forces is entitled to pay the resident tuition fee for the member and the member's dependents, providing that each semester he or she submits to the fee assessors in registration a letter from his or her commanding officer stating that he or she is currently on permanent assignment in the state.

The $50 maximum tuition fee for nursing students applies to non-residents as well as residents of Texas.

The responsibility of registering under and maintaining the proper residence classification rests on the student. If there is any question concerning his or her classification as a resident of Texas at the time of registration, or any time thereafter, it is the student's obligation to consult with the residence advisor in the Office of the Registrar and have his or her classification officially determined. All requests for reclassification should be submitted to the Registrar's Office at least 30 days prior to the registration period in question.

REFUNDS

TOTAL WITHDRAWAL FROM SCHOOL

A student who officially withdraws through the Student Administration section of the Registrar's Office will receive a refund according to the schedule indicated below.

1. A student who withdraws prior to the first class day will receive a 100% refund.
2. If the foregoing condition is not met, then the refund shall be as indicated below.

Fall and Spring Semesters	
During class days 1 through 5	80%
During class days 6 through 10	70%
During class days 11 through 15	50%
During class days 16 through 20	25%
After 20th class day	no refund
Summer Sessions	
During class days 1 through 3	80%
During class days 4 through 6	50%
After sixth class day	no refund

DROPPING COURSE(S) BUT CONTINUING ENROLLMENT

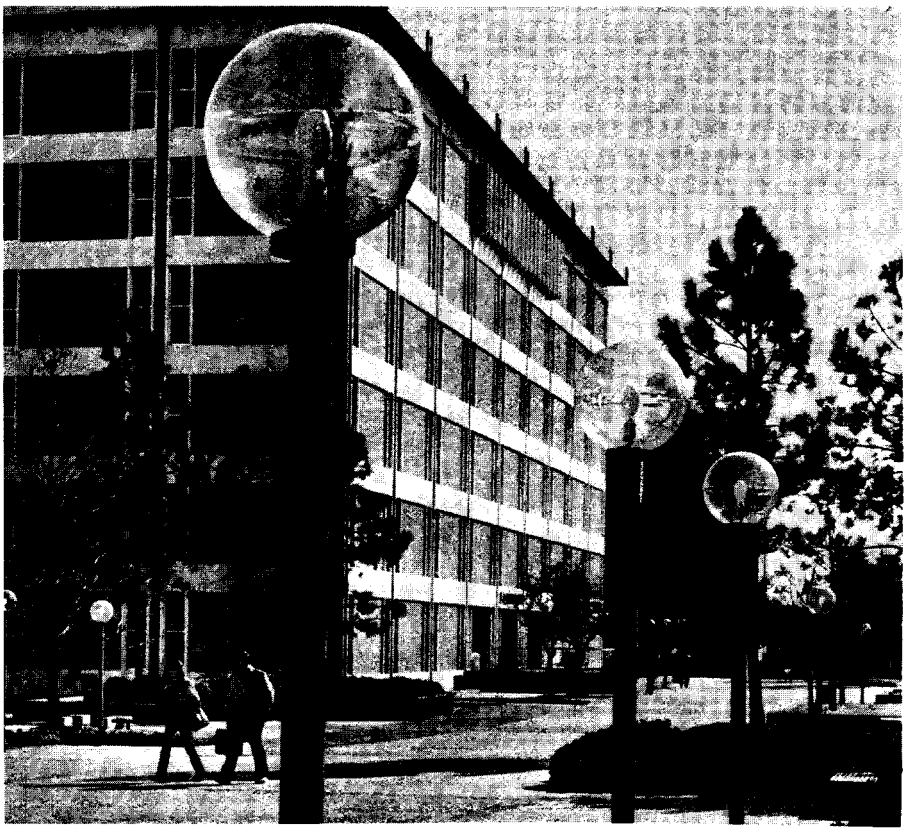
All the additional costs that apply to courses dropped before the Census Date, when the student continues enrollment in other course(s), will be refunded.

PAYMENT OF REFUNDS

Refunds cannot be made until a computerized audit of fees has been performed; thus, refunds normally cannot be issued until approximately eight weeks after a semester begins. Refunds are mailed to the address the student indicates on the enrollment packet at registration.

Refunds for recipients of certain types of financial aid administered through the University will be applied to the accounts from which the funds were received. In addition, refunds are applied to outstanding bills owed by the student.

Inquiries concerning refunds should be directed to the University Business Office, Room 421, Davis Hall.



STUDENT SERVICES AND FINANCIAL AID

HOUSING

The University owns and operates residence halls, apartments, and houses for students. Because of the demand for housing, students should make application as early as possible. Applications and information are available at the Housing Office, 801 S. Davis Street, 273-2706.

The Housing Office also has information concerning off-campus housing.

STUDENT HEALTH SERVICES

The Student Health Center is staffed and equipped to care for most routine health needs of students. Its financial support is from a portion of the Student Service Fee, supplemented by a reimbursement from the student patients for such costs as medicine, x-rays and laboratory tests.

The staff includes full-time physicians and nurses, registered pharmacist, clinical psychologist, laboratory technologists, and related personnel. The Student Health Service provides medical services for the student body during those times when the University is open. Services are not available during scheduled University holidays. During these periods, medical care received by the student from another source will be his or her financial responsibility. Hours of operation are posted at the entrance.

Students eligible for medical care are entitled to medical services of staff physicians, nursing services, routine laboratory services, diagnostic x-ray studies, consultation on matters related to health and illness, psychological counseling, and health advice and immunization certificates for traveling students. Before being examined or treated for routine illness, the student must complete a Report of Medical History. Each student is responsible for transportation to the Health Center.

Services not currently available are obstetrical care, dental care, specialized diagnostic services, and specialty care beyond the scope of Health Service staff. Those medical problems deemed to be beyond the capacity of the Health Center to treat efficiently and completely will be referred to the appropriate facility.

Prior to registration, a student will submit a Report of Medical History with proof of immunizations. A physical examination is required only if the student is medically unfit for such activities as physical education. Confidentiality of medical records will be in accordance with The Family Educational Rights and Privacy Act of 1974.

It is the student's responsibility to satisfy indebtedness to the Health Service with reasonable promptness. Upon payment, receipts will be issued which can be used by the student for submitting claims on personal insurance policies.

STUDENT HEALTH INSURANCE

Because the Student Health Service is not able to meet all medical care needs, particularly the more extensive diagnostic and inpatient services of a general hospital, students are strongly urged to consider subscribing to an appropriate medical insurance program.

Brochures describing the current student health and accident insurance may be obtained at the Student Health Center, 605 S. West Street. If additional information is needed, Mr. Gene Mundy, Servicing Agent, may be contacted at (214) 386-8100.

All students on non-immigrant visas enrolled at UTA must have health insurance coverage for accident and hospitalization. There is a health insurance plan offered through UTA which offers very basic coverage for approximately $100 per calendar year. Students are not required to purchase this particular plan, but they are required to show proof of coverage at the time of registration.

COUNSELING, TESTING, AND CAREER PLACEMENT

The Office of Counseling, Testing, and Career Placement is located at 216 Davis Hall, 273-3671.

COUNSELING

Three primary types of counseling are provided in group format and individually: (1) personal counseling—developing new life skills and perspectives, decision-making, dealing with extraordinary life events; (2) academic counseling—advisement, counseling, and skill building (a full range of academic skills seminars is offered on subjects of reading improvement, test taking, study skills, and time management); and (3) career counseling—exploration of interests, aptitudes, decision-making, and career preparation, with skill-building seminars on interview and resume preparation.

TESTING

The following tests are given on national test dates: Graduate Record Examination, Graduate Management Admission Test, Law School Admission Test, and the Test of English as a Foreign Language. The Miller Analogies Test is available by appointment. Specialized tests of aptitudes, interests, and abilities are also given in conjunction with counseling.

CAREER PLACEMENT

Approximately 500 recruiting companies and agencies schedule interviews on campus primarily during the months of October, November, February, and March. Any graduate student may take advantage of the campus interviews. After graduation the alumni have the opportunity to use the Jobs Hotline service to learn about immediate job openings for experienced graduates.

RESOURCES

The Placement Library, career development materials, academic skills materials, and computerized guidance are some of the office resources of value to graduate students. Catalogs of most United States graduate schools are available on computer and microfiche.

INTERNATIONAL OFFICE

The International Office provides many services to the international student. This office was established to serve the particular needs of the international students attending this University. It is recognized that students from other countries sometimes have unique and unusual problems, which the staff of this office are trained to handle. If staff members of the International Office can not help the student directly, they will refer him to the proper office, on or off campus. The office is located at 705 Summit, 273-2355.

MINORITY STUDENT SERVICES

The Office of Minority Student Services facilitates the full participation of ethnic minorities at UTA by helping to create an academic, social, and cultural atmosphere conducive to the presence and responsive to the needs of minority students, including Black, Mexican-American, Native American Indian, and Asian students. The office assists students in presenting a varied program of cultural events and activities, designed to expose the university community to the history, culture, and tradition of ethnic minority groups. The Director of Minority Student Services coordinates services with other University offices and departments to assist minority students in achieving their academic objectives and long-term goals. The office is located at B36 University Center, 273-2099.

HANDICAPPED STUDENT SERVICES

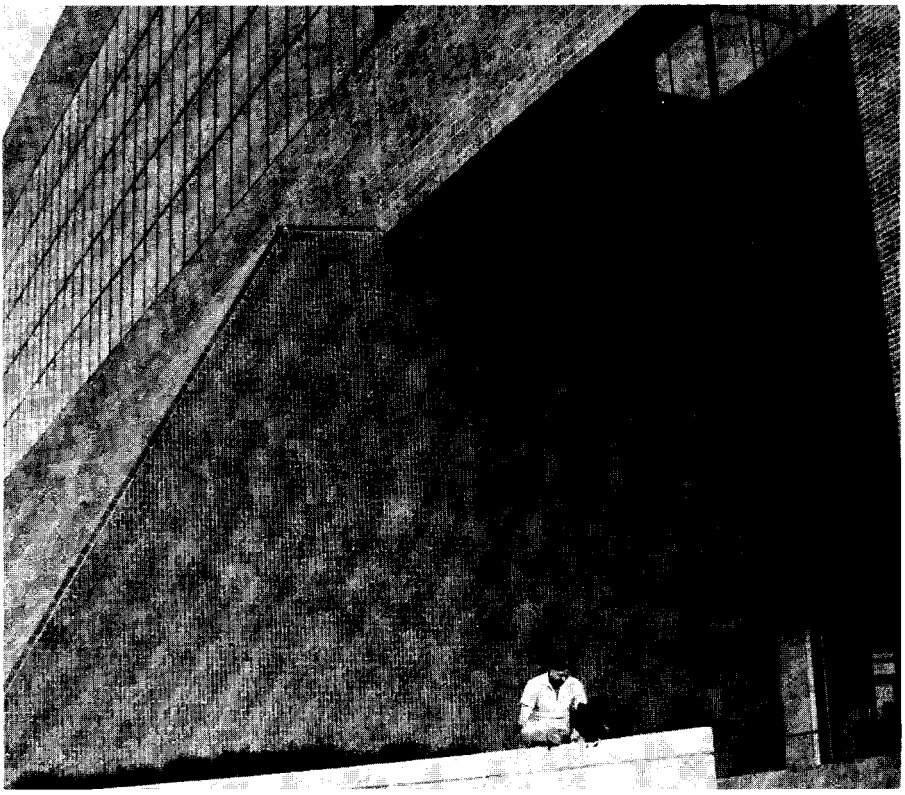
The objective of the Handicapped Student Services Office is to help physically impaired students. The Coordinator of the Services Office requires personal interviews with handicapped students prior to registration, if deemed necessary. The purpose of the Services Office is to provide needed services for handicapped students and to assist them with general campus orientation and registration. For further information contact the Handicapped Student Services Office, B-13 University Center, 273-3364.

STUDENTS' ATTORNEY

The students' attorney will be available to advise students regarding legal problems and to assess their need for further legal assistance. The Office of the Students' Attorney is located in B-09 University Center, 273-3771.

STUDENT CONDUCT AND DISCIPLINE

The University of Texas at Arlington reserves the right to impose a disciplinary penalty, including restriction of enrollment, on any student for disciplinary reasons. Information about the various judicial bodies, rules of conduct, and due process procedures is published in the "Rules and Regulations of the Board of Regents of The University of Texas System" and the "Handbook of Operating Procedures of The University of Texas at Arlington," copies of which are in the Office of the Dean of the Graduate School.



BURSAR'S OFFICE

At the Bursar's Office, located on the first floor of Davis Hall, students may:

1. pay fees and bills due to the University (on other than registration days);
2. confer on all problems arising in connection with fees and bills;
3. obtain information concerning repayment of loans;
4. pay residence hall room rent; and
5. obtain check cashing services.

CHECK CASHING AND PAYMENT PROCEDURES

A current University I.D. and a driver's license are required of anyone making payment to the University by check or anyone desiring to cash a personal check. Students may cash personal checks for an amount not to exceed $25.

RETURNED CHECKS

A charge of $10 will be made for each returned check. A person who gives UTA a bad check (one in which the bank is not at fault) will be subject to one or more of the following actions: (1) a bar against readmission of the student, (2) withholding of the student's grades and official transcript, (3) withholding of degree to which the student otherwise would be entitled.

Additionally, the University will not accept a check from anyone who has given a total of two bad checks unless the person submits a written statement from the bank stating "bank error or unusual circumstance" to be the cause of the bad checks.

STUDENT FINANCIAL AID

Financial Aid is generally limited to U.S. citizens or those in this country on other than temporary visa status and accepted for enrollment or enrolled and making satisfactory academic progress. The Financial Aid Office is located in Suite 260 Davis Hall, 273-3561.

STUDENT EMPLOYMENT SERVICE

The Student Employment Service, located on the first floor of the University Center, assists students and their spouses in finding full- or part-time off-campus employment. Any student currently enrolled or accepted for admission at UTA for the following semester may register for assistance from this employment service. The Student Employment Service actively develops jobs for graduate students interested in positions that offer an opportunity for quality, on-the-job, professional development and interaction.

SHORT-TERM LOANS

Loans up to $300 are made for current expenses and are to be repaid during the semester in which the money is borrowed. Applicants with baccalaureate degrees from institutions other than UTA must have a grade point average of at least 2.0 and have completed a minimum of 15 semester hours at The University of Texas at Arlington. A co-signer may be required. Application deadline will be two days prior to the first day of registration for any semester.

ASSISTANCE BASED ON NEED

Students anticipating the use of any of the following financial aid programs should process a Financial Aid Form (FAF) available from the Financial Aid Office. Financial aid in these categories is generally limited to U.S. citizens or those in this country on other than temporary visa status. Early application is encouraged.

Grants-In-Aid

The State of Texas has made available a limited amount of funds as grants-in-aid to needy students not to exceed half of the student's financial need or $100 per month, whichever is less.

Long-Term Loans

UTA participates in several long-term loan programs. The common element in all long-term loans is the deferred repayment provision that permits a student to repay the loan after termination of at least half-time studies at the University. The programs offered at The University of Texas at Arlington are National Direct Student Loan Program and the Guaranteed Student Loan Program.

The Guaranteed Student Loan program enables any eligible student to borrow funds to meet legitimate educational expenses. These loans cost the student no interest while enrolled on at least a half-time basis. However, a guarantee fee and an origination fee are paid by the student when the loan is advanced. Repayment of principal and interest at the rate of 7-9% for previous borrowers and 8% for first-time borrowers begins six (6) months after the end of the enrollment period and may be scheduled for a period not to exceed ten years. A graduate student may be able to borrow up to $5,000.

Parent Loan Program—A loan program designed specifically for independent graduate students and the parents of dependent students provides for loans up to $3,000 per year. Persons seeking this type of loan may inquire at the Guaranteed Student Loan Office to locate financial institutions which are participating in this program. Certification of eligibility for this type of loan is made by the Guaranteed Student Loan Office; however, it is the responsibility of the student to locate the lending institution.

College Work-Study

Students who need a job to help pay for college expenses may be eligible for employment at The University of Texas at Arlington under federally supported Work-Study Programs. To work under this program, a student must be in good standing or be accepted for enrollment. The student's eligibility depends on his need for employment to defray college expenses, with preference given to applicants with the greatest financial need. Employment is available in many departments on campus and in a limited number of off-campus locations.

General Fee Waiver

In cases of exceptional financial need the state provides for a waiver of the $6 per semester hour General Fee. Students qualifying for this type of assistance will still be required to pay the $8 per capita building use fee.

FINANCIAL COUNSELING

The Financial Aid Office provides financial or budgetary counseling for any and all students regardless of whether or not they qualify for other types of financial assistance.

OUT-OF-STATE STUDENT ASSISTANCE

Several states offer aid to their students attending schools in other states. Amounts and requirements for this assistance vary greatly. Further information can be obtained from the Financial Aid Office.

VETERANS' ASSISTANCE

Veterans' Administration Representatives (VET REPS) in the Registrar's Office can answer questions concerning eligibility for and payment of VA benefits and other matters for veterans attending or planning to attend UTA.

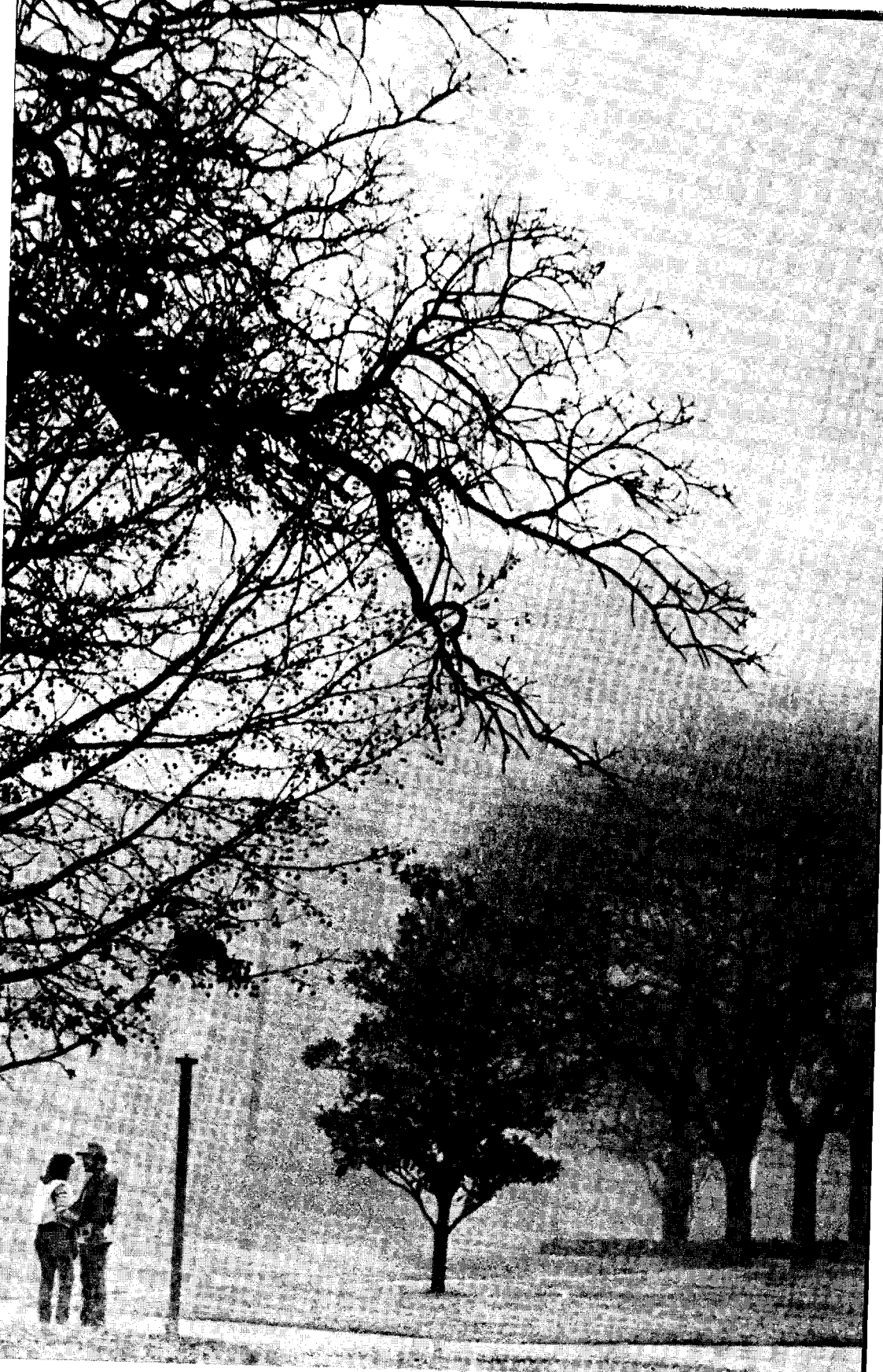
ASSISTANTSHIPS

Research and teaching assistantships are available in most departments. Such appointments may be held only by students unconditionally admitted to Graduate School. Prospective graduate students should see the appropriate department chairman for further information. To be continued on a research or teaching assistantship, a student must be in good standing and have performed assigned duties satisfactorily in the preceding semesters as determined by the respective department. Consult the catalog section on General Graduate School Regulations and Information for regulations regarding registration and responsibility of Graduate Assistants.

Academic Programs and Courses of Instruction

DEPARTMENTAL PROGRAMS

The University reserves the right to withdraw courses at any time, change fees, rules, calendar, curriculum, degree programs, degree requirements, graduation procedures, and any other requirements affecting students. Changes will become effective whenever the proper authorities so determine and will apply to both prospective students and those already enrolled. The provisions of this catalog do not constitute a contract, express or implied, between any applicant, student, or faculty member and The University of Texas at Arlington Graduate School or The University of Texas System.



Department of ACCOUNTING (ACCT)

Areas of Study	*Degrees*
Accounting	M.P.A., M.S.
Taxation	M.S.
Administration (See Interdepartmental and Intercampus Programs.)	Ph.D.

Master's Degree Plans: Thesis, and Non-Thesis

Chairman: Bill Ross — 409 Business — 273-2044
Graduate Advisor: Flora Chance — 506 Business — 273-3590
Graduate Faculty:

Professors Casler, Courtney, Ross, Snavely
Associate Professors Dierks, Dunn, Hall, Solomon, Tsay, Walther, Witt
Assistant Professors Harris, McConnell

OBJECTIVE

The objective of the Master of Professional Accounting, the Master of Science in Accounting, and the Master of Science in Taxation degree programs is to prepare students for careers as professional accountants, in public, private, or government accounting. As a part of this objective the programs are designed to provide the educational background to become Certified Public Accountants or to attain other appropriate professional certification. The MPA program, appropriate for students without significant prior study in accounting, is also designed to provide a sound understanding in selected fields such as finance, management, behavioral sciences, management sciences and economics. The M.S. in Accounting and M.S. in Taxation are more specialized degrees which build on the candidate's prior background in accounting and business related subjects. Thus, the programs seek to insure that the student attains a broad perspective, which is a requisite to success both as a professional accountant and as a top-level financial or business executive.

DEGREE REQUIREMENTS

Admission to the Master of Professional Accounting graduate degree programs is based upon the general admission requirements of the Graduate School. Both a satisfactory score on the Graduate Management Admission Test and other evidence (such as a suitable GPA in previous study) are required for admission to the program.

The programs, which can be completed by part-time students who attend classes during the evening hours, are designed to accommodate students with divergent educational backgrounds and career interests. Each student's program of work must be approved by the Accounting Graduate Advisor and it must include a minimum of 15 semester hours in advanced graduate accounting courses taken at The University of Texas at Arlington. It should be noted that courses which are not considered suitable to a student's program will not be approved. During the final semester, students who have written a thesis must defend the thesis in an oral examination. The following requirements for the Accounting Graduate Degrees are in addition to the general regulations and requirements given in the introductory sections of this catalog.

Master of Professional Accounting
Background Category I

Students who have had no prior academic work in business administration are included in this category. These students will take the courses in the Foundation Program (thirty semester

hours as shown below); in addition, they must complete the requirements of the Category I MPA program which totals 39 semester hours of work.

Foundation Program

Semester I	**Semester II**
Accounting Analysis I (ACCT 5301)	Accounting Analysis II (ACCT 5302)
Economic Analysis I (ECON 5309)	Economic Analysis II (ECON 5311)
Statistics (BUSA 5301)	Marketing (MARK 5311)
Decision Models and Information Systems (MASI 5311)	Finance (FINA 5311)
Behavioral Science in Management (MANA 5311)	Management (MANA 5312)

Category I MPA Program

Financial Accounting I (ACCT 5311)
Financial Accounting II (ACCT 5312)
Financial Accounting III (ACCT 5319)
Cost Accounting (ACCT 5317)
Accounting for Management Planning and Control (ACCT 5322)
Information System Analysis (ACCT 5329)
Study of Federal Income Tax Law Relative to Individuals (ACCT 5314)
Contemporary Issues in Accounting Theory (ACCT 5327)
Auditing Concepts and Practices (ACCT 5316)
Law I (BUSA 3311)
Business Policy (BUSA 5333)

In addition to the courses listed above (or their equivalents), the student will select one graduate level accounting course and one appropriate graduate level course in statistics or management science.

Master of Professional Accounting Background Category II

Students who have some prior academic work in business administration but who do not have the equivalent of a major in accounting are included in this category. Students in Category II must meet the same foundation requirements as Category I students, and they must complete the coursework of the Category I MPA Program. However, equivalent courses taken in a student's previous academic work will be waived; such courses cannot be repeated for credit. For example, a student with an undergraduate major in business administration typically would not be required to complete any of the courses in the Foundation Program.

In addition to any needed foundation courses and regardless of the number of courses waived, a student in Category II who chooses to write a thesis is required to complete a minimum of 33 semester hours; a student who chooses not to write a thesis is required to complete a minimum of 39 semester hours (including 18 hours of accounting coursework).

Master of Science in Accounting

This category includes students who have an undergraduate degree in accounting or a degree in business administration with a major in accounting. The student, with the assistance and consent of the Graduate Advisor, will develop a course of study designed to meet his or her educational needs in light of previous academic work and career objectives.

A minimum of 30 semester hours (including 18 semester hours of accounting coursework) is required if the student chooses to write a thesis. If the student chooses not to write a thesis, a minimum of 36 semester hours (including 24 semester hours of accounting coursework) is required. Of the accounting semester hours included in a student's program, a maximum of six semester hours may be represented by upper-division undergraduate courses, provided that the requirement of 15 semester hours in graduate accounting courses is met. The student must have previously studied or include in his or her program courses covering the following areas of accounting: financial accounting and accounting theory, management accounting (including cost accounting), management information and computer systems, financial and operational

auditing, and taxation. At least six semester hours of non-accounting graduate level courses offered by the College of Business Administration are required, including BUSA 5333 and an appropriate graduate course in statistics or management science. BUSA 5333 is waived if the student has had a similar course before admission to the Master of Science in Accounting program.

Background Requirements

Students in the M.S. in Accounting program must have completed the following courses in addition to the Program Requirements (below) for the M.S. in Accounting degree:

(1) Courses equivalent to the Foundation Program for the Master of Professional Accounting degree (see above); and
(2) Courses equivalent to UTA Accounting courses ACCT 5311, 5312, 5314, 5316, 5317, and 5322.

These courses typically will have been completed as a part of a candidate's undergraduate program in accounting.

Program Requirements

The required program for an M.S. in Accounting consists of the following:

18 semester hours: Graduate level accounting courses beyond those stipulated in "Background Requirements" above. ACCT 5319, 5327, and 5329 must be included if equivalent courses have not been completed previously. The courses selected must include at least 12 semester hours of non-tax graduate level accounting courses.

3 semester hours: BUSA 5333 (Business Policy), or an elective non-accounting graduate level course offered by the College of Business Administration if the student completed a course similar to BUSA 5333 before admission to the M.S. in Accounting Program.

3 semester hours: Appropriate graduate level course in Statistics or Management Science.

Thesis Option (Total program of 30 semester hours)

6 semester hours: Thesis on accounting (non-tax) topic.

Non-Thesis Option (Total program of 36 semester hours)

6 semester hours: Graduate level accounting courses.
6 semester hours: Graduate level courses (other than taxation courses) offered by the College of Business Administration.

Master of Science in Taxation

This Program is designed for students who have an undergraduate degree in accounting or a degree in business administration with a major in accounting who wish to specialize in taxation. The student, with the assistance and consent of the Graduate Advisor, will develop a course of study designed to meet his or her educational needs in light of previous academic work and career objectives.

A minimum of 36 semester hours, including a minimum of 18 semester hours in taxation courses beyond ACCT 5314, is required. The student may choose to write a thesis that will count as six semester hours towards the 36-hour requirement. Of the accounting semester hours included in a student's program, a maximum of six semester hours may be represented by upper-division undergraduate courses, provided that the requirement of 15 semester hours in graduate accounting courses is met. The student must have previously studied or include in his or her program courses covering the following areas of accounting: financial accounting and accounting theory, management accounting (including cost accounting), management information and computer systems, financial and operational auditing, and taxation. Also required are ECON 5337, BUSA 5333 and BUSA 5334. BUSA 5333 is waived if the student has had a similar course before admission to the Master of Science in Taxation program.

Background Requirements

Students in the M.S. in Taxation program must have completed the following courses in addition to the Program Requirements (below) for the M.S. in Taxation degree:

(1) Courses equivalent to the Foundation Program for the Master of Professional Accounting degree (see above); and
(2) Courses equivalent to UTA Accounting courses: ACCT 5311, 5312, 5314, 5316, 5317, and 5322.

These courses typically will have been completed as a part of a candidate's undergraduate program in Accounting.

Program Requirements

The required program for an M.S. in Taxation consists of the following:

18 semester hours: Graduate level taxation courses beyond ACCT 5314. Taxation courses required of all candidates are ACCT 5341, 5342, 5347 and 5348.
3 semester hours: ECON 5337 Business and Economic Forecasting
3 semester hours: BUSA 5334 Real Property Law
3 semester hours: BUSA 5333 (Business Policy) or an elective graduate level course offered by the College of Business Administration if the student completed a course similar to BUSA 5333 before admission to the M.S. in Taxation program.
3 semester hours: Elective graduate level course offered by the College of Business Administration.

Thesis Option (Total Program of 36 semester hours)
6 semester hours: Thesis on taxation topic.

Non-Thesis Option (Total program of 36 semester hours)
6 semester hours: Elective graduate level courses offered by the College of Business Administration.

5301. ACCOUNTING ANALYSIS I (3-0). Introduction to concepts, purposes, problems, methodology, and terminology of financial accounting.

5302. ACCOUNTING ANALYSIS II (3-0). Introduction to concepts, purposes, problems, methodology, and terminology of managerial accounting. Prerequisite: ACCT 5301 or equivalent.

5310. INTRODUCTION TO BUSINESS TAXATION (3-0). Introduction to Internal Revenue Code, Treasury Regulations and other tax literature applicable to business entities. Includes tax planning for sole proprietorship, partnership and corporation. Cannot be taken for credit by persons who previously have taken a course in Federal Income Taxation. Prerequisite: ACCT 5301 or equivalent.

5311. FINANCIAL ACCOUNTING I (3-0). Examination of financial accounting process, problems encountered in preparation of financial statements, and concepts and principles used to resolve these problems. Prerequisite: ACCT 5301 or equivalent.

5312. FINANCIAL ACCOUNTING II (3-0). Study of additional problems encountered in preparation of financial statements. Also an introduction to accounting for non-profit entities. Prerequisite: ACCT 5311 or equivalent.

5313. ACCOUNTING THEORY (3-0). Examines the history and development of accounting theory, forces influencing this development, differing concepts of income, and significant problems of asset and liability measurement. Prerequisite: ACCT 5312 or equivalent.

5314. STUDY OF FEDERAL INCOME TAX LAW RELATIVE TO INDIVIDUALS (3-0). Comprehensive analysis of the federal income tax consequences applicable to individuals. Emphasizes the analysis of concepts relating to passive and earned income, deductible expenses, and tax credits. May not be taken for credit by students who have credit for any course in federal income taxation. Prerequisite: ACCT 5301 or equivalent.

5316. AUDITING CONCEPTS AND PRACTICES (3-0). Concentrates on practice of professional accounting and auditing. Emphasizes decision making in a variety of unstructured situations where decisions demand a grasp of purpose, method, and judgment for their resolution. May not be taken for credit by students who have received credit for a course in auditing. Prerequisites: ACCT 5312 or equivalent and BUSA 5301 or equivalent.

5317. COST ACCOUNTING (3-0). Uses and classification of costs incurred in manufacturing. Emphasis on concepts involved in assignment and reporting of costs under job order, process, standard and direct costing systems. Prerequisite: ACCT 5302 or equivalent.

5318. STUDIES IN AUDITING (3-0). A critical analysis of advanced topics in both auditing theory and professional practice. Emphasis on: development of auditing theory, generally accepted auditing standards, professional responsibilities, auditing EDP, statistical sampling in

auditing, SEC practice and reporting, cases in audit decision making, and analyses of emerging issues and contemporary problems in auditing. Prerequisite: ACCT 5316 or equivalent.

5319. FINANCIAL ACCOUNTING III (3-0). Accounting for business combinations, preparation of consolidated financial statements, multi-national operations, partnerships, and estates and trusts. Prerequisite: ACCT 5312 or equivalent.

5320. GOVERNMENTAL AND NONPROFIT ACCOUNTING (3-0). Budgeting, accounting and financial reporting, managerial control, and auditing considerations of governmental and nonprofit entities (e.g. hospitals, universities, and voluntary health and welfare organizations). Prerequisite: ACCT 5301 or equivalent or permission of the instructor.

5321. CASES IN FINANCIAL ACCOUNTING (3-0). Designed to improve student's ability to deal with complex problem areas in financial accounting and to sharpen his understanding and application of accounting concepts and principles. Case studies and problems considered and analyzed. Prerequisite: ACCT 5312 or equivalent.

5322. ACCOUNTING FOR MANAGEMENT PLANNING AND CONTROL (3-0). Concentrates on information needs of management for planning and control of operations. Topics include setting corporate objectives, behavioral problems, capital budgeting and profit-planning, the use of quantitative tools, divisional performance evaluation, and transfer pricing. May not be taken for credit by students who previously received credit for ACCT 4302 or equivalent. Prerequisite: ACCT 5302 or equivalent.

5323. CORPORATE MODELING (3-0). Aggregative approach to modeling corporate activities with emphasis on financial modeling. Problem definition, design choices, and validation problems considered. Computer models developed. Prerequisite: ACCT 5322 or equivalent and consent of instructor.

5324. ADVANCED STUDIES IN PLANNING AND CONTROL (3-0). In-depth study of selected topics in planning and control using cases and readings from current literature. Representative topics include behavioral and organizational considerations and use of quantitative techniques for effective planning and control, design of accounting systems for performance measurement. Emphasis of course and topics vary. Prerequisite: ACCT 5322 or equivalent.

5327. CONTEMPORARY ISSUES IN ACCOUNTING THEORY (3-0). Designed to familiarize students with significant problems currently facing the accounting profession, to examine in depth various solutions proposed by accounting scholars and others, and to strengthen student understanding of today's critical issues in accounting theory. Prerequisite: ACCT 5312 or equivalent.

5329. INFORMATION SYSTEM ANALYSIS (3-0). Structures, functions, and objectives of accounting and related information systems. Both theoretical and implementive aspects of systems explored. Special consideration given to impact of system structure on individual and group motivation. Prerequisite: nine hours of accounting.

5330. INTERNATIONAL ACCOUNTING AND FINANCIAL REPORTING (3-0). Financial accounting and reporting principles and practices in various countries, the role of accounting in economic development, as well as the accounting considerations in international business operations—e.g. foreign currency translation, auditing, accounting systems, taxation, and sensitive payments. Prerequisite: ACCT 5302 or nine hours of undergraduate accounting.

5340. STUDY OF FEDERAL INCOME TAX FOR ENTITIES OTHER THAN INDIVIDUALS (3-0). Comprehensive analysis of the federal income tax consequences applicable to entities other than individuals. Analysis of the relevant tax principles of corporations, partnerships, trusts and estates will be undertaken. Prerequisite: ACCT 5314 or equivalent.

5341. TAX PROBLEMS OF PARTNERSHIPS AND PARTNERS (3-0). Analysis of the federal income tax rules governing partners and partnerships. Prerequisite: ACCT 5340 or equivalent.

5342. TAX PROBLEMS OF CORPORATE REORGANIZATIONS (3-0). Historical development and present laws governing tax-free reorganizations and liquidations. Subjects include mergers, stock-for-stock and stock-for-asset acquisitions, divisive reorganizations, tax carryovers, the problems of basis and gain and loss considerations, foreign reorganizations, state, local, and federal compliance considerations, accounting vs. tax considerations, reorganizations in bankruptcy and tax treatment of distributions in corporate liquidations. Prerequisite: ACCT 4340 or equivalent.

5343. TAX PROBLEMS OF TRANSACTIONS IN REAL ESTATE (3-0). Problems and elections relating to the acquisition, holding, and disposition of real property. Subjects include means of acquisition and disposition, capital gains and losses, deferred payment sales, organization of syndicates, sale and lease-back, dissolutions, and general tax-saving methods. Prerequisite: ACCT 4340 and BUSA 5334 or equivalents.

5344. TAX PROBLEMS OF THE EXTRACTIVE INDUSTRIES (3-0). Subjects include depletion, intangible drilling and development costs, exchanges of interests in oil and gas property, studies of current practices in planning petroleum transactions. Prerequisite: ACCT 4340 or equivalent.

5345. CONTEMPORARY ISSUES IN FEDERAL TAXATION (3-0). Analysis of current federal taxation problems. Subjects include recent changes in federal tax legislation, minimization of tax liability through certain investments, analysis of tax liabilities. Prerequisite: ACCT 4340 or equivalent.

5346. SEMINAR IN TAXATION (3-0). In-depth study of current matters in the operations of the federal taxation system. Subjects include employee benefit programs, Keogh and individual retirement plans, charitable and educational organizations, and other tax exempt entities. Prerequisite: ACCT 4340 or equivalent.

5347. FEDERAL TAXATION OF GIFTS AND ESTATES (3-0). A comprehensive survey of the principles and procedures involved in determining the federal estate tax and the supplementary federal gift tax including taxability and valuation of property and the determination of deductions and credits. Prerequisite: ACCT 5340 and BUSA 5334 or equivalents or permission of instructor.

5348. TAX PLANNING AND RESEARCH (3-0). Intensive study of the more complex provisions of the internal revenue code pertaining to individuals, partnerships, corporations, estates and trusts, and practice and procedure before the Internal Revenue Service. Emphasizes tax planning for business enterprises and student research into tax problem areas. Prerequisite: ACCT 5340 or equivalent.

5349. ADVANCED TAX PLANNING (3-0). In-depth development of planning concepts in specific areas of taxation to sharpen the student's planning skills and to illustrate general planning techniques. Prerequisites: ACCT 5341, 5342, 5347, and 5348, and either MASI 5326 or ECON 5337.

5182, 5282, 5382. INDEPENDENT STUDIES IN ACCOUNTING. Extensive analysis of an accounting topic. Prerequisite: consent of faculty member and department chairman.

5391, 5691. RESEARCH COLLOQUIUM. Provides the vehicle for presentation of research by the candidate and an arena for critical evaluation by faculty and other candidates. May, with appropriate permission, be used as a partial substitute for the traditional type of thesis work.

5192, 5292, 5392. SELECTED TOPICS IN ACCOUNTING. In depth study of selected topics in accounting. May be repeated when topics vary. Prerequisite: consent of instructor.

5398, 5698, 5998. THESIS. Prerequisite: permission of Graduate Advisor.

ADMINISTRATION PROGRAM

See Interdepartmental and Intercampus Programs, p. 185.

Department of AEROSPACE ENGINEERING (AE)

Areas of Study		*Degrees*
Aerospace Engineering		M.S., Ph.D.
Master's Degree Plan: Thesis		
Chairman: Donald D. Seath	306C Engineering	273-2603
Graduate Advisor: Donald R. Wilson	301C Engineering	273-2604

Graduate Faculty:

Professors Dalley, Fairchild, Gaines, Payne, Seath, Wilson
Associate Professor Stanovsky

OBJECTIVE

The overall objective of the aerospace graduate program is to develop in a student the ability to define a technical problem, establish an appropriate mathematical or experimental model based on a firm understanding of the physical nature of the problem, analyze the problem by theoretical, numerical, or experimental techniques, and evaluate the results. Although this ability is developed in the context of aerospace problems, it is applicable to the engineering of any physical system. The program is designed for a student with any of the following specific objectives:

1. A sound foundation in advanced mathematics, science, and engineering which will equip him well for research and development work or for further advanced study toward a doctoral degree in engineering.
2. A program of advanced study which allows specialization in one of the following areas:
   a. Atmospheric flight mechanics
   b. Stability and control
   c. Theoretical or applied aerodynamics
   d. Turbulence
   e. Aerospace propulsion
   f. Aeroacoustics
   g. Viscous fluid mechanics
   h. Hydro- and aero-physics of fluid pollution
   i. Structural mechanics
   j. Vibrations and dynamics

   } see Engineering Mechanics Program for course descriptions.

   k. Gas dynamics and MHD power generation
   l. V/STOL aerodynamics and dynamics
   m. Computational fluid dynamics
3. A balanced but non-specialized program of advanced study in aerodynamics, astronautics, flight dynamics, structural analysis, propulsion, and fluid mechanics, with emphasis on experimental techniques and modern mathematical analysis.

ADMISSION REQUIREMENTS

Applicants for the Master's Degree in aerospace engineering must meet the general requirements of the Graduate School as stated in the catalog section entitled "Admission Requirements and Procedures" to be considered for unconditional admission.

Applicants who do not meet all of the minimum criteria but nevertheless show promise of being able to complete the Master's program successfully will be considered for probationary admission. For applicants without prior formal training in engineering, the same minimum criteria will apply, and, in addition, their prior records will be reviewed for relevance to the intended program of study. In general, a specific program of remedial work will usually be required to remove any deficiencies that would prevent successful completion of the graduate program.

Students applying for the Ph.D. program will normally be expected to have qualifications exceeding the above-stated minimum requirements. In addition, their master's degree program will be closely reviewed for relevance to their intended program of studies for the Ph.D. degree.

DEGREE REQUIREMENTS

All students will be expected to be proficient in computer programming. No graduate credit will be granted for courses that are required in the undergraduate aerospace engineering curriculum. Normally, all master's and doctoral candidates in aerospace engineering shall enroll in the Graduate Seminar (Aerospace Engineering 5101) a minimum of three times (see course description). The final enrollment shall require an oral presentation of thesis/dissertation results. All candidates are encouraged to obtain an approved program of work early (in the second full semester or after 12 hours are completed).

Master of Science in Aerospace Engineering

The Master of Science degree in aerospace engineering is an advanced program of study consisting of a minimum of 24 credit hours of advanced course work, and six credit hours of an acceptable thesis. The thesis may be oriented towards either research or advanced engineering analysis and design. The Graduate Advisor should be consulted for specific degree requirements.

Doctor of Philosophy

The Ph.D. degree will be tailored to satisfy the individual student's aspirations in choice of the area of specialization, while at the same time providing a broad range of knowledge in the major technical areas comprising the field of aerospace engineering. The program will generally require two to three years of full-time study beyond the Master's degree and will include a scholarly dissertation that provides a valuable contribution to the state-of-the-art in aerospace engineering.

5101. GRADUATE SEMINAR (1-0). May be repeated as often as required. Enrollment mandatory for first semester graduate students and for students enrolled in AE 5398, 5698, 5998 or AE 6399, 6699, 6999 courses. Purpose is to acquaint peers and faculty with research in progress at UTA. During total enrollments in this course, student expected to present two seminars: ideally, the first to be when his problem area has been well-defined and the second as a "dry-run" for his oral defense. May be graded P/F.

5301. ADVANCED AERODYNAMICS (3-0). May be repeated for credit as topics change. Topics include: hypersonic aerodynamics, transonic aerodynamics, unsteady aerodynamics and optimum aerodynamic shapes.

5302. ADVANCED FLIGHT MECHANICS (3-0). Basic dynamics of vehicles, flight path analysis and optimization. May be repeated for credit as topics change. Prerequisite: permission of department.

5303. AERODYNAMICS OF WINGS AND BODIES (3-0). Application of classical potential theory to the analysis of the aerodynamics of wings and bodies. Knowledge of complex variable theory assumed.

5304. V/STOL AERODYNAMICS (3-0). Basic aerodynamics and dynamics are used to develop the important characteristics of rotary wing aircraft. Simple momentum, blade element, combined momentum-blade element, vortex theories are utilized to study the aerodynamics of the rotor in hovering and forward flight.

5305. BOUNDARY LAYER THEORY I (3-0). Conservation laws of a viscous fluid developed from integrated viewpoints. Prandtl's boundary-layer concepts and applications. Lie group theory provides scaling laws for solutions including jet, wake, stagnation flows. Similarities include Stokes, Heimenz, Falkner-Skan, von Karman, and Pohlhausen. Singular perturbations provide "Triple deck" modeling. Emphasis upon laminar flow. Prerequisite: a course in fluid mechanics.

5306. BOUNDARY LAYER THEORY II (3-0). Flow stability and transition as precursors of turbulence introduced. The Reynolds' equations, eddy viscosity, "Law of the wall," and "Law of the wake" lead to calculational schemes exercised upon computer. Statistical measurements, correlations, spectra ("PSD"), skewness and kurtosis treated from a phemonenological, not a probablistic view point. Emphasis is developing insights for calculation, measurement and modeling. Prerequisite: AE 5305 or approval of instructor.

5307. APPLIED AERODYNAMICS FOR DESIGN (3-0). Introduces non-aerospace engineering majors to sufficient fundamentals of aerodynamics theory to critically evaluate the effect of design features on aerodynamic performance, stability and control.

5308. ADVANCED V/STOL AERODYNAMICS (3-0). Assumes an introductory knowledge of rotary wing aerodynamics. Emphasizes the more sophisticated aspects of V/STOL aerodynamics, i.e. the effects of rotor system dynamics and kinematics, more exact representation of induced velocity fields, and wing-rotor interferences.

5309. V/STOL STABILITY AND CONTROL (3-0). Rotor control system kinematics and dynamics. Manual control strategies. System stability and control analysis. Stability augmentation system design. Prerequisite: AE 5312.

5311. ADVANCED ASTRONAUTICS (3-0). Topics include orbital mechanics, Keplerian mechanics, orbit determination, perturbations, numerical techniques, and applied optimal estimation. Course may be repeated for credit as topics change.

5312. ADVANCED DYNAMICS OF FLIGHT (3-0). Matrix-tensor development of equations of motion. Laplace transform analysis of response to control and gust inputs. Stability analysis by Bode and Root Locus Methods. Stability augmentation system synthesis.

5313. PREDICTION OF FLYING QUALITIES (3-0). Development of human pilot model. Analysis of vehicle motion with pilot in feedback loop. Criteria for satisfactory flying qualities. Stability and control augmentation systems. Prerequisite: AE 5312.

5314. MHD POWER GENERATION (3-0). Development of MHD equations and Ohm's law for electrical conduction in ionized gases. Application to the design and performance analysis of MHD power generator channels. MHD cycle studies, integration with conventional fossil and nuclear power plants. Also offered as ME 5314, but credit granted only once.

5315. PLASMADYNAMICS (3-0). Review of electromagnetic field theory, development of equilibrium and non-equilibrium kinetic theory of an ionized gas, study of interactions between an ionized gas and electromagnetic field, application of plasmadynamics to MHD power generation, gasdynamic lasers, and controlled fusion. Also offered as ME 5315, but credit granted only once.

5316. ADVANCED APPLIED AIRFOIL THEORY (3-0). Application of potential flow theory and boundary layer theory to the problem of optimum design of airfoils, wings, bodies and combinations thereof.

5317. VISCOUS FLUID MECHANICS (3-0). Classic "real world" flows, i.e., very slow flow (lubrication and bio-capillary), boundary-layers (airfoils, river beds), wakes (of airfoils, ships, buildings), jets (propulsive and entraining), acoustic-fluid interactions (noise pollution) and non-Newtonian flow regimes. Prerequisite: a course in fluid mechanics.

5318. INTRODUCTION TO TURBULENCE (3-0). Phenomenological approach to develop classical methods for understanding turbulent flows; for example, jet, wake, and boundary layer flows. Survey of modern approaches to predictive and correlative techniques. Emphasizing development of the student's intuition for treating natural turbulent flows. Prerequisite: approval of the instructor.

5319. HOMOGENEOUS TURBULENCE (3-0). Emphasizes mathematics and intuitive foundations of turbulence. Uses probability theory to describe homogeneous turbulent flow characteristics such as velocity co-variances and the kinetic energy spectrum. Prerequisite: approval of the instructor.

5320. NON-HOMOGENEOUS TURBULENCE (3-0). Theoretical results applied to flows of interest to the practicing engineer. The "Law of the Wall," "Eddy Viscosity," and "Mixing Length" concepts applied to flows over flat and curved surfaces including roughness and pressure gradients. Prerequisite: approval of instructor.

5321. LARGE-SCALE STRUCTURE OF TURBULENT SHEAR FLOWS (3-0). The nonlinearities ("Large Eddy" and "Spectral Transfer") of "real" turbulence and their implications for design of submerged vehicles. "Second" order approaches have been successful in predicting values and variation of the "eddy viscosity" function.

5325. COMBUSTION (3-0). Fundamental treatment of problems involving simultaneous occurrence of chemical reaction and transfer of heat, mass, and momentum. Also offered as ME 5325, but credit granted only once.

5326. ADVANCED PROPULSION (3-0). Development of thrust and efficiency equations, thermodynamic cycle analysis, cycle design methods of aerospace propulsion systems, component performance analysis methods, component matching and dynamic interactions, and vehicle/propulsion-system interactions. Also offered as ME 5326, but credit granted only once.

5330. FLOW STABILITY AND TRANSITION TO TURBULENCE (3-0). Laminar flow stability predicted by the linear methods of small perturbation theory and integral techniques for arbitrary strength and form of disturbance so that transition-onset and development can be calculated. Matched asymptotic expansion techniques developed for singular perturbation problems. Prerequisite: approval of instructor.

5340. EXPERIMENTAL METHODS IN TURBULENCE I (2-3). May be repeated for credit. Techniques presented include hot-wire and hot-film anemometers, laser-Doppler and laser-interferometer, hot-thermister, "high response" pressure sensors, fluid "tracers" and other techniques. Student will participate actively in the selection, design, and execution of flow experiments. Prerequisite: approval of instructor.

5342. ADVANCED GASDYNAMICS I (3-0). Review of fundamental compressible flow theory. Introduction to compressible flow with friction and heat transfer, linearized two-and three-dimensional flow theory, and method for characteristics for perfect gases. Also offered as ME 5342, but credit granted only once.

5343. ADVANCED GASDYNAMICS II (3-0). Survey of kinetic theory, statistical mechanics, and chemical reaction rate theory. Application to the prediction of thermodynamic properties of gases and the analysis of problems in high-temperature gasdynamics. Also offered as ME 5343, but credit granted only once.

5191, 5291, 5391. ADVANCED STUDIES IN AEROSPACE ENGINEERING. May be repeated for credit. May be graded P/F.

5398, 5698, 5998. THESIS. Prerequisite: graduate standing in aerospace engineering. Co-requisite: AE 5101.

6197-6997. RESEARCH IN AEROSPACE ENGINEERING. May be repeated for credit.

6399, 6699, 6999. DISSERTATION. Prerequisite: admission to candidacy for the Doctor of Philosophy degree. Co-requisite: AE 5101.

ARCHITECTURE
Program (ARCH)

Area of Study			*Degree*
Architecture			M. ARCH.

Master's Degree Plans: Thesis and Thesis Substitute

Dean, School of Architecture and Environmental Design: George S. Wright	335 Fine Arts	273-2801
Director of Architecture: John McDermott	329 Fine Arts	273-2801
Graduate Advisor: Richard Scherr	331 Fine Arts	273-2801

Graduate Faculty:

Professors Antoniades, McDermott, Myrick, G. Wright
Associate Professors Boswell, Brooks, Duncan, Ferrier, Hamilton, Henry, McBride, Pinno, Price, Scherr, Spears
Assistant Professors Elledge, Guy, Windham, Yardley

OBJECTIVE

The professional Master of Architecture degree is an accredited degree that affords opportunities for advanced studies, specialization and research in architecture, and studies in related environmental design disciplines. The program is designed to provide an educational experience that will allow each individual to accept an active role in society with the responsibility of making sound judgments in shaping the physical environment.

Degree options in Environmental Studies and in Interior Architecture are offered in this program but are not accredited and are not intended to be substitutes for the professional degree program. The objective of the Environmental Studies option is to relate societal goals with the many complex problems facing the built environment and to prepare students to meet the future through environmental involvement. The Interior Architecture option is designed to prepare competent professionals with capabilities of specializing in specific areas of interior design and research.

ACCREDITATION

The professional Master of Architecture degree is accredited by the National Architectural Accrediting Board.

DEGREE REQUIREMENTS

The applicant must meet the general requirements of the Graduate School. A personal interview is recommended, and letters of reference are required. All graduate students in architecture programs are required to consult the Graduate Advisor to obtain course and schedule approval each semester prior to registration.

Applicants to the professional degree programs I and III must submit a portfolio of work for evaluation by the School. Professional degree program students must demonstrate reasonable proficiency in working drawings by either: (1) presenting evidence of similar experience gained in an architect's office, or (2) passing ARCH 4346 and 4347 or a similar course as an undergraduate or graduate student.

Undergraduate students must have approval of the Graduate Advisor prior to enrollment in graduate courses.

Professional Degree Program I

For applicants who hold a Bachelor of Science in Architecture degree or the equivalent from an accredited college or university.

A minimum of 54 credit hours is required for the thesis option or 57 for the thesis substitute option. Requirements include a six hour thesis, or an individual problem with comprehensive examination.

The core curriculum of 39 semester hours required for this program of study is one graduate course in architectural history as well as **ARCH 5325, 5326, 5329, 5330, 5331, 5350,** 12 hours of design studio, and either **5698,** or **5593** with **5194.** Students in the thesis substitute option must also take ARCH 5363.

One graduate course in architectural history, ARCH 5330, and six hours of design studio must be completed by the end of the first two semesters attended by the graduate student unless otherwise permitted by the Graduate Advisor.

The remaining 15 semester hours are taken in appropriate electives selected by the student with the direction and approval of the Graduate Advisor.

Suggested Course Sequence: Program I

First Year

Fall Semester	*Spring Semester*
5325 Environmental Control Systems	5326 Environmental Control Systems
5330 Comparative Structures	5329 Computers and Environmental Design
5670 Design Studio	5670 Design Studio
Electives: 3 hours	Electives: 3 hours (Architectural History)

Second Year

Fall Semester	*Spring Semester*
5331 Professional Practice	5350 Construction Documents
5363 Design Research (for Thesis Substitute Option)	5593 Individual Problems
	5194 Masters Comprehensive Exam
	or
	5698 Thesis
Electives: 9 hours	Electives: 6 hours (Thesis Substitute Option)
	3 hours (Thesis Option)

Professional Degree Program II

For applicants who hold a degree but do not meet the minimum requirements of a Bachelor of Science in Architecture.

Students in Program II shall complete a Basic Course Series in architecture theory and practice including: 5303, 5304, 5323, 5324, 5327, 5328, and 18 hours of design, or equivalent courses. (These courses are not open to students in Program I or Program III except as approved by the Graduate Advisor.) Some of these courses may be waived by the faculty for students who demonstrate ability that warrants advanced standing. Students with undergraduate backgrounds deficient in science and mathematics may be advised to add such courses to the Basic Course Series. Students must begin the basic studio series in the Fall semester, and are encouraged to take a full load of 15 hours for Fall and Spring semesters unless otherwise approved by the Graduate Advisor. After completing the Basic Course Series, Program II students will meet the requirements of Program I.

Suggested Course Sequence: Program II

Fall Semester	*Spring Semester*
5303 History of Environmental Design	5304 History of Environmental Design
5323 Construction Materials and Structural Concepts	5327 Structures II
5324 Structures I	5691 Design Studio: Levelling
5691 Design Studio: Levelling	

Summer Semester

5328 Structures III
5691 Design Studio: Levelling

Professional Degree Program III

For applicants who hold a five-year professional degree in architecture (BArch) or a four year degree in architecture and acceptable professional experience including registration.

Thirty semester credits are required of students in Program III with thesis, while 33 hours will be required of students with a thesis substitute. A minimum of 18 hours are required in architectural program courses, including six hours of history/theory seminar or lecture courses, as well as thesis or thesis substitute and the comprehensive examination. Students are also required to take a design studio, which may be waived by student request if design proficiency or equivalent experience has been demonstrated. The remainder of the work will be arranged with and approved by the Graduate Advisor to suit the interests of the student. Courses of study may provide for an area of specialization or for advanced general studies.

Suggested Course Sequence: Program III

Fall Semester

History/Theory Lecture or Seminar: 3 hours
5670 Design Studio
5363 Design Research (for Thesis Substitute Option)

Electives: 3 hours

Spring Semester

History/Theory Lecture or Seminar: 3 hours
5593 Individual Problems
5194 Masters Comprehensive Exam
or
5698 Thesis
Electives: 9 hours (Thesis Substitute Option)
6 hours (Thesis Option)

Environmental Studies Option

This option requires 60 semester hours of work including one graduate course in architectural history as well as ARCH 5325, 5326, 5351, 5352, 5363, 12 hours of design, and nine hours of thesis (5397, 5698). In addition, candidates must complete 21 hours of approved electives.

Applicants should consult the Graduate Advisor for the specific requirements for this option prior to admission to the program. All curricula for this option must be approved in advance of registration by the Graduate Advisor.

Interior Architecture Option

This option requires 60 semester hours of work including one graduate course in architectural history as well as ARCH 5325, 5326, 5360, 5361, 5362, 5363, 12 hours of design studio, nine hours of thesis (5397 and 5698), and 18 hours of approved electives.

Applicants should consult the Graduate Advisor for the specific requirements for this option prior to admission to the program. All curricula for this option must be approved in advance of registration by the Graduate Advisor.

JOINT M.C.R.P. AND M.ARCH. DEGREE PROGRAM

Students in the joint program can earn both the Master of City and Regional Planning and the Master of Architecture degrees in a curriculum of 84 semester credit hours. Applicants must meet the admission requirements of both the MCRP and the MArch programs. City and Regional Planning students wishing to earn the MArch degree will be required to take Program II (see above) unless they have earned an undergraduate degree in architecture. Programs of study will follow both master's programs, with all of the 15 credit hours of electives in the MArch program to be taken in the MCRP program. In addition to the 33 credit hours of architectural core courses, the remainder of coursework will be in the City and Regional Planning program

with a required thesis to be supervised by a member of the City and Regional Planning faculty.

Course selection and programs of study should be designed with the assistance of the Graduate Advisors in both areas. Only in special instances may students select the thesis substitute plan of the MCRP program. The successful candidate will be awarded both degrees rather than one joint degree.

5194. MASTER'S COMPREHENSIVE EXAMINATION. Directed study, consultation, and comprehensive examination over course work, leading to the thesis-substitute Master of Architecture degree. Graded P/F. Required of all thesis-substitute M.Arch. students in the semester in which they plan to graduate. Prerequisite: concurrent enrollment in ARCH 5593.

5303. HISTORY OF ENVIRONMENTAL DESIGN (3-0). Historical and analytical review of the art of architecture and environmental design with the physical, religious, social, economic, and political factors which shaped them from pre-history through the Middle Ages. Prerequisite: permission of instructor.

5304. HISTORY OF ENVIRONMENTAL DESIGN (3-0). Historical and analytical review of the art of architecture and environmental design with the physical, religious, social, economic, and political factors which shaped them from the Renaissance to the present. Prerequisite: ARCH 5303 and permission of instructor.

5306. URBAN DESIGN (3-0). Urban design theory, method, and implementation using contemporary and historic examples.

5308. HISTORY OF URBAN FORM (3-0). History of urban form, considered as the product of political, economic and social forces. Prerequisite: permission of instructor.

5309. MODERN ARCHITECTURE (3-0). Detailed consideration of principal theories, designers and monuments of modern architecture. Prerequisite: permission of instructor.

5310. AMERICAN ARCHITECTURE (3-0). Detailed consideration of the architecture of the United States from the 17th century to the present, with special attention to the great and little masters of the field. Prerequisite: permission of instructor.

5311. ARCHITECTURAL THEORY (3-0). A review and analysis of the concepts, philosophy, ideology, and models that promulgated 20th Century architectural design. Prerequisite: permission of instructor. May be repeated for credit as topics change.

5313. HISTORIC RESTORATION AND ADAPTIVE RE-USE (3-0). Investigation of methods and procedures used in restoration of buildings, including building diagnostics, re-fabrication of architectural details, cleaning and waterproofing, structural investigation and reinforcement; examination of office procedures and practice, production of measured drawings, photogrametry, code investigation, working drawing techniques and problems of aesthetic integrity/design retrofit.

5314. HISTORIC PRESERVATION (3-0). Concepts of historic preservation as expressed in legislation, institutions and actual projects. Lectures and case studies designed to familiarize the student with methods of architectural and bibliographic research, preservation legislation, historic certification procedures, economic strategies, and current problems in adaptive use of historic landmarks.

5315. SELECTED TOPICS IN ARCHITECTURAL HISTORY (3-0). Lecture courses to explore and present selected topics in architecture and environmental design of the Ancient Mediterranean, the Classical World, the Middle Ages, the Renaissance and Baroque, the Nineteenth Century, and the Non-Western Traditions. May be repeated for credit as topics change. Prerequisite: permission of instructor.

5319. HOUSING DESIGN (3-0). Evolution of housing from the end of the 19th century to the present with particular emphasis on contemporary design methods, techniques and solutions.

5321. ADVANCED COMPUTER APPLICATIONS (3-0). The study and application of specialized computer programs in environmental design. Prerequisite: ARCH 4329 or 5329 or the equivalent, and permission of the instructor.

5323. CONSTRUCTION MATERIALS AND STRUCTURAL CONCEPTS (3-0). Nature of materials and structural concepts as used in the construction process. Prerequisite: permission of instructor.

5324. STRUCTURES I (3-0). Introduction to architectural structures related to construction materials, including statics and strength of materials. Prerequisite: permission of instructor.

5325. ENVIRONMENTAL CONTROL SYSTEMS (3-0). Illumination, acoustics, climate controls, mechanical and electrical systems, and their significance in the total design.

5326. ENVIRONMENTAL CONTROL SYSTEMS (3-0). Continuation of ARCH 5325.

5327. STRUCTURES II (3-0). Continuation of ARCH 5324 presenting the theory of structural design of timber and in structural steel. Prerequisite: ARCH 5324.

5328. STRUCTURES III (3-0). Continuation of ARCH 5327 which presents the theory of structure design in masonry and in reinforced concrete. Prerequisite: ARCH 5327.

5329. COMPUTERS AND ENVIRONMENTAL DESIGN (3-0). Range and potential of digital computer applications in the environmental design professions. Prerequisite: permission of the instructor.

5330. COMPARATIVE STRUCTURES (3-0). Comparative analysis and design of structural systems and construction techniques, including architectural and economic determinants.

5331. PROFESSIONAL PRACTICE (3-0). Survey of the administrative functions, and the ethical and legal responsibilities of the architect.

5332. ENERGY USE AND CONSERVATION IN ARCHITECTURE (3-0). Concepts of the efficient use and conservation of energy and their embodiment in the built environment. Prerequisite: permission of the instructor.

5333. CONSTRUCTION METHODS AND ESTIMATING (3-0). Construction methods and techniques, quantity calculations, and estimate of cost in place. Prerequisites: ARCH 5323 and 5324.

5334. CONSTRUCTION MANAGEMENT (3-0). Study of the administrative and management techniques applied to the unique requirements of construction. Prerequisites: BUSA 3311, 3312, and 4320, or permission of instructor.

5335. CONSTRUCTION SCHEDULING AND COST CONTROL (3-0). Application of management processes and computer assisted calculations to the problems of scheduling construction performance, budgeting, and cost control. Prerequisites: CSE 1201 and ARCH 5333.

5341. DEVELOPMENT PROCESSES (3-0). Comprehensive study of the principles and institutions involved in the process of building development from concept to occupancy.

5350. CONSTRUCTION DOCUMENTS (3-0). Seminar structured to study the documents necessary for the construction of buildings.

5351. ENVIRONMENTAL DESIGN (3-0). Seminar surveying the inter-relationships of physical design and related aspects of civilization.

5352. ENVIRONMENTAL DESIGN DECISION MAKING (3-0). Study of the process of decision making in shaping the built environment.

5360. THEORY OF INTERIOR DESIGN (3-0). Seminar on theories of interior design and the ethics of the profession.

5361. INTERIOR ELEMENTS (3-0). Seminar involving research in the application and detailing of textiles, finishing materials, furnishings, lighting, mechanical and electrical systems, and the codes and regulations pertaining to these elements.

5362. FURNITURE SYSTEMS AND DESIGN (2-4). Studio in the investigation, design, and construction of furniture units and systems. Prerequisite: ARCH 4369 or equivalent.

5363. DESIGN RESEARCH (3-0). Seminar directed toward the understanding of research methods and the programming of an independent design project, leading to the thesis substitute.

5670. DESIGN STUDIO: ARCHITECTURAL PROJECTS (3-12). Studio in programming and design development of buildings and groups of buildings. Required as the first graduate design course in Programs I and II. May be repeated for credit.

5691. DESIGN STUDIO: LEVELING (3-12). Design studio intended for Program II students to prepare them for entry into Program I. Repeated twice, with sequence beginning in Fall only.

5593. INDIVIDUAL PROBLEMS IN ARCHITECTURE. Required of all thesis-substitute candidates. Individual study project conducted by a supervising committee, with program and statement of intent filed with the Graduate Advisor during the previous semester. Prerequisite: ARCH 5363 and concurrent enrollment in ARCH 5194.

5381, 5681. PRACTICUM (0-16). Internship program including work done through an approved architect's office, designed to give practical experience leading to a broader knowledge of the profession. Placement in offices must be approved, and in some cases may also be arranged by the SAED. Students may enroll in 5381 for half-time employment or 5681 for full-time employment. Students enrolled in Practicum may also participate in the Intern Development Program of the American Institute of Architects. No more than six total credit hours in Practicum are allowed for degree. Graded P/F.

5191, 5291, 5391. CONFERENCE COURSE. Special subjects and issues as arranged with individual students and faculty members. May be repeated for credit.

5195-5695. SELECTED TOPICS IN ARCHITECTURE. Studio lecture and seminar courses to explore and present selected topics in architecture and environmental design. May be repeated for credit as topics change.

5698. THESIS. Independent research and presentation of findings under direction of a supervising committee. May be repeated, but only six hours may be counted toward degree.

Department of ART (ART)

Area of Study		*Degrees*
Humanities (See Interdepartmental and Intercampus Programs.)		M.A., Ph.D.
Chairman: Vincent Bruno	144 Fine Arts	273-2891

Graduate Faculty:

Professors Bruno, Merrill, Turner
Associate Professors Keens, Rascoe

OBJECTIVE

The graduate course offerings in art are provided to support other graduate degree programs, for example, an art history concentration in Humanities, and to meet the express needs of students. No program leading to a graduate degree in art exists at this time.

5302. ART AS THERAPY (3-0). Examination of uses recently made of art as medium for psychological testing and diagnosis and as method of treatment in therapy programs. Function of art as therapy in a wide variety of specific contexts, as for example, in educational programs designed for retarded children and in programs for rehabilitation and reorientation of criminals in prisons. May be repeated for credit as the area of emphasis changes.

5320. HISTORY OF ART CRITICISM (3-0). Survey of the sources of art history and its literature from classical antiquity to the modern period.

5391. INDEPENDENT STUDY (3-0). Independent research projects in art. Must be stated in writing and approved by supervising faculty and Graduate Advisor prior to registration. May be repeated for credit.

6330. SEMINAR IN SPECIAL TOPICS IN ART HISTORY AND CRITICISM. May be repeated for credit as the topic changes.

6391. READINGS IN ART HISTORY.

Department of BIOLOGY (BIOL)

Area of Study		*Degree*
Biology		M.S.
Mathematical Sciences (See Interdepartmental and Intercampus Programs.)		Ph.D.

Master's Degree Plans: Thesis and Non-Thesis

Chairman: William C. McDonald	337 Life Science	273-2871
Graduate Advisor: John D. Bacon	237 Life Science	273-2871

BIOLOGY

Graduate Faculty:

Professors Arnott, Hall, Hellier, McCrady, McDonald
Associate Professors Bacon, Boley, Bragg, Butler, Frye, McMahon, Neill, Phillips, Stewart, Whitmore
Assistant Professors Campbell, Chrzanowski, Robinson, Sandgren, Smatresk

OBJECTIVE

The program leading to the degree of Master of Science in biology is designed to provide graduate education which will prepare students to pursue vocations in industry, government, and teaching, and to pursue further graduate education leading to the doctorate.

ADMISSION

In addition to the general regulations and admission requirements stated elsewhere in this catalog, the student must present to the department a satisfactory score on the Graduate Record Examination including the Advanced Test in biology. Competency in a foreign language is also required and may be demonstrated by credit in an approved language at the sophomore level or by successful completion of an examination administered by the Foreign Language Department. International students whose native language is not English must present a minimum TOEFL score of 575.

DEGREE REQUIREMENTS

Supporting work outside the student's major area may be taken in botany, chemistry, geology, mathematics, microbiology, physics, and zoology. Approved courses in civil engineering, philosophy, psychology, and sociology may also be taken in support of the student's program.

The non-thesis plan is designed to meet the needs of practicing teachers or those intending to enter the teaching profession. Students enrolled in the thesis-plan program are required to take 18 hours of formal course work excluding 5101, 5291, 5391, 5193-5693, 5398, 5698 and 5998.

5101. SPECIAL TOPICS IN BIOLOGY (1-0). Seminar on significant biological research. May be repeated for credit. Prerequisite: consent of faculty.

5200. SEMINAR ON SCIENCE AS A PROFESSION (2-0). Use of scientific literature including computer data bases, fundamentals of technical writing including grants and proposals, investigation of scientific societies, exploration of career opportunities in specific disciplines. Prerequisite: consent of graduate advisor. P/F only.

5211. HISTORY OF BIOLOGY (2-0). Trends of thought in the biological sciences with emphasis on notable contributors. Philosophical systems dealing with biological concepts in western civilization are stressed. Prerequisite: consent of instructor.

5290. EXPERIMENTAL METHODS IN BIOLOGY (1-3). Theory and practice of commonly used techniques in biological research. Content may be routinely changed to provide a wider scope of methods than can be offered in one semester. **$4 lab fee.**

5302. MICROBIAL GENETICS (3-0). Consideration of the physical, chemical, and functional nature of the genetic processes in micro-organisms. Prerequisites: BIOL 2451 and 3315 or their equivalents.

5303. DEVELOPMENTAL BIOLOGY (3-0). Discussion of regulatory mechanisms associated with cyto-differentiation and morphogenesis. Prerequisites: BIOL 3446 and 3315, or consent of instructor.

5304. ENVIRONMENTAL BIOLOGY (3-0). Primarily for non- biologists. Includes general concepts of ecosystems and biological principles as applied to environmental health, environmental impact analysis, environmental law, pollution, and land planning.

5306. BIOENERGETICS (3-0). The use of quantitative analysis of energy resource partitioning to study the evolution of adaptational strategy at the cellular, individual and population levels, including quantitative analysis of physiological processes and life history adaptations in terms of energetic efficiency. Prerequisite: consent of instructor.

5310. SELECTED TOPICS IN BIOLOGY (3-0). Topics may vary depending on the needs and interests of the students. May be repeated for credit. Prerequisite: consent of the student's thesis committee and the current course instructor.

5311. EVOLUTION (3-0). Study of the origin of living systems and the mechanism of their evolution. Prerequisite: BIOL 3315 or equivalent.

5312. CELLULAR IMMUNOLOGY (3-0). The origin, distribution, major functions, and interactions of various cell types involved in the vertebrate immune response. Prerequisite: consent of instructor.

5313. IMMUNITY TO PARASITES (3-0). Immune responses of invertebrates and vertebrates to protozoan and metazoan parasites. Emphasis on mechanisms by which parasites modify immunological responsiveness of hosts. Prerequisite: BIOL 3312.

5314. BIOMETRY (3-0). An examination of statistical methods and procedures in relation to the design of biological experiments and the analysis of their results. Prerequisite: consent of instructor.

5315. COMMUNITY ECOLOGY (3-0). An investigation of the effects of interspecific interactions on the distribution and abundance of organisms. Prerequisite: consent of the instructor.

5316. ADVANCED EVOLUTIONARY BIOLOGY (3-0). An analysis of existing biological phenomena with regard to their selective advantage in biological systems. Prerequisite: 5311 or consent of instructor.

5320. BIOGEOGRAPHY (3-0). The role of natural and artificial transport, population pressure and limiting agencies are examined in the light of the patterns of distribution of living organisms. Prerequisite: consent of instructor.

5335. ANIMAL BEHAVIOR (3-0). Phylogenetic approach to some basic problems in behavior, with special emphasis on unlearned behavior. Same as PSYC 5335.

5339. PHYSIOLOGICAL ECOLOGY (3-0). Survey of the physiological adaptations of animals to their environments. Emphasizes physiological variation and acclimation and the evolution of physiological processes. Prerequisite: consent of the instructor.

5341. PLANT ECOLOGY (2-3). Development and structure of; plant communities; interactions of environmental factors and of organisms within a community; literature in plant ecology. Prerequisite: consent of instructor. **$2 lab fee.**

5342. ICHTHYOLOGY (2-3). Classification, anatomy, physiology and natural history of fishes. Prerequisite: consent of instructor. **$4 lab fee.**

5343. HERPETOLOGY (2-3). Systematics, speciation and adaptive mechanisms of reptiles and amphibians. Prerequisite : consent of instructor. **$4 lab fee.**

5344. MAMMALOGY (2-3). Taxonomy, population dynamics, distribution and evolution of mammals. Laboratory includes preparation and identification of specimens and the practice of field techniques. Prerequisite: consent of instructor. **$4 lab fee.**

5345. ORNITHOLOGY (2-3). Anatomy, physiology, identification, population dynamics and ethology of birds. Laboratory includes field identification, preparation of specimens, and field study techniques. A weekend field trip is required. Prerequisite: consent of instructor.

5346. BIOLOGY OF THE MOLLUSCA (2-3). Survey of the classification, evolution, ecology, physiology and ethology of the Mollusca. Emphasizes the adaptive radiation of the major subgroups and the evolution of structure-function relationships within the phylum. Laboratory involves the study of living and preserved specimens and the study of molluscs in natural Texas environments. **$4 lab fee.**

5351. BIOLOGICAL ULTRASTRUCTURE (3-0). Techniques of analyzing ultrastructural data derived from animal, plant, and microbial sources. Examination of cells and organelles as revealed by the electron microscope and other techniques. Emphasis on analysis of ultrastructural data.

5352. BIOLOGICAL ELECTRON MICROSCOPY (2-3). Theory and practice of specimen preparation and electron microscopy of biological specimens. Prerequisite: consent of the instructor. **$4 lab fee.**

5353. SCANNING ELECTRON MICROSCOPY (1-4). Principles and operation of the Scanning Electron Microscope (SEM). Training in the use of ISI M7 and JEOL 35C instruments. Specimen preparation for SEM included in the lectures and laboratory. Open to non-biologists. Prerequisite: consent of the instructor. **$2 lab fee.**

5354. MEDICAL MYCOLOGY (2-3). Study of representative fungi pathogenic in men and other animals. Methods and techniques used in studying these fungi and common contaminants. Prerequisite: 12 hours of biological science including a course in microbiology and mycology or permission of instructor. **$4 lab fee.**

5355. AQUATIC BIOLOGY (2-3). Ecological relationships in aquatic ecosystems with empha-

sis on those of freshwater; laboratory concerned with the pond, stream, and reservoir habitats of the Southwest. Prerequisite: BIOL 4347 or consent of instructor.

5359. ADVANCED GENETICS (2-3). Lectures and seminars presenting modern interpretations of linkage and crossing-over, chromosomal aberrations, gene mutations, extranuclear inheritance, and behavioral genetics of eukaryotes. Laboratory experimentation with Drosophila includes population studies, mutation induction, and characterization of unknown mutants in Drosophila. Prerequisite: consent of instructor. **$4 lab fee.**

5291, 5391. INDIVIDUAL PROBLEMS IN BIOLOGY. Individual research projects supervised by a staff member. Prerequisite: consent of staff.

5193-5693. RESEARCH IN BIOLOGY. Conference course in which the student undertakes intensive investigation of topics under the supervision of a staff member. Prerequisite: consent of instructor.

5440. BACTERIAL PHYSIOLOGY (3-3). Advanced survey of catabolic and anabolic metabolism of bacteria including a discussion of control of the major metabolic pathways. Laboratory will consist of demonstration and seminars. Prequisite: consent of instructor.

5442. VERTEBRATE PHYSIOLOGY (3-3). Environmental approach to the study of physiological regulation, including consideration of energy metabolism, responses to temperature, water and solute metabolisms, oxygen transport, and acid-base regulation. Topics discussed in relation to current literature. Each student will select a small research project to be completed under supervision of instructor. Prerequisite: consent of instructor.

5447. PLANKTON ECOLOGY (3-3). Overview of current theory and techniques associated with studies of phytoplankton and zooplankton ecology, including physiological adaptations, life history strategies, competition, grazing and temporal and spatial organization. Emphasis on reservoir systems. Prerequisites: BIOL 3455 or 4347; one ecology course, or instructor's permission. **$4 lab fee.**

5449. PARASITOLOGY (3-3). Lecture deals with ecology of parasites, morphologic and physiologic adaptations to parasitic way of life, host adaptations to parasitism, and effects of parasites on hosts. Laboratory deals with clinical and veterinary parasitology, animal dissections, diagnosis of parasitic infections, and identification of parasites. Prerequisite: 16 hours of laboratory biology. **$5 lab fee.**

5451. ACAROLOGY (3-3). Taxonomy of mites and their near relatives, with emphasis on identification and biology. Laboratory involves collection and processing of specimens as well as preparation of a collection. Prerequisite: consent of instructor. **$4 lab fee.**

5455. MICROBIAL ECOLOGY (2-6). Advanced treatment of concepts involving interrelationships between micro-organisms and their environment in light of current literature. Lectures and seminars will focus on the roles of micro-organisms in the major nutrient cycles. Field and laboratory work includes sampling procedures and techniques to measure microbial activities. Prerequisite: consent of the instructor. **$8 lab fee.**

5398, 5698, 5998. THESIS. Prerequisite: consent of faculty

The following courses may be taken for graduate credit subject to approval by the student's committee and the limitations stated in the general requirements for the Master of Arts degree.

4312. INTRODUCTION TO VIROLOGY
4315. GENERAL ENDOCRINOLOGY
4317. DEVELOPMENTAL BIOLOGY
4340. PLANT PHYSIOLOGY
4343. PLANT ANATOMY
4347. LIMNOLOGY
4357. RESEARCH METHODS IN CELL BIOLOGY
4361. METHODS OF IMMUNOLOGY
4392. BIOLOGICAL MATERIALS FOR TEACHERS
4445. ADVANCED GENERAL MICROBIOLOGY
4465. PHYCOLOGY
4680. FIELD BIOLOGY

BIOMEDICAL ENGINEERING Program

See Interdepartmental and Intercampus Programs, p. 191.

BUSINESS ADMINISTRATION Program

See Interdepartmental and Intercampus Programs, p. 195.

Department of CHEMISTRY (CHEM)

Areas of Study	*Degree*
Chemistry	M.S.
Applied Chemistry	D.Sc.
Mathematical Sciences (See Interdepartmental and Intercampus Programs.)	Ph.D.

Master's Degree Plans: Thesis, Thesis Substitute, and Non-Thesis

Chairman: Richard B. Timmons — 219 Science Hall — 273-3171

Graduate Advisor: Dennis Marynick — 300H Science Hall — 273-3814

Graduate Faculty:

Professors Baker, Francis, Girardot, Martin, Pomerantz, Schelly, Ternay, Timmons
Associate Professors Bellion, Brown, Marynick
Assistant Professors Ho, Rajeshwar

OBJECTIVE: MASTER OF SCIENCE

The objectives of the Chemistry Department's program leading to the Master of Science degree include (a) developing the individual's ability to do independent research, (b) preparing students for more advanced study in chemistry and (c) providing advanced training to professional chemists and those employed in technical and business areas in which chemistry at this level is necessary for efficient performance. The areas of specialization are analytical chemistry, biochemistry, inorganic chemistry, organic chemistry, and physical chemistry.

MASTER'S DEGREE REQUIREMENTS

A candidate for graduate study must satisfy the general admission requirements of the Graduate School and his or her academic record must show preparation for advanced work in chemistry.

CHEMISTRY

Master's Degree With Thesis

A minimum of 18 hours in chemistry from courses listed in the *Graduate Catalog* will be required, including no more than three of the following: 5216, 5242, 5306, 5314, 5319, 5320, 5346, 5461. Twelve of these hours should be from Chemistry 5301, 5305, 5311, 5315 and 5321. Electives may be senior or graduate division courses in a science or engineering subject selected by the candidate with the approval of the Graduate Advisor.

Master's Degree With Thesis Substitute

Admission to the program requires approval of the Graduate Studies Committee. Minimal registration in a project course (CHEM 5391 or 5691 *or* CHEM 5392 or 5692) is also required. At the time the degree is awarded the candidate is expected to have completed at least five years of suitable *professional* experience in an industrial, government, or other chemistry laboratory.

All potential applicants MUST contact the Graduate Advisor prior to registration.

Combined BS/MS Program

This accelerated program is designed for students wishing to spend minimum time in completing the requirements for the BS and MS degrees in chemistry. Although a student's progress cannot be foretold, it may be possible for some students to earn both degrees in five years. Program details are given in the current undergraduate catalog. Entry into the program is most easily made during the first three years of undergraduate study but will be permitted only after approval of Undergraduate and Graduate Advisors. Participants must reserve graduate credit for two graduate courses taken in the second semester of the senior year. Successful participants will be granted, sequentially, BS and MS degrees.

OBJECTIVE: DOCTOR OF SCIENCE

The program leading to the Doctor of Science in Applied Chemistry is designed primarily to prepare doctoral-level chemists for Industrial research careers. The student must (1) acquire the practical knowledge of the type of research conducted in industry and of the constraints (both practical and philosophical) under which such research is conducted; and, (2) demonstrate the ability to carry out independent research. The areas of specialization are analytic chemistry, biochemistry, inorganic chemistry, organic chemistry, and physical chemistry.

D.SC. DEGREE REQUIREMENTS

To be admitted to the Doctor of Science program, an applicant must satisfy the general admission requirements of the Graduate School and his or her academic record must show preparation for advanced work in chemistry.

Each candicate must complete the following program requirements:

(1) Core courses:

CHEM 5301 Physical Chemistry
CHEM 5305 Organic Chemistry
CHEM 5315 Inorganic Chemistry
CHEM 5346 Advanced Synthetic Methods
CHEM 5311 Analytical Chemistry
CHEM 6201 Industrial Chemical Problems Seminar
CHEM 6301 Unit Operations
CHEM 6302 Principles of Industrial Chemistry
CHEM 6303 Regulatory Aspects of the Chemical Industry
IE 5327 Information Systems for Engineering Management Decisions
ENGL 5350 Advanced Technical Writing

(2) Internship: **CHEM 6304, CHEM 6904**

(3) Additional research and elective courses chosen according to the student's dissertation topic and area of specialization under the guidance of the supervising committee.

Within two years of admission to the doctoral program, the student must pass the cumulative

examinations administered by the Department. The candidate must also demonstrate proficiency in German and a computer language.

5101. SEMINAR IN CHEMISTRY (1-0). Two semesters of registration required of all graduate students. May not be counted for credit toward the degree requirements. Every student is expected to present one seminar to the Chemistry Department during the two-semester period. Includes learning how to prepare, present, and defend an oral presentation. Seminar topics are selected with the assistance of the instructor and may include both pure and applied chemistry. Graded P/F only.

5139. SCIENCE OF GLASSBLOWING (1-3). Structure and physical properties of glasses. Basic techniques of glassblowing. Scientific and artistic uses of glass. Graded P/F only.

5200. SEMINAR ON SCIENCE AS A PROFESSION (2-0). Use of scientific literature including computer data bases, fundamentals of technical writing including grants and proposals, investigation of scientific societies, exploration of career opportunities in specific disciplines. Prerequisite: consent of graduate advisor. P/F only.

5216. PROPERTIES AND REACTIONS OF INORGANIC SYSTEMS (2-0). Selected compounds based upon their economic importance. Chemistry of the commercial manufacturing processes with emphasis on source and cost of raw materials. Properties of the chemicals are demonstrated to relate to their commercial applications.

5242. LABORATORY TECHNIQUES IN BIOCHEMISTRY (1-3). Analytical and preparative biochemical techniques are discussed and applied to various typical biochemistry problems. Experiments include: spectrophotometric determination of equilibrium constants, protein assays, enzyme preparation and assay, enzyme kinetics, protein chemistry, preparation of RNA and DNA, and basic carbohydrate chemistry. Prerequisite: CHEM 4311 or equivalent or consent of instructor. **$8 lab fee.**

5300. SURVEY OF CHEMICAL CONCEPTS AND METHODS (3-0). Discussion of recent developments in chemistry with emphasis on instrumental methods and techniques; review of fundamental principles as needed for explanation of new methods. Prerequisite: consent of graduate advisor.

5301. PHYSICAL CHEMISTRY (3-0). Survey including topics from thermodynamics, statistical thermodynamics, quantum chemistry, reaction dynamics, and molecular spectroscopy. Prerequisite: CHEM 3322 or equivalent.

5303. SELECTED TOPICS IN ADVANCED PHYSICAL CHEMISTRY (3-0). May be repeated for credit when topics vary. Prerequisite: CHEM 5301, or equivalent with permission of instructor.

5305. ORGANIC CHEMISTRY (3-0). Effects of structure, substituents, and experimental conditions upon reaction mechanisms, such as nucleophilic and electrophilic substitution, elimination and addition reactions, as well as rearrangements. Use is made of stereochemistry, kinetics, product identification, and bonding theory in elaborating mechanisms. Prerequisite: CHEM 2454 and 3322 or equivalent.

5306. PHYSICAL ORGANIC CHEMISTRY (3-0). Structure and reactivity relationships as applied to organic reaction mechanisms. Substituent effects, kinetics, isotope effects, acid and base catalysis, linear free energy relationships, nucleophilicity, solvent effects, and hard and soft acids and bases. Pericyclic, orbital symmetry, controlled reactions, and basic aspects of stereochemistry. Prerequisite: CHEM 2454. Prerequisite or corequisite 3322 or equivalent.

5307. SELECTED TOPICS IN ADVANCED ORGANIC CHEMISTRY (3-0). May be repeated for credit when topics vary. Prerequisite: CHEM 5305, or equivalent with permission of instructor.

5308. DETERMINATION OF MOLECULAR STRUCTURE BY PHYSICAL METHODS (3-0). Use of modern instrumental techniques to determine structure: infrared, ultraviolet, and magnetic resonance spectroscopy, mass spectrometry, optical rotatory dispersion. Emphasis on interpretation of spectra. Prerequisite: CHEM 2454 or equivalent.

5311. ANALYTICAL CHEMISTRY (3-0). Survey of sampling theory and practice, separation mechanisms, and basic analytical methodology. Prerequisite: CHEM 4461 or equivalent.

5313. SELECTED TOPICS IN ADVANCED ANALYTICAL CHEMISTRY (3-0). May be repeated for credit when topics vary. Prerequisite: CHEM 5311, or equivalent with permission of instructor.

5314. SURVEY OF INORGANIC CHEMISTRY (3-0). Bonding, transition metal chemistry, coordination compounds, non-aqueous solvents and recent developments in inorganic chemistry. Pre- or corequisite: CHEM 3322 or equivalent.

5315. INORGANIC CHEMISTRY (3-0). Survey of main group and transition element compounds including: factors influencing Lewis acid-base interactions, bonding, spectral and magnetic properties, reaction mechanisms, organometallic chemistry and the metallic bond. Prerequisite: CHEM 3322.

5317. SELECTED TOPICS IN ADVANCED INORGANIC CHEMISTRY (3-0). May be repeated for credit when topics vary. Prerequisite: CHEM 5315, or equivalent with permission of instructor.

5319. GENERAL BIOCHEMISTRY I (3-0). Amino acids, carbohydrates, nucleic acids, enzymes. Obtaining of energy and cellular material from glucose and acetate including glycolysis, the TCA cycle, electron transport and oxidative phosphorylation and the pentose phosphate pathway. Prerequisite: CHEM 2454 or equivalent. A knowledge of physical chemistry is helpful.

5320. GENERAL BIOCHEMISTRY II (3-0). Modes of breakdown and synthesis of fats, oxidative degration of amino acids and proteins and biosynthesis of carbohydrate and protein. Chemical significance of the genetic code. Prerequisite: one semester of approved biochemistry (CHEM 5319 or equivalent).

5321. BIOCHEMISTRY (3-0). Intermediary metabolism and metabolic regulation. Topics: amino acid, nucleotide, phospholipid, steroid, porphyrin and mucopolysaccharide biosynthesis, biochemistry of muscle, vision and the regulation of glycogen, carbohydrate and fat metabolism. Prerequisite: CHEM 4312 or equivalent and/or permission of the instructor.

5323. SELECTED TOPICS IN BIOCHEMISTRY (3-0). Prerequisite: CHEM 5321, or equivalent with permission of instructor.

5330. STATISTICAL THERMODYNAMICS (3-0). Investigation of macroscopic systems and properties from a microscopic or molecular point of view, using statistical arguments. Includes: ensembles; phase spaces; Boltzmann, Fermi-Dirac and Bose-Einstein distributions; thermodynamic functions; kinetic theory of gases; Debye-Huckel Theory; correlation functions. Prerequisite: CHEM 3322.

5332. CHEMICAL KINETICS (3-0). Kinetics and mechanisms of reactions in the gas phase, solutions, and at interfaces, theory of rate processes, structure-reactivity correlations and photochemical kinetics. Contemporary experimental methods to study reaction dynamics on a molecular level. Prerequisite: CHEM 3322.

5334. QUANTUM CHEMISTRY (3-0). Internal molecular motion, molecular interactions, chemical bonds and spectroscopy, using quantum theory. Exact solutions of the Schrodinger equation; approximate methods; molecules; molecular spectroscopy; timedependent perturbation. Prerequisite: CHEM 3322.

5335. MATHEMATICAL METHODS OF CHEMISTRY (3-0). Functional analysis, series expansion, differential equations, matrices, vectors and tensors, special functions. Prerequisite: permission of instructor.

5336. COMPUTATIONAL METHODS OF CHEMISTRY (3-0). Interpolation, numerical solution of differential equations, least square polynomial approximations, numerical solutions of equations, matrix manipulations, minimization techniques. Prerequisite: CHEM 5335 or equivalent.

5337. STATISTICAL TREATMENT OF EXPERIMENTAL DATA (3-0). Errors, probability, probability distributions (binomial, Poisson, Gauss), standard deviation, propagation of errors, least square methods, correlations. Prerequisite: permission of instructor.

5338. GROUP THEORY IN CHEMISTRY (3-0). Groups, subgroups, orthogonality, character tables, reducible and irreducible representations, crystallographic point groups. Applications to problems in molecular quantum mechanics. Prerequisite: permission of instructor.

5340. ADVANCED CONCEPTS IN STRUCTURAL AND MECHANISTIC ORGANIC CHEMISTRY (3-0). Use of kinetics, isotope and steric effects, conformational and product analysis to determine influence of structure on reaction mechanisms. Prerequisite: CHEM 5305 and consent of the instructor.

5345. SYNTHESIS, STRUCTURE AND MECHANISM IN INORGANIC CHEMISTRY (3-0). Synthetic methodology, structure-reactivity relationships, structure determination and characterization of inorganic substances. Prerequisite: CHEM 5315 and consent of graduate advisor.

5346. ADVANCED SYNTHETIC METHODS (1-6). Laboratory practice and planning in the synthesis of selected types of inorganic and organic compounds, using special laboratory techniques. Selection of starting materials, strategy for forming the molecular skeleton and functional groups, and control of stereochemistry. Individual work on a variety of kinds of reactions and equipment.

5347. REACTION DYNAMICS (3-0). Theoretical and experimental aspects of the rates and energetics of chemical-physical processes. Prerequisite: CHEM 5301 and consent of graduate advisor.

5350. ADVANCED POLYMER CHEMISTRY (3-0). Synthesis, degradation, physical and chemical characterization of polymeric systems. Prerequisite: consent of instructor.

5461. ANALYTICAL INSTRUMENTATION (2-8). Theory of instrumentation and chemical signal source with emphasis on industrial problems. Practical experiments utilizing atomic and molecular absorption and emission spectroscopy, chromatographic analysis, and electrochemical techniques. Prerequisite: CHEM 3322 or equivalent.

5191-5691. READINGS IN CHEMISTRY. Conference course which may be repeated for credit, with credit granted according to work performed. Graded P/F only. Prerequisite: permission of instructor.

5192-5692. RESEARCH IN CHEMISTRY. Conference course with laboratory with credit granted according to work performed. May be repeated for credit. Prerequisite: permission of instructor.

5380. TEACHING CHEMISTRY (3-0). Registration is required of all graduate students who are in their first semester as teaching assistants. May not be counted for credit toward the degree requirements. Graded P/F only.

5398, 5698, 5998. THESIS. Prerequisite: permission of instructor.

6201. INDUSTRIAL CHEMICAL PROBLEMS SEMINAR (2-0). Preparation and oral presentation of technical reports dealing with typical industrial problems; discussion topics selected with the assistance of the instructor. Graded P/F only.

6301. UNIT OPERATIONS (3-0). Survey of measurement and control techniques, and the fundamentals of physical and chemical industrial processes. Prerequisite: CHEM 3322 or equivalent or permission of instructor.

6302. PRINCIPLES OF INDUSTRIAL CHEMISTRY (3-0). Survey of industrial inorganic and organic chemical processes. Prerequisite: permission of instructor.

6303. REGULATORY ASPECTS OF THE CHEMICAL INDUSTRY (3-0). Survey of chemical toxicology, regulatory aspects involved in the chemical industry, industrial safety, patents and patent law.

6304, 6904. CHEMISTRY INTERNSHIP (12-0). Each student is required to spend three months in an industrial chemical laboratory; credit may be given for a student's previous industrial research experience. Student's internship will be monitored through discussion with faculty and by submission of technical progress reports. Graded P/F only. Prerequisite: permission of instructor.

6305. SPECIAL TOPICS IN APPLIED CHEMISTRY (3-0). May be repeated for credit when topics vary. Prerequisite: permission of instructor.

6306. BIOCHEMICAL TECHNOLOGY (3-0). Survey of industrial biochemical processes. Prerequisite: CHEM 5321 or equivalent or permission of instructor.

6399, 6699, 6999. DISSERTATION. Prerequisite: admission to candidacy for the degree of Doctor of Science in Applied Chemistry.

DISSERTATION—See also Mathematical Sciences.

Department of CIVIL ENGINEERING (CE)

Area of Study	*Degrees*
Civil Engineering	M.S., M.ENGR.,Ph.D.

Master's Degree Plans: Thesis (M.S.), and Non-Thesis (M.Engr.)

Chairman: Clinton E. Parker — 435-B Engineering — 273-2202

Graduate Advisor: Arthur R. Poor — 206-C Engineering — 273-3702

Graduate Faculty:

Professors Everard, Haynes, Huang, Nedderman, Parker, Poor, Qasim, Yuan
Associate Professors Armstrong, Clark, Matthys, Petry, Spindler
Assistant Professors Corley, Crosby, Rivero, Wiersig
Senior Lecturer Argento

OBJECTIVE

The graduate program provides opportunities for advanced professional development in such forms as: instructional courses to enhance technical competence; guided studies under faculty

supervision to comprehend special topics; and training in design, development, and research to advance the state-of-the-art of civil engineering.

A student, with the assistance of a faculty advisor, may plan a program in the following fields of specialization within civil engineering.

1. Geotechnical (Soil Mechanics and Foundations)
2. Sanitary and Environmental
3. Structures
4. Transportation (Traffic, Highways, Transit)
5. Urban Planning
6. Water Resources (Hydraulics-Hydrology)

ADMISSION

Applicants for the master's degree program who hold a baccalaureate degree in civil engineering must meet the general requirements of the Graduate School as stated under the section entitled "Admission Requirements and Procedures." Applicants not meeting all criteria may be admitted on a provisional or probationary basis only under exceptional circumstances.

For applicants with no prior training in civil engineering, the same minimum criteria will apply; in addition, their records will be reviewed in relation to the intended program of study. Probationary status with specific remedial work required may be a basis for acceptance of such applicants. See "Handbook for Graduate Studies in Civil Engineering" which is available in the department.

The acceptance of applicants who have already received a master's degree in engineering will be based on the above-mentioned minimum criteria as well as on all graduate work.

Applicants for the Ph.D. program must have a master's degree or its equivalent and must meet, as well, all requirements stated above in both undergraduate and graduate work. The applicant shall also demonstrate through previous academic preparation the potential to carry out independent research in civil engineering.

DEGREE REQUIREMENTS

The Master of Science degree is a research-oriented program in which completion of a thesis is mandatory; the program consists of a minimum of at least 24 credit hours of coursework and an acceptable thesis (six credit hours).

The Master of Engineering degree is an engineering practice-oriented program. The degree is a 36 credit-hour program in which six credit hours must be outside civil engineering but supportive to the major area of study.

The Ph.D. degree is a research degree and, as such, requires the candidate to carry out successfully original independent research in an area acceptable to the civil engineering faculty. Normally, this will require a minimum of one year of advanced course work beyond the master's degree in addition to the research.

GRADE AND GRADUATION REQUIREMENTS

Graduate study in Civil Engineering follows the grade requirements for probation as specified in this catalog in the section entitled "Grade Requirements." In addition, to graduate, students must have at least a 3.0 grade point average in all course work and area of concentration. Students will be declared ineligible for further graduate study in Civil Engineering and will be dismissed from the Civil Engineering graduate program if they accumulate grade deficiency points greater than 3. Any grade of C is worth one deficiency point, any grade of D is worth 2 deficiency points and any grade of F is worth 3 deficiency points. Deficiency points may not be removed from a student's record by additional course work.

5301. COMPUTER METHODS IN CIVIL ENGINEERING (3-0). Computer programming using the Fortran IV language. Problems are taken from all phases of civil engineering. Students will write programs, and will use existing programs to solve civil engineering problems. Prerequisite: consent of the Graduate Advisor.

5303. TRAFFIC SIGNAL SYSTEMS (3-0). Traffic signal equipment development; currently available devices; corridor progression utilizing pretimed and actuated signals; delay and cycle length optimization techniques; control algorithms and optimizations for splits, offsets and cycle lengths in large scale networks. Prerequisite: CE 4302.

5304. STRUCTURAL DESIGN IN LIGHT GAGE STEEL (3-0). Design course for cold formed steel structures. Includes post buckling, plate behavior of stiffened and unstiffened elements, columns, braced and unbraced beams, connectors, and shear diaphragms. Building Codes and related recommended practice documents. Prerequisite: CE 4348.

5305. BRIDGE DESIGN (3-0). Theory and design procedures related to the analysis and design-synthesis of bridges and guideways for vehicles. Using the AASHTO Code, includes concrete, steel and timber structures, construction practices and procedures. Prerequisites:CE 3444, CE 4347, and CE 4348.

5306. PLAIN CONCRETE (3-0). Theories used in the design of concrete, factors affecting the properties, and behavior of material and of test specimens. Behavior of plain concrete under different types of environment and loading, such as long-time, repeated, and triaxial. Critical reviews of experimental and analytical investigations. Prerequisite: CE 4347.

5307. STRUCTURAL TIMBER DESIGN (3-0). Covers grades and design properties of structural lumber; design criteria using timber; design of bending and compression members; connectors design; design of glued laminated timber, box beams, stressed-skin panels, shear walls, and trusses. Prerequisite: CE 3444.

5308. MASONRY STRUCTURES (3-0). Includes masonry unit types and grades, mortar types, reinforcing and connectors, and beam, column, arch, bearing wall design. Structural behavior and standard construction practices. Plain and reinforced masonry, building codes and recommended practice documents. Prerequisite: CE 3444.

5309. CONCRETE SHELL STRUCTURES (3-0). General theory of thin shells including membrane theory for domes of double curvature such as hyperbolic and elliptic paraboloids, cylindrical shells and folded plates. Analysis and design are included. Prerequisite: CE 4347.

5310. NUMERICAL METHODS IN STRUCTURAL DESIGN (3-0). Suitable numerical and approximate methods used in structures. Includes problems of static response, stability and free vibration. Prerequisite: CS 1201 or CE 5301, and CE 3444.

5311. PLASTIC STEEL DESIGN (3-0). Plastic analysis and design of continuous beams, single-story frames, and multistory steel structures. Prerequisite: CE 4348.

5312. CONCRETE DESIGN I (3-0). Includes structural components such as beams, columns, slabs, footings and walls using the ultimate strength method; building code requirements for reinforced concrete; flat slabs, and other two-way systems; and yield line theory, torsion, and shear-friction. Prerequisite: CE 4347.

5313. STRUCTURE-SOIL INTERACTION (3-0). Considers methods of analysis of structure-soil interaction behavior including numerical techniques. Physical problems reviewed include beams, slabs, flexible retaining walls, and laterally loaded piles interacting with elastic and inelastic soils. Prerequisite: CE 4321 or CE 5315.

5314. EARTH STRUCTURES (3-0). Study of the states of stress and analysis techniques associated with cuts, fills and retaining structures. Stress changes due to water flow in soil along with numerical techniques. Prerequisite: CE 4321 or instructor approval.

5315. FOUNDATION ANALYSIS AND DESIGN (3-0). Bearing capacity, earth pressure theories and settlement characteristics of various types of soils. The performance of footings, rafts, flexible slab-on-grade and piles founded on or in silts, low activity clays, active silts and clays, and stratified soils. Prerequisite: CE 4321 or instructor approval.

5316. WATER SUPPLY AND TREATMENT PLANT DESIGN (3-0). Theory and design of community water supply systems. Design of treatment facilities, equipment selection and distribution network, and cost estimates. Prerequisite: CE 3314.

5317. WASTEWATER TREATMENT PLANT DESIGN (3-0). Effluent quality standards, and theory and design of wastewater treatment plants. Design and layout of wastewater treatment systems using manufacturers' catalogs, and cost estimates. Prerequisite: CE 3314.

5318. ANALYSIS OF RECEIVING WATERS (3-0). Ecological response of lakes, reservoirs, streams, and estuaries from municipal and industrial waste loadings and surface runoffs. Mathematical models for water quality prediction and planning examined and developed. Prerequisite: CE 3314.

5319. ENVIRONMENTAL ENGINEERING (3-0). Discussion of engineering and administrative functions in the control of environmental pollution, control legislation, and current status of science and technology of environmental improvements. Prerequisite: CE 3314.

5320. SOLID WASTE MANAGEMENT (3-0). Technical aspects of current practices and new developments in the management of solid waste facilities. Theory and design of solid waste collection, transfer, disposal and recovery, and reuse systems. Prerequisite: consent of instructor.

5321. WATER QUALITY (3-0). Physical, chemical, and biological indicators of water quality; various pollutants and their effects upon ecosystem; water quality criteria and uses. Prerequisite: consent of instructor.

5322. STORMWATER MODELING (3-0). Interpretation of hydrologic data using methods of systems analysis; hydrologic components analyzed as linear and nonlinear systems integrated into mathematical models of watershed response; optimizing model parameters with illustrative examples. Prerequisite: CE 6307.

5323. MICROCLIMATOLOGY (3-0). Study of the climate in the lower two meters of atmosphere where nearly all life goes on; effects of this microclimate on man, plants, and animals. Prerequisite: instructor's approval.

5324. SURFACE-WATER HYDROLOGY (3-0). Study of hydrologic cycle, elements of hydrometeorology, infiltration and soil moisture, runoff, rainfall-runoff relationships and effects of these factors with regard to utilization and conservation of water resources.

5325. GROUND-WATER HYDROLOGY (3-0). Occurrence and movement of ground water from a geologic viewpoint as preparation for application of general hydrologic equations to such problems as safe yield, hydraulics of wells, well design, and artificial recharge.

5326. ADVANCED HYDROLOGY (3-0). Elements affecting runoff hydrograph, generation of runoff hydrograph, flood flow characteristics, determination of design flood, flood damage alleviation methods. Other hydrologic principles developed as required to support the topics named and statistical and computer methods introduced wherever appropriate. Prerequisite: CE 5324, and 6307 and three hours of Statistics-Probability.

5327. ENVIRONMENTAL IMPACT ANALYSIS (3-0). Covers various elements of environmental impact statements and environmental impact assessment resulting from the requirements of National Environmental Policy Act. Analytical tools and techniques and their applications on the environmental impact measurement of engineering projects both beneficial and adverse are discussed. Prerequisite: consent of instructor.

5328. AIR POLLUTION CONTROL (3-0). Air pollution law, federal and state regulations. Types, sources and effects of air pollutants. Design of pollutant collection and transport equipment and air pollution control devices. Procedure for sampling emission levels. Prerequisite: CE 3314 or consent of instructor.

5329. ENVIRONMENTAL POLLUTION SURVEY (3-0). Survey of the nature and effects of pollution as it relates to air, water, and soil; and the current status of the science and technology of environmental improvements and anti-pollution legislation. Credit not given to sanitary and environmental engineering majors. Prerequisite: consent of instructor.

5330. CHARACTERISTICS OF TRAFFIC (3-0). The fundamental elements of traffic—the driver, the vehicle, and the roadway—are considered and then extended into studies of streams of traffic flow. Emphasis on speed, volume, and density relationships and methods of measuring each. Capacity and levels of service along with some basic theories of traffic flow. Parking and parking terminal concepts are included as well as accident studies. Prerequisite: CE 4302.

5331. TRAFFIC ENGINEERING OPERATIONS (3-0). Methods of traffic regulation and control optimization. Traffic intersection design and control and the operation of traffic signal network systems. Techniques of conducting traffic engineering studies and traffic engineering functions and administration. Analysis and design techniques involving capacity and the level of service concept. Prerequisite: CE 4302.

5332. HIGHWAY DESIGN (3-0). Geometric considerations necessary for the design of city streets, highways, and freeways such as the cross sections, vertical and horizontal alignment, sight distances and stopping distances. Includes the design of maneuver areas, channelization, ramps, intersections, and interchanges. Prerequisite: CE 4302.

5334. URBAN ENGINEERING (3-0). A service course intended principally for other than civil engineering majors on influence and relative importance of engineered structures on urban development. Includes the engineering factors important to consider in land-use planning, utility location, waste disposal, drainage, public health, and recreation.

5335. MASS TRANSIT TECHNOLOGY (3-0). Engineering principles and requirements of various types of transit systems as well as the states of development of transit types. New or emerging transit configurations and possible future innovations will be included. Considerations of environmental consequences and measures of effectiveness of transit systems will be introduced as well as several methods of conducting transit studies.

5336. CITY MANAGEMENT (3-0). Study of the functions of the city manager, administration of municipal affairs, forms of city government, organization of city departments, city finances, public utilities, emergency service, parks and recreation.

5337. URBAN TRANSPORTATION PLANNING (3-0). Theory and application of comprehensive urban transportation planning technology. Basic studies of population, urban economics, land use, simulation models, forecasting trip generation and distribution, traffic assignment, modal split, system design and evaluation, mass transit characteristics. Prerequisite: CE 4302 or permission of instructor.

5338. URBAN PLANNING THEORY AND STUDIES (3-0). Relationship of physical planning to general theory and process of planning, real estate economics, urban land use planning and forecasting, site engineering and transportation geography related to aesthetic values, and application of engineering processes to the social system, housing. Prerequisite: instructor's approval.

5339. METROPOLITAN PLANNING AND ADMINISTRATION (3-0). History of planning controls in the United States, organization and structure of local and regional planning administration, theory and functions of management and principles of organization. Engineering systems approach related to problems in population growth, social stratification, governmental fragmentation problems, principles of municipal public works administration and capital improvements programming; planning and engineering techniques related to contemporary political science in urban America. Prerequisite: instructor's approval.

5343. HAZARDOUS WASTES (3-0). Sources, chemistry, classification and monitoring of hazardous wastes. Discussion of environmental hazards, legal aspects, transportation, detoxification, storage, and disposal and incineration. Prerequisite: consent of instructor.

5344. RADIOLOGICAL HEALTH ENGINEERING (3-0). Sources, effects, measurement, health hazard and control of environmental radiation. Discussion of disposal of radioactive wastes, and legal aspects of radiation controls. Prerequisite: instructor's approval.

5345. ADVANCED METHODS IN SANITARY ENGINEERING (2-3). The standard laboratory techniques used to characterize wastes, and current analytical techniques for measuring trace pollutants in water, soil, and air. Includes advanced sanitary engineering theories and practices, research topics and methods. Prerequisite: consent of instructor. **$10 lab fee.**

5346. STATISTICAL HYDROLOGY (3-0). Statistical methods and models that have been applied to hydrology and hydrologic situations, probability, random variables, distributions, hypothesis testing, regression, correlation, multivariate analysis, time series, and stochastic models. Prerequisite: CE 5324.

5347. KINEMATIC WAVE THEORY (3-0). Approximations of De Saint Venet equations by Kinematic Wave Theory applied to overland flow and stream flow; criteria for approximation and methods of linkage of infiltration, overland flow, and stream flow. Prerequisite: CE 6307.

5348. SEDIMENT TRANSPORTATION (3-0). Sediment properties and measurements; bed loads and suspended load movement; erosion, scour, transportation, and deposition of sediments by flowing water; silting of reservoirs and related topics. Prerequisite: CE 6307.

5350. FLEXIBLE PAVEMENT DESIGN (3-0). Stress analysis in layered pavement systems. Effects of loads, natural forces, and material quality on layer thicknesses. Current design practices for flexible highway and airfield pavements. Prerequisite: CE 4302.

5354. PHYSICAL AND CHEMICAL TREATMENT PROCESSES (2-3). Physical and chemical operations and processes used in water and wastewater treatment, air pollution control, and solid waste disposal. Includes mixing, equalization, gravity separation, flotation, filtration, adsorption, heat transfer, gas transfer and disinfection. Laboratory scale models are used to determine design parameters. Prerequisite: CE 3314. **$10 lab fee.**

5355. BIOLOGICAL TREATMENT PROCESSES (2-3). Principles of evaluation and control of aerobic and anaerobic biological treatment processes. Oxidation ponds, activated sludge, trickling filters, and sludge digestion. Laboratory scale models are used to determine biodegradability, operation and performance of treatment processes. Prerequisite: CE 3314. **$10 lab fee.**

5356. CHEMICAL ANALYSIS IN ENVIRONMENTAL ENGINEERING (2-3). Basic physical and chemical principles applicable to environmental and sanitary engineering. Nature and effects of pollutants as they relate to air, water, and soil, and instrumental methods of analysis and separation. Prerequisite: consent of instructor. **$10 lab fee.**

5357. BIOLOGICAL ASPECTS OF ENVIRONMENTAL POLLUTION (2-3). Biological and microbiological principles applicable to environmental and sanitary engineering. Bacteriological examinations of water and wastewater. Prerequisite: consent of instructor. **$10 lab fee.**

5361. ADVANCED SOIL TESTING (2-4). Considers soil testing techniques utilized during research, determination of stabilization mix designs, and development of complete soil parameters. Testing includes specialized consolidation, direct and triaxial shear, soil stabilization and selected chemical and mineralogical techniques. Prerequisite: CE 4322, 6336 and 6337.

5362. AIR PHOTO INTERPRETATION OF LAND MASSES (2-3). Considers applications of photogrammetry, aerial photo interpretation, and remote sensing techniques to determination of land mass, soil and rock types. Emphasis on use of air photo interpretation, geologic maps, soil maps in combination to ascertain engineering soil and land mass properties.

5191, 5291, 5391. ADVANCED STUDIES IN CIVIL ENGINEERING. Individual studies of advanced topics under the supervision of a professor or professors. Graded P/F.

5395. SPECIAL PROJECT IN CIVIL ENGINEERING (3-0). Special project in research under direction of the student's major professor and his committee in the thesis-substitute degree plan. The student must register for this course during the semester of graduation.

5398, 5698, 5998. THESIS. Research and preparation pertaining to the master's thesis.

6300. SELECTED TOPICS IN CIVIL ENGINEERING (3-0). Topics of current interest in the field of civil engineering. The subject title listed in class schedule. May be repeated for credit when topic changes.

6302. HIGHWAY CAPACITY (3-0). Rational methods for determination of highway and street capacities. Emphasizes street intersection capacities, ramp and weaving section capacities, and freeway capacities. The level of service concept utilized and factors affecting the level of service as well as the capacity considered.

6303. RIGID PAVEMENT DESIGN (3-0). Stresses due to shrinkage, temperature, and load in pavement slabs; theory of rigid pavement design along with current design practices and methods of construction. Prerequisite: CE 4342.

6304. HYDROMETEOROLOGY (3-0). General meteorology and climatology, atmospheric variables, cloud and precipitation physics, techniques of precipitation analysis, probable maximum precipitation, rainfall frequency and weather modification. Prerequisite: CE 5324.

6305. WATER RESOURCES PLANNING (3-0). Historical and present concepts in water development. Systems approach to development of water resources. Problems and policies with regard to water resources allocation and administration. General principles and procedures of water resource planning within a regional, multi-purpose context with economic considerations.

6306. DAM APPURTENANCES AND THEIR DESIGN (3-0). Hydraulic principles used in the design of appurtenances associated with retarding structures such as dams and diversion works are included. Prerequisite: CE 6307.

6307. OPEN CHANNEL FLOW (3-0). Steady flow in open channels. Basic principles, velocity formulas, backwater curves, flow through transitions, obstructions, and bends.

6308. APPLIED SOIL MECHANICS (3-0). Engineering reports as concern subsurface investigations discussed as well as the design of subsurface investigations. Case histories discussed showing the reasoning for the types of foundations recommended. Students will be placed in the position of the consulting engineer and engineering reports will be written for several projects. Prerequisite: CE 5315 or consent of instructor.

6310. SOIL DYNAMICS (3-0). Vibrations of simple oscillators, wave propagation in elastic media, dynamically loaded foundations, blast and earthquake resistant design of foundations.

6311. ROCK MECHANICS (3-0). Failure theories of brittle, jointed and anisotropic rocks, elastic rock properties and behavior, including in-situ and laboratory testing. Basics of tunneling included. Problem formations, advancing tunnel headings and design of support systems.

6312. THEORY OF STRUCTURES I (3-0). Analysis of statically indeterminate elastic structures, Maxwell's law of reciprocal displacements, Castigliano's theorems, real work, virtual work, method of consistent deformations, column analogy, elastic center, influence lines, three-moment theorem, approximate analysis of structural frames. Credit not given for both CE 6312 and CE 4310. Prerequisite: CE 3444.

6313. THEORY OF STRUCTURES II (3-0). Continuation of Theory of Structures I. Study of the theory of arches, rings, rigid frames, three dimensional frames and trusses, cable supported structures, long span continuous structures and statically indeterminate continuous trusses, classical methods and energy methods. Prerequisite: CE 6312 or consent of instructor.

6314. MOMENT AND SHEAR DISTRIBUTION (3-0). Theoretical methods for obtaining stiffness coefficients, carry-over factors and fixed-end moments for continuous beam columns and beams and frames with elastic supports. Modified moment distribution methods are utilized to obtain solutions to complex problems. Prerequisite: CE 3444.

6316. FINITE ELEMENT METHOD FOR STRUCTURES (3-0). Structural stiffness, finite elements of a continuum, plane stress and strain, axi-symmetric stress analysis, element shape functions, and various applications. Prerequisite: CE 6317.

6317. MATRIX METHODS FOR STRUCTURES (3-0). Stiffness and flexibility methods of structural analysis by using matrix algebra. Credit not granted for both CE 4308 and CE 6317. Prerequisite: CE 3444.

6318. BEHAVIOR OF STRUCTURES UNDER DYNAMIC LOADS (3-0). Idealization of structures for dynamic analysis, natural and forced vibrations of single and multiple degrees of freedom systems, response of structures subjected to blast, wind, and earthquakes. Prerequisite: CE 4310 or 6312.

6321. PLATE STRUCTURES (3-0). Study of plates and slabs considering various materials. Methods of analysis and design are emphasized after theoretical concepts are fully developed.

Flat plates and folded plates are considered using various support conditions. Prerequisite: CE 4310 or 6312.

6322. PRESTRESSED CONCRETE (3-0). Discussions concerning materials and methods used in prestressing; design of sections for flexure, shear and anchorage; camber, deflections and cable layouts, simple spans, continuous beams, prestressed piles and prestressed tanks. Prerequisite: CE 4347.

6323. PRINCIPLES OF ENVIRONMENTAL HEALTH ENGINEERING (3-0). Engineering methods of controlling communicable disease vectors, epidemiology, and a survey of public health engineering. Prerequisite: consent of instructor.

6324. INDUSTRIAL HYGIENE AND TOXICOLOGY (3-0). Industrial health hazards and methods of controlling them. Includes a survey of health hazards in industry, the toxicity of industrial gases, vapors, and dusts, and methods of eliminating hazards. Prerequisite: consent of instructor.

6325. AIR POLLUTION (3-0). Particle and gas dynamics and relation to theoretical collection principles. Review of control devices, design of multiple unit control systems, and calculation of their efficiencies. Basic dispersion modeling of point, line and area sources. Prerequisite: CE 5328 or consent of instructor.

6326. INDUSTRIAL WASTE TREATMENT (3-0). Specialized physical, chemical, and biological treatment schemes required to treat specific industrial wastes. Pretreatment regulations, individual industries, and combined municipal and industrial waste treatment. Prerequisite: CE 3314.

6329. WATER WAVE MECHANICS (3-0). Introduction to selected topics in surface and wave motion. Linear solutions to the partial differential equations of surface motions for deep and shallow waves in bodies of water, waves in constrained flows, numerical solution methods, wave forces and flood routing. Prerequisite: CE 6307.

6330. ESTUARINE HYDRAULICS (3-0). Selected topics including physics of mass transfer in estuaries, deposition problems, wave physics and design parameters for off-shore structures, and protective works. Ecological ramifications, historical failures and successes reviewed. Prerequisites: CE 6307 and 6329.

6331. STEEL DESIGN (3-0). Covers torsional design of beams, beams with web holes, composite design of beams, lateral-torsional buckling of beams, plate buckling, column design and behavior, frame stability, bracing requirements for compression members. Prerequisite: CE 4348.

6332. CONCRETE DESIGN II (3-0). Structural systems such as continuous beams,arches, continuous frames, box girders, vierendeel trusses, shear walls with columns, caissons and mat foundations. Computer methods of analysis and design utilized to study building and bridge structure. Beam methods for long shells discussed. Prerequisite: CE 4347.

6333. DISPERSION MODELING (3-0). Review of air pollution meteorology; pollutant dispersion calculations; utilizing Gaussian dispersion models; point, line, and area source dispersion calculations; multipoint source dispersion models utilizing computerized models; modeling results application to federal and state regulations.

6334. ADVANCED HYDRAULIC ENGINEERING I (3-0). Advanced concepts concerning water transmission via free and confined systems which lead to design problems for steady and unsteady flow. Includes transients and surges and topics of current interest. Prerequisite: CE 6307.

6335. ADVANCED HYDRAULIC ENGINEERING II (3-0). Additional topics not covered in CE 6334. Prerequisite: CE 6334.

6336. THEORETICAL SOIL MECHANICS I (3-0). Stress-strain, stress distribution, settlement, contact pressure concepts, theory of consolidation, time dependent behavior, strength limitations, and engineering applications of these parameters.

6337. THEORETICAL SOIL MECHANICS II (3-0). Physiochemical properties and behavior of expansive clay soils, theories of plastic equilibrium, behavioral patterns to engineering problems. Considers tie-back and bracing of excavations, and reinforced earth.

6338. SEEPAGE ANALYSIS AND EARTH DAMS (3-0). Permeability and flow through a porous media. Includes parameters of earth dam design such as site selection, stability analysis, construction problems and instrumentation. Considers analysis of seepage through and below various structures along with corrective techniques for limiting flow.

6339. SUB-SURFACE CONSTRUCTION (3-0). Concepts of diaphragm wall construction. Soft ground tunneling, including hazards, support systems, and design aspects. Caisson construction, including pneumatic, floating, and sunken design requirements.

6340. PUBLIC TRANSIT PLANNING (3-0). Person movement by bus, by rail, and paratransit modes, nature and role of public transit, transit studies, demand analysis, routing, scheduling, system costs, marketing, and management programs. Prerequisite: CE 5337.

6341. PLANNING MODELS FOR TRANSPORTATION (3-0). Analytical analysis of urban travel demand-trip generation, distribution, model split, and assignment, employing mathematical,

statistical and computer techniques; principles of model development including sketch planning and state-of-the-art techniques. Prerequisite: CE 5337.

6342. TRAFFIC FLOW THEORY (3-0). Speed, density relationships of vehicular traffic flow; statistical aspects of traffic events and queueing processes; deterministic models and simulation models of traffic flow behavior; applications of flow theory to traffic problem solutions. Prerequisite: CE 4302.

6197-6997. RESEARCH IN CIVIL ENGINEERING. May be repeated for credit.

6399, 6699, 6999. DISSERTATION. Preparation of a doctoral dissertation in civil engineering. Prerequisite: admission to candidacy for the Doctor of Philosophy degree. Graded P/F.

A limited number of the following courses may be applicable toward the graduate degree if approved in advance by the graduate advisor.

4308. ADVANCED STRUCTURAL ANALYSIS
4310. ANALYSIS OF STATICALLY INDETERMINATE STRUCTURES
4312. STREET AND HIGHWAY DESIGN
4313. TRAFFIC ENGINEERING
4315. ENVIRONMENTAL HEALTH ENGINEERING
4318. CITY PLANNING
4321. FOUNDATION ENGINEERING
4322. SOIL STABILIZATION
4327. WATER RESOURCES: ENGINEERING HYDROLOGY
4328. WATER RESOURCES: CONVEYANCE SYSTEMS
4351. SANITARY ENGINEERING DESIGN
4360. ELEMENTS OF PHOTOGRAMMETRY

Department of COMPUTER SCIENCE AND ENGINEERING (CSE)

Areas of Study	*Degrees*
Computer Science	M.S., M.C.S., Ph.D.
Computer Science and Engineering	M.S., M.Engr., Ph.D.
Mathematical Sciences (See Interdepartmental and Intercampus Programs.)	Ph.D.

Master's Degree Plans: Thesis (M.S.) and Non-Thesis (M.C.S., M.Engr.)

Chairman: Bill D. Carroll — 706 Carlisle — 273-3785

Graduate Advisor: Roger S. Walker — 706 Carlisle — 273-3785

Graduate Faculty:

Professors Carroll, Hsia, Sparr, Walker
Associate Professors Classen, Elizandro, Pierce, Rinewalt, Starks, Underwood, Ward
Assistant Professors Buckles, Drew, Kamangar, Kavi, Peterson, Umbaugh

OBJECTIVE

The purpose of the graduate programs in Computer Science and Computer Science and Engineering is to prepare the student for continued professional and scholarly development. The Master of Science (MS) programs are designed to extend the student's knowledge and to provide additional strengthening in a particular concentration. The Master of Computer Science (MCS) and Master of Engineering (MEngr) programs are designed to provide the part-time student with the opportunity for professional development in the computer field. The Doctor of Philosophy (PhD) programs are designed to prepare the student to conduct research and development in an area of concentration.

Typical areas of concentration include systems software, microcomputers, computer architecture, and various applications of computers.

ADMISSION

Applicants for graduate study who have a baccalaureate degree in Computer Science or Computer Science and Engineering must meet the general requirements of the Graduate School as stated under the section entitled "Admission Requirements and Procedures."

Applicants who have limited background in Computer Science or Computer Science and Engineering but who meet all other requirements may be admitted. Such students normally must take additional courses beyond the minimums listed below. For further information, applicants may contact the Graduate Advisor.

DEGREE REQUIREMENTS

Master of Science in Computer Science

The Master of Science in Computer Science degree program is designed to develop the scholarship and research skills of the student. Thirty credit hours which include six thesis credits are required.

Master of Science in Computer Science and Engineering

The Master of Science in Computer Science and Engineering, which is intended for students with a baccalaureate degree in engineering, requires 30 credit hours of which six are thesis credits.

Master of Computer Science

The Master of Computer Science (MCS) provides professional development in computer science to part-time students. The MCS requires 36 credits and includes an individual project.

Master of Engineering

The Master of Engineering in Computer Science and Engineering provides professional development in computer science and engineering to the student with a baccalaureate degree in engineering. The degree requires 36 credits and includes an individual project.

PhD (Computer Science)

The PhD in Computer Science continues the development of research and scholarship capabilities of the student. Coursework selection in each student's program is designed to support the dissertation area selected by the student.

A minimum of two semesters of full-time study is required during the dissertation phase. There is no foreign language requirement.

PhD (Computer Science and Engineering)

The PhD in Computer Science and Engineering is available to students with a prior degree in engineering.It contains essentially the same requirements as the PhD (Computer Science) degree except that it permits interdisciplinary research between Computer Science and one or more of the various engineering disciplines.

COMPUTER SCIENCE

PhD (Mathematical Sciences)

See the program listing for Mathematical Sciences under "Interdepartmental and Intercampus Programs."

5300. INTRODUCTION TO PROGRAMMING (3-0). Introduction to computer programming using PASCAL. Structured design and programming techniques will be emphasized.

5301. ADVANCED INFORMATION STRUCTURES (3-0). Development and analysis of algorithms for internal sorting, external sorting, and internal searching; introduction to file structures for single and multi-key retrieval (ISAM, B—TREES, VSAM). Prerequisites: CSE 5346 and 5345 or equivalent and IE 5317.

5302. COMPUTER GRAPHICS (3-0). Input/output devices and programming techniques suitable for the visual representation of data and images. Prerequisite: MATH 1325, CSE 5301 or concurrent enrollment.

5303. DESIGN OF OPERATING SYSTEMS (3-0). Hardware and software techniques used in constructing operating systems for large multiprogram batch and timesharing computer systems. Includes memory management, processor scheduling, concurrent processes, job scheduling, I/O device management, and Information Management. Prerequisite: CSE 5320, 5345, and IE 5317.

5304. COMPILER DESIGN I (3-0). Review of programming language structures, translation, execution, and storage allocation. Introduction to formal languages and their descriptions. Compiler organization, including lexical, syntax, and semantic analysis and code-generation techniques. Error analysis and execution-time storage allocation introduced. Prerequisites: CSE 5313 or concurrent enrollment, 5345, and 5346.

5305. COMPILER DESIGN II (3-0). Definitions of additional language types and their processors (e.g. LL(k) , etc.). The techniques and use of translator writing systems such as XPL. Extensive treatments of code generation and optimization. Prerequisite: CSE 5304.

5306. DATABASE SYSTEMS (3-0). Database models, data description and manipulation languages, database design, functional dependencies and normal forms, decomposition, concurrent access and integrity. Prerequisites: CSE 5336 and 5345.

5308. COMPUTER SYSTEMS ARCHITECTURE (3-0). A continuation of CSE 5407. Topics include parallel processors, pipelined processors, tightly coupled multiprocessors, data-flow processors, demand-driven systems, microprogrammed and nanoprogrammed computer systems. Prerequisites: CSE 5303 and 5407.

5309. ADVANCED COMPUTATIONAL METHODS FOR ENGINEERS AND SCIENTISTS I (3-0). Selected topics from the theory and practice of using automatic digital computers for approximating arithmetic operations, approximating functions, solving systems of linear and non-linear equations, computing eigen-values and solving ordinary and partial differential equations. Prerequisite: CSE 2306 and graduate standing in engineering or science.

5310. ADVANCED COMPUTATIONAL METHODS FOR ENGINEERS AND SCIENTISTS II (3-0). A continuation of CSE 5309. Topics in matrix operations, iterative procedures, quadrature, solution of differential equations, boundary value determination and simulation of physical processes studied in context of computer applications. Prerequisite: CSE 5309 or 4301 and consent of instructor.

5312. DATA PROCESSING MANAGEMENT (3-0). Comprehensive study of problems associated with management of data processing and computer facilities. Particular emphasis placed on problems of cost effectiveness, machine configuration, personnel, security, systems planning, and facilities requirements. Prerequisite: CSE 5320 or concurrent enrollment.

5313. ALGORITHMIC LANGUAGES (3-0). Survey of higher level programming languages to solve common computational problems including numeric, character, list and data processing applications; languages such as PL/1, SNOBOL, LISP, FORTRAN, COBOL, and PROLOG, which represent a spectrum of available languages. Prerequisites: CSE 5300 and 5319.

5315. COMPUTER NETWORKS AND COMMUNICATIONS SYSTEMS (3-0). A study of hardware and software used in data communication systems; consideration given to communication media, modems, data link protocols, packet switching networks, and teleprocessing software; applications of computers in communication such as telephone switching systems. Prerequisite: CSE 5303 or concurrent enrollment.

5316. INFORMATION PROCESSING SYSTEMS (3-0). Methods and consideration for planning, organizing, implementing, and evaluating information processing systems in the public and private sector. Emphasis areas include project coordination, system design and documentation, and a study of implementing an information system. Prerequisite: CSE 5306.

5317. APPLICATION OF DIGITAL COMPUTERS TO ENGINEERING PROBLEMS (2-3). Analysis of engineering problems from the viewpoint of their expedient computation. Students will

acquire a working knowledge of high speed digital computer through the laboratory sessions. Emphasis placed on those problems which have become accessible by high speed computers. Prerequisite: CSE 4301 or CSE 5309, or MATH 3345.

5318. COMPUTER APPLICATIONS IN THE SOCIAL SCIENCES (3-0). Provides the graduate student in the social and behavioral sciences with programming and decision-making techniques which might be needed to support their research. Exercises in programming, applications to statistical problems, authenticity of authorship, computer assisted instruction, and computer simulation of cognitive processes.

5319. ASSEMBLY LANGUAGE (3-0). Accelerated course for students entering the graduate computer science program. Includes a study of machine language instruction sets and assembly language programming. Prerequisite: CSE 5300 or other appropriate introductory programming course.

5320. SYSTEMS PROGRAMMING (3-0). Program linking conventions, types of computer systems, assembler design and implementation, linkers and loaders, text editors, macro language and conditional assembly language, interrupt processing, physical I/O, and data management terminology and concepts. Prerequisite: CSE 5346 or concurrent enrollment.

5322. COMPUTER SIMULATION TECHNIQUES (3-0). Study of discrete event simulation techniques for the solution of Monte Carlo processes. Survey of computer simulation languages. Prerequisites: CSE 2306 and IE 5317.

5323. CONTINUOUS SYSTEM MODELING (3-0). Brief survey of languages suitable for digital representation of continuous models. Exercises and projects assigned for application to physical systems. Prerequisite: CSE 5322.

5324. SOFTWARE ENGINEERING (3-0). Program development techniques with structured methodologies. Structured design, the Jackson method, top-down development, structured programming, programming style, program testing and debugging, and other current techniques. Prerequisite: CSE 5320.

5325. DESIGN OF HYBRID COMPUTING SYSTEMS (3-0). Introduction to design and programming of analog/hybrid computing elements in hybrid linked systems. I/O structure of digital process for hybrid applications. Advanced hybrid concepts. Hybrid considerations for real time simulation. Prerequisites: CSE 5407 and MATH 2325.

5326. LIST PROCESSING AND SYMBOL MANIPULATION (3-0). List and string manipulation languages including SNOBOL4, LISP, SAIL, and PROLOG. Applications presented in a variety of areas. Design of list-processing systems considered. Prerequisites: CSE 5313 and 5346.

5327. MATHEMATICAL THEORY OF COMPUTATION (3-0). Semantics and syntax of programming languages, formal systems of proving equivalence of programs, computability and unsolvability, computer proof procedures, and related topics in mathematical logic. Prerequisite: CSE 5304.

5330. THE COMPUTER AND NATURAL LANGUAGE (3-0). Survey of computer applications in processing natural language, an introduction to programming the computer to manipulate natural language, and exploration of appropriate programming languages and useful programming techniques. Prerequisite: CSE 5313.

5331. ARTIFICIAL INTELLIGENCE (3-0). Survey of the methods and concepts of artificial intelligence. Prerequisites: CSE 5301 and 5313.

5332. MODELS FOR DATABASE DESIGN (3-0). Models of an information resource as a dynamic entity. Study of infological and datalogical concepts of database organization which incorporates both structure of information and patterns of interactions. Prerequisite: CSE 5306.

5333. INFORMATION RETRIEVAL (3-0). Text retrieval including classification, content analysis, and clustering. Development of a vector space model of document retrieval. Prerequisites: CSE 5306 and MATH 3330 or 4331 or equivalent.

5334. MICROCOMPUTER ORGANIZATION AND PROGRAMMING (3-0). Study and applications of micro/mini computer systems including microprocessors and other support components which make up the microcomputer; emphasis on microcomputer programming and system design applications. Prerequisite: CSE 5407.

5335. ADVANCED MICRO SYSTEMS DESIGN (3-0). Advanced studies in the design and implementation of microprocessor/microcomputer based systems. Prerequisite: CSE 5334.

5336. DESIGN OF FILE AND DATABASE SYSTEMS (3-0). Introduction to file servers, quantitative description of file and database structures, introduction to database concepts including relational, hierarchical and network models. Prerequisites: CSE 5313 or concurrent enrollment, 5320 or concurrent enrollment, and IE 5317.

5337. COMPUTER SYSTEM PERFORMANCE EVALUATION (3-0). Queueing network models and simulation for studying computer system capacity planning, hardware selection and upgrade problems, and performance evaluation. Prerequisite: CSE 5303.

5338. MINI-MICRO COMPUTER CONTROLS (2-3) (3 hours credit). Mini and micro computers in instrumentation and control systems. Includes digital filtering, feedback control, and predictive filtering. Laboratory projects give "hands-on" experience with computer systems. Prerequisite: CSE 5334 and a knowledge of Laplace Transforms.

5340. ARCHITECTURE OF NON-NUMERIC PROCESSORS (3-0). A study of non-numeric processor architectures including stack machines, associative processors, database architectures, LISP machines and inference machines. Prerequisites: CSE 5313, 5336, and 5308 or concurrent enrollment.

5345. DISCRETE STRUCTURES (3-0). The study of discrete structures as a foundation for topics in computer science; set theory, relations, group theory, logic, graph theory, and probability theory included. Prerequisite: MATH 1302 or equivalent, and knowledge of programming or concurrent enrollment in CSE 5300.

5346. INFORMATION STRUCTURES (3-0). Information representations and relationship between representation and computer algorithm design, creation and manipulation of storage structures such as lists and trees; introduction to ordering techniques. Prerequisites: CSE 5300 and 5319.

5407. DIGITAL LOGIC AND COMPUTER ORGANIZATION (3-3). A design intensive course focussing on digital logic and conventional (von Neumann) computer organization; digital logic design, design of instruction sets, microprogrammed and hardwired control units, design of ALU, memory organizations, and design of input/output processors. Prerequisite: CSE 5319.

5191, 5291, 5391. INDIVIDUAL STUDY IN COMPUTER SCIENCE. Topics dealing with special problems in Computer Science on an individual instruction basis. May be repeated for credit. Prerequisite: consent of the instructor. Graded P/F only.

5398 or 5698. THESIS. Prerequisite: graduate standing in computer science.

6301. ALGORITHM ANALYSIS (3-0). Topics concerning what can and cannot be proven about computational complexity including algorithm design methodologies, techniques for analysis of space and time requirements, and P and NP completeness. Prerequisites: CSE 5303, 5304, and 5306, MATH 3318.

6304. FORMAL LANGUAGE THEORY (3-0). Formal grammars, finite automata, pushdown automata, Turing machines, solvable and unsolvable problems. Prerequisite: CSE 5304.

6311. ADVANCED OPERATING SYSTEMS (3-0). Operating system policies and algorithms from a formal viewpoint. Mathematical models devised and analyzed to derive performance measures and properties of selected algorithms or system configurations. Current literature used to supplement the presentation with modeling examples. Prerequisite: CSE 5303.

6321. COMPUTERIZED IMAGE MANIPULATION (3-0). Extraction of information from visual images. Image enhancement, feature extraction, scene analysis, and image modeling. Prerequisites: CSE 5302 and MATH 2325.

6324. ADVANCED SOFTWARE ENGINEERING (3-0). Evaluation criteria, experiment design considerations and determination of the effectiveness of techniques, tools, and methodologies in software engineering. Establishing a programming environment by integrating desired software engineering components into one unified framework. Investigating the necessary characteristics to formulate experimental software/engineering. Prerequisite: CSE 5324.

6328. SIGNAL PROCESSING (3-0). Basic theoretical methods of information processing are presented. Includes methods of signal representation, data conversion, decision making, filtering, digital error problems and machine interaction. Prerequisite: CSE 5407 and a basic knowledge of probability and statistics.

6329. DATABASE SYSTEMS II (3-0). Continuation of CSE 5306, further topics in relational database systems, logic as a tool for data and query representation, deductive retrieval and the incorporation of semantic information into databases. Prerequisite: CSE 5306.

6339. ADVANCES IN COMPUTER ARCHITECTURE (3-0). Study of recent advances in computer architecture including language-directed, object-based, capability-based, message-based, reduced instruction set, distributed functional processor organizations. Prerequisite: CSE 5304 and 5308.

6340. DISTRIBUTED COMPUTING (3-0). A comprehensive study of the design of distributed computing systems including architecture, operating systems, languages and databases. Prerequisites: CSE 5306, 5308, 5313, 5315 or consent of instructor.

6341. DESIGN OF VLSI SYSTEMS (3-0). Design of very large scale integrated (VLSI) circuits with emphasis on architectural and topological issues. Emphasis also on the use and design of computer-aided-design tools for VLSI. Prerequisite: Consent of the instructor.

6343. FAULT TOLERANT COMPUTING (3-0). Architecture and design of fault-tolerant computing systems with emphasis on hardware and software redundancy techniques, fault-detection, fault-isolation, recovery, reliability and availability estimation. Prerequisite: Consent of instructor.

6192, 6292, 6392. SPECIAL TOPICS IN ADVANCED COMPUTER SCIENCE. May be repeated for credit when the topics vary. Prerequisite: graduate standing and consent of the instructor.

6197-6997. RESEARCH IN COMPUTER SCIENCE. Individually supervised research projects. Prerequisite: graduate standing in computer science and approval of Graduate Advisor.

6399, 6699, 6999. DISSERTATION. Preparation of dissertation in computer science or computer science and engineering. See also the section on interdepartmental and intercampus programs for students in the Ph.D. program in mathematical sciences.

CRIMINAL JUSTICE
Programs Division (CRJU)

Area of Study — *Degree*
Criminal Justice — M.A.

Master's Degree Plans: Thesis, Thesis Substitute, and Non-Thesis

Division Director: David MacKenna — 551 University Hall — 273-3071

Graduate Advisor: James W. Stevens — 546 University Hall — 273-3071

Graduate Faculty:

Professors Butcher, Stevens
Associate Professor MacKenna

OBJECTIVES

The Institute of Urban Studies graduate program contains courses designed for advanced education in criminal justice. Students will receive coverage of the total criminal justice system with specific courses oriented to special areas of interest. The program is multi-disciplinary and draws heavily from political science, sociology, law, psychology, public administration, and business administration. Faculty members have diverse backgrounds normally covering several of these areas of study with practical experience in and advanced study of the criminal justice process.

The program is designed for both the practitioner and the student expecting to pursue further study at the doctoral level. Psychological, sociological, and behavioral courses emphasize the human and behavioral environment of criminal justice agencies and provide instruction in the most advanced methods of group and personal communication skills. Current research and innovative techniques for utilizing modern technology serve as the basis for the entire program. Within the Criminal Justice Division, a special program of study emphasizing administration, management, planning, and research is available to interested students. The program is primarily conceptual and theoretical, seeking to develop an advanced understanding of management and a strong organizational and operational research capability. For further information on this track of study, please see the Criminal Justice Graduate Advisor.

DEGREE REQUIREMENTS

The degree of Master of Arts in Criminal Justice requires a minimum of thirty-six semester hours. The degree plan of each student must be approved by the division.

Thesis: This option is recommended for students who have work experience which is at least equivalent to an internship and/or who intend to pursue further academic study.

Internship: Students with no prior work experience in a criminal justice agency should ordinarily expect to select the internship option. Students who are employed in a criminal justice

agency may not utilize their present jobs as internships unless they were employed for fewer than six months prior to enrolling for internship credit.

Non-Thesis: This option will be available only to students who will have completed one year's experience in a criminal justice agency prior to completion of all coursework. Students enrolled in this option must complete at least six semester hours of research and statistics courses at the graduate level.

Each student's coursework will be selected by the student with the advice of his Graduate Advisor and must include certain specified core courses in Criminal Justice. The degree program must ensure full coverage of the criminal justice system while at the same time allowing the student to emphasize areas of special interest. The core courses will be selected to provide a firm interdisciplinary basis for graduate study.

All students are required to take a written examination after completing 18 semester hours of graduate work and a final oral comprehensive examination.

5306. THE NATURE OF CRIME (3-0). Examination of the changing perspectives regarding causes and control of crime and the criminal; major emphasis given to the theory of crime from an interdisciplinary frame of reference; consideration of the impact of ideology upon societal intervention systems.

5307. DEVIANT BEHAVIOR (3-0). Analysis of psychological and sociological factors involved in deliquent and criminal behavior. Crime and criminal behavior is viewed as one of the many forms of deviation from political, moral and conduct norms of the majority culture. Studies parallel genesis of crime and other prevalent forms of deviance.

5308. ANALYSIS OF PERSONALITY (3-0). Examination of personality and the factors leading to growth and development. Emphasizes the problems of personality development relevant to criminal justice agency organization and function. Focuses on operational problems stemming from inadequate personality growth, individual needs, perceived personal insecurity, immaturity, and anxiety.

5309. PUBLIC ORGANIZATIONAL THEORY (3-0). Analysis, evaluation, and application of organizational theory to public organizations with an emphasis on criminal justice organizations. Classical organization theory, systems theory and behavioral theory emphasized with special reference to the organizational process, personal mobilization, behavioral change, motivation, and human relations.

5315. THE ADMINISTRATION OF JUSTICE (3-0). Analysis of administrative practices and procedures of criminal justice agencies. Emphasis placed on the administrative structures of various components of criminal justice process and functioning and interrelationships of these units within the total criminal justice system. Includes police administration, judicial administration, and parole, probation, and corrections administration. Students expected to select one area of administration for special study.

5316. PLANNING, MANAGEMENT, AND RESOURCE UTILIZATION IN CRIMINAL JUSTICE (3-0). Analysis of planning processes, management practices, and resource utilization structures and decision making in criminal justice agencies. Includes personnel administration, budgeting, planning, organizational research, evaluation, project development, project monitoring, supervision, and grants development.

5318. CRIMINAL JUSTICE PERSONNEL ADMINISTRATION (3-0). Personnel administration and management in criminal justice agencies and institutions; analyzes functions of recruitment, selection, hiring, placement, evaluation, dismissal, benefits systems, minority recruitment, training, education, promotion, career development, and retirement.

5319. ADVANCED LAW ENFORCEMENT PRINCIPLES AND PRACTICE (3-0). Analyzes the problems, practices, and philosophies of law enforcement in contemporary society. Students expected to give special attention to particular areas such as personnel selection, police-community relations, crisis intervention, patrol innovations.

5325. THE POLITICAL BASIS OF THE CRIMINAL JUSTICE SYSTEM (3-0). Interorganizational relations, political support, legislative relations, administrative relations, and community support will be examined. Emphasis placed on the political setting of criminal justice agencies and patterns of behavior in the political process.

5326. CONSTITUTIONAL ISSUES, INDIVIDUAL RIGHTS, AND JUDICIAL BEHAVIOR (3-0). Analysis of national and state constitutional issues in regard to protection of individual rights, criminal justice agencies constraints imposed by constitutional guarantees and their impact on the criminal justice process.

5327. JUVENILE DELINQUENCY, YOUTH CRIME, AND THE YOUTH CULTURE (3-0). Examines the meaning of the concept of juvenile delinquency, the relationship between social

attitudes and definitions of law violations, the various forms of delinquency, the youth culture and youth attitudes, and juvenile rights. Emphasis placed on effective means for official interaction with various subcultures within the youth population.

5329. CRIMINAL JUSTICE INFORMATION SYSTEMS (3-0). Emphasizes current developments in the area of computerized criminal justice information systems. Systems at the national, state, regional, and local levels examined. Focuses on system design, purpose, utilization, file content and structure, and security and access limitations.

5332. CORRECTIONAL THEORY AND PRACTICE (3-0). Analysis of the theoretical basis for societal intervention in the control and disposition of offenders; contemporary responses, both intramural and extramural are examined in the context of historical development, contemporary availability, and future needs and planning.

5335. THE JUDICIAL PROCESS (3-0). Examination of the structure and operations of the courts with special attention to the recruitment and activities of the defense bar, prosecuting attorneys, and judges. Principles of court management.

5338. CRIMINAL JUSTICE RESEARCH AND METHODS (3-0). Examination of criminal justice research and methodology. Emphasis on significance of research topics, methodological adequacy, theoretical contributions, problems in the conduct of criminal justice research, public policy implications, and problems of implementation.

5339. STATISTICS AND STATISTICAL TECHNIQUES IN CRIMINAL JUSTICE RESEARCH (3-0). Introduction to statistical techniques appropriate for use in criminal justice research. Descriptive statistics, scales of measurement, measure of central tendency, variability, and association.

5341. COMMUNICATION, INTERVENTION STRATEGIES, AND INTERPERSONAL SKILLS (3-0). Examination of basic principles of interpersonal communication with emphasis on developing skills in both crisis and long-term intervention by criminal justice personnel in corrections, law enforcement and the judiciary; exploration of current theories of counseling and their applications.

5395. SPECIAL TOPICS IN CRIMINAL JUSTICE (3-0). May be repeated for credit as the topic changes.

5396. CONFERENCE COURSE IN CRIMINAL JUSTICE (3-0). Reading and research in a specialized area of criminal justice under the direction of a member of the graduate faculty.

5397,5697,5997. INTERNSHIP REPORT. Under special conditions, a student may elect an internship report in lieu of the thesis requirement. The report on the internship will meet the same standards of scholarship and writing applied to the traditional thesis.

5398,5698,5998. THESIS.

Department of ECONOMICS (ECON)

Areas of Study	*Degree*
Economics	M.A.
Administration (see Interdepartmental and Intercampus Programs.)	Ph.D.

Master's Degree Plans: Thesis and Non-thesis

Chairman: John M. Trapani	309-C Business	273-3061
Graduate Advisor: P.M. Hayashi	312 Business	273-3061

Graduate Faculty:

Professors Carney, Furubotn, Hayashi, Holland, Keim, Mullendore, Nelson, Trapani, Ziegler
Associate Professor McCall
Assistant Professors Gaynor, Graham, Harris

ECONOMICS

OBJECTIVE

The general purpose of the Master of Arts in economics program is to provide students an opportunity to obtain a better understanding of the economic aspects of modern society and a greater depth of training in the discipline of economic science than is possible in a baccalaureate degree program. Specific objectives of the program are to prepare students for careers in government, business, research, and teaching and for further graduate study.

Economics is one of the areas a student may choose to study in the Doctor of Philosophy in Administration program. Additional information concerning the doctoral program is presented in the catalog under the heading Administration.

DEGREE REQUIREMENTS

Applicants meeting the general admission requirements of the Graduate School, including a satisfactory score on the Graduate Record Examination, may be admitted unconditionally to the program. Other applicants may be admitted if approved by the Graduate Advisor in economics and the Graduate Dean. Applicants admitted but not having 12 semester hours of advanced courses in economics or not meeting prerequisite requirements for core courses are admitted subject to conditions assessed by the Graduate Advisor in economics.

MASTER'S DEGREE WITH THESIS: A minimum of 30 semester hours is required. The core requirement is ECON 5310, 5312, 5336, and the thesis (for which a six hour credit is received). Six hours of electives in economics must be chosen. The remaining nine hours of electives may be a combination of courses in economics or in a minor field. A maximum of nine hours of advanced undergraduate courses may be taken for graduate credit, with the approval of the Graduate Advisor. Not more than six hours of such courses may be in either the major or the minor field.

MASTER'S DEGREE WITH NON-THESIS: The non-thesis degree option is designed for students who will enter the job market upon completion of the M.A. degree in economics. This degree plan requires a minimum of 36 semester hours, including a core of ECON 5310, 5312, 5336 and 5329. The total may include up to nine semester hours in supporting subjects with the approval of the Graduate Advisor. A maximum of nine semester hours of advanced undergraduate work may be taken for graduate credit, with the approval of the Graduate Advisor.

5301. ECONOMIC DEVELOPMENT (3-0). Analysis of selected problems in the economic growth of countries at various stages of maturity. Prerequisite: ECON 5309 and 5311 or equivalent.

5304. ADVANCED PUBLIC FINANCE (3-0). Application of welfare theory to government budget policy in terms of resource allocation and income distribution; economic effects of particular taxes. Prerequisite: ECON 5309 and 5311 or the equivalent.

5308. ECONOMIC HISTORY OF THE UNITED STATES (3-0). An analysis of the development of the major economic institutions accompanying the industrial growth of the U.S. economy in the 19th and 20th Centuries. Prerequisite: permission of Graduate Advisor.

5309. ECONOMIC ANALYSIS I (3-0). Accelerated course in fundamental economic analysis for students enrolled in graduate programs other than the Master of Arts in economics. Basic analytical concepts of price theory and application to managerial decisions developed. Includes the theory of consumer behavior, theory of the firm, and market structure. Non-credit for MA in Economics.

5310. MICROECONOMIC THEORY (3-0). Theories of consumer choice and of the firm; marginal productivity and functional distribution; general equilibrium of production, consumption, and exchange.

5311. ECONOMIC ANALYSIS II (3-0). Develops understanding of macroeconomic environment within which each person must earn a living. Integration of business, government, monetary, international factors within context of inflation, productivity, growth. Non-credit for MA in Economics.

5312. MACROECONOMIC THEORY (3-0). Study of the aggregate approach to the economy and the tools of analysis used for the solving of national economic problems.

5313. MANAGERIAL ECONOMICS (3-0). Application of economic analysis in formulating business decisions, drawing upon the theoretical foundations of the concepts of demand, cost, production, profits, and competition, with special emphasis on case studies. Prerequisite: ECON 5309 or the equivalent.

5314. INDUSTRIAL ORGANIZATION (3-0). Relationship of pricing, advertising, research and development to market structure of an industry. Performance and objectives of firms under

various forms of market organization and modes of ownership. Prerequisite: ECON 5309 or equivalent.

5316. MATHEMATICAL ECONOMICS I (3-0). Mathematical methods useful in economic analysis; topics include constrained and unconstrained optimization problems, comparative statics and application to economic models. Prerequisite: ECON 5309 or 5311 or the equivalent.

5317. MATHEMATICAL ECONOMICS II (3-0). Mathematical methods for economic dynamics and other advanced topics, including difference and differential equations, introduction to control theory, and their application to dynamic modelling. Prerequisite: ECON 5316 or equivalent.

5321. INTERNATIONAL ECONOMICS (3-0). In-depth examination of the factors responsible for international specialization and exchange. Commercial policy questions also stressed. Prerequisites: ECON 5309 and 5311 or equivalent.

5324. MONETARY AND FISCAL ECONOMICS (3-0). Analysis of the effects of central bank policy and government spending and taxation on income and employment; public debt management. Prerequisite: ECON 5311 or the equivalent.

5326. HISTORY OF ECONOMIC THOUGHT (3-0). Survey of economic ideas and systems of thought from Adam Smith through modern economic theory. Prerequisite: ECON 5309 and 5311 or the equivalent.

5327. INTERNATIONAL FINANCE (3-0). In-depth examination of the institutional framework for international monetary relations. Factors responsible for international monetary disequilibrium, the adjustment process, and questions pertaining to exchange rates stressed. Prerequisites: ECON 5311 or equivalent.

5328. INSTITUTIONAL ORGANIZATION AND ECONOMIC BEHAVIOR (3-0). Effects of institutional arrangements on economic behavior systematically studied; property-rights analyses applied to selected problems; consideration given to the interrelations among institutional structure, economic incentives, transactions costs, and efficiency in production and distribution. Prerequisite: ECON 5309 or equivalent.

5329. RESEARCH METHODS IN APPLIED ECONOMICS (3-0). Research problems and methods most commonly encountered by economists in industry and government; specific research projects required in applied areas such as corporate planning, utility rate analysis, manpower planning, micro and macro forecasting, etc.; emphasis on practical research methods and on the presentation of results in coherent written reports. Prerequisite: ECON 5310, 5312, and 5336.

5330. ADVANCED LABOR ECONOMICS (3-0). Economic analysis of the supply of labor, the allocation of labor among alternative uses, investment in human capital, the extent and incidence of unemployment, and the determination of wages. Prerequisite: ECON 5309 or equivalent.

5331. URBAN ECONOMICS (3-0). Analysis of urban problems and goals with special attention given to those factors that influence the economic development of urban communities and the quality of urban life. Attention is given to policy formulation as a means for urban problem solving. Prerequisite: ECON 5309 or equivalent.

5332. TRANSPORTATION ADMINISTRATION (3-0). Characteristics, underlying economic principles, effective management of various transport modes. Function of transportation systems, logistics systems. Effective administration within regulated environment. Spatial element introduced to analysis. Contemporary developments, dynamic issues. Prerequisite: ECON 5309 or equivalent.

5333. ECONOMICS OF HEALTH (3-0). Employment of economic theory to analyze the health sector and consider problems such as rising prices and maldistribution of resources. Topics include: methods of policy evaluation, impact of national health insurance, productivity, determinants of health. Prerequisite: ECON 5309 or equivalent.

5335. GOVERNMENT REGULATION OF BUSINESS (3-0). Development of a general theory to explain the origin of government regulation as a pervasive force in the American economy, affecting goods, services, and the workplace; examination of the various forms of government regulation and consideration of the costs and benefits of regulation. Prerequisite: ECON 5309 or equivalent.

5336. ECONOMETRICS I (3-0). Statistical methods applied to business and economic models; topics include multiple regression, generalized linear regression, systems estimation procedures and applications.

5337. BUSINESS AND ECONOMIC FORECASTING (3-0). Econometric model-building and forecasting with applications to business and economics. Single equation models, multiple equation models, and time-series models are covered with emphasis on practical problems in analysis and forecasting. Prerequisite: BUSA 5301 or equivalent.

5338. SEMINAR (3-0). Topics covered to vary from semester to semester. Prerequisite: permission of Graduate Advisor in economics.

5340. ADVANCED MANPOWER ECONOMICS (3-0). Development of human resources, including the role of education, labor market institutions, manpower programs and manpower policy. Prerequisite: ECON 5309 or equivalent.

5350. ECONOMIC FOUNDATIONS FOR THE SOCIAL SCIENCES—I (3-0). Accelerated course in microeconomic analysis designed for those who are seeking master's degrees in other social sciences. Emphasizes the application of microeconomic theory to the study of current social problems, i.e., pollution, poverty, energy systems, etc. Non-credit for MA in Economics or MBA. Prerequisite: consent of the instructor.

5351. ECONOMIC FOUNDATIONS FOR THE SOCIAL SCIENCES—II (3-0). Accelerated course in macroeconomic analysis designed for those seeking master's degrees in other social sciences. Emphasizes the application of macroeconomic theory to the solution of aggregate problems of the economic system, i.e., unemployment, inflation, growth, etc. Non-credit for MA in Economics or MBA. Prerequisite: consent of the instructor.

5182, 5282, 5382. INDEPENDENT STUDIES IN ECONOMICS. Extensive analysis of an economic topic. Prerequisite: consent of instructor and department chairman.

5191, 5291, 5391. RESEARCH AND SPECIAL TOPICS IN ECONOMICS.

5398, 5698, or 5998. THESIS. Prerequisite: permission of Graduate Advisor in economics.

6310. APPLIED MICROECONOMIC THEORY (3-0). Applications of advanced economic theory that explain and predict the behavior of individual households, business firms, and markets, and use of which substantially improves managerial decision-making in business and government; applications such as cost-benefit analysis, transfer pricing, and utility regulation. Prerequisite: ECON 5310 and 5316 or consent of instructor.

6312. APPLIED MACROECONOMIC THEORY (3-0). Applications or advanced economic theory that explain and predict the aggregate behavior of households, business firms, government, and markets, the use of which improves managerial decision-making in business and government; specific applications such as monetary and fiscal policy stimulation, forecasting, and estimation of the employment-inflation trade-off. Prerequisite: ECON 5312 and 5316 or consent of instructor.

6336. ECONOMETRICS II (3-0). Advanced topics in econometrics, such as systems estimation with restrictions, time-series analysis, Bayesian econometrics, non-linear estimation and other special problems in econometrics. Prerequisite: ECON 5336 or equivalent.

6392. RESEARCH IN ECONOMICS. Independent research under supervision of a faculty member. Prerequisite: consent of instructor.

Center for PROFESSIONAL TEACHER EDUCATION (EDUC)

Director: Charles W. Funkhouser 500 Hammond 273-2591

Graduate Faculty:

Professor Crow

Associate Professors Brooks, Funkhouser, Leffingwell, Reinhartz

Assistant Professors Kyle, Parker, Perez, Strickland, Van Cleaf

OBJECTIVE

The graduate course offerings in education are provided to support other graduate programs and meet expressed needs of students. The courses are designed to synthesize the theory and the application of professional skills. No program leading toward a graduate degree in education exists at the present time.

5301. MULTICULTURAL PERSPECTIVES IN EDUCATION (3-0). Examination of historical and current conditions in society that influence education. Emphasis given to educational literature that discusses the process of socialization, educational opportunity, the multicultural as-

pects of society, and the cultural, social, and philosophical forces that shape educational policies and programs.

5321. INTRODUCTION TO EDUCATIONAL RESEARCH (3-0). Examination of basic concepts and procedures necessary for empirical research investigations within classroom contexts; experimental design, data collection procedures, univariate and multi-variate analysis types, computer application, data interpretation, summary report formats, and a review of research in disciplines related to classroom content/instruction. Mathematical background is not a prerequisite.

5325. CLINICAL PRACTICES IN DIAGNOSIS AND REMEDIATION OF READING DISABILITIES (2-2). Covers the proficient administration of a battery of diagnostic tests related to analyzing reading and language arts difficulties. Emphasis given to interpeting test results, writing diagnostic reports, and designing individual remediation programs in the clinical setting.

5390. SELECTED TOPICS IN EDUCATION (3-0). An examination of different topics each semester with a focus on such subjects as the gifted student, the education of minorities, the open concept school, or other selected topics concerning the teaching-learning process. This seminar may be repeated for credit as the topic changes. Prerequisite: permission of instructor.

Department of ELECTRICAL ENGINEERING (EE)

Areas of Study — *Degrees*

Electrical Engineering — M.S., M.ENGR., Ph.D.

Master's Degree Plans: Thesis, Thesis Substitute (M. Engr. only), and Non-Thesis

Chairman: James E. Thompson — 316C Engineering — 273-2671

Graduate Advisor: Charles V. Smith, Jr. — 214B Engineering — 273-2673

Graduate Faculty:

Professors Cash, Chen, Fitzer, Jiles, Owens, Rao, Rouse, Salis, Smith, Spradlin, Thompson
Associate Professors Blanchard, Cannon, Carter, Davis, Dillon, Rucker, Shoults, Yeung
Adjunct Associate Professor Welch
Assistant Professors Garcia, Kondraske, Manry

OBJECTIVE

The course offerings provide the student with an opportunity to broaden as well as to intensify his knowledge in a number of areas of electrical engineering. The student, with the aid of a faculty advisor, may plan a program in any one of a number of fields of specialization within electrical engineering or from the offerings of related departments in science and engineering.

Graduate study and research are offered in the areas of:

1. Analysis and Synthesis of Circuits, Networks and Systems
2. Electromagnetic Fields and Microwave Systems
3. Electronics—Solid State Theory, Device and System Theory
4. Energy Systems—Efficient Operation and Planning in Generation, Transmission, and Distribution
5. Information Transmission and Communication Systems
6. Digital Logic and Microprocessor Systems
7. Digital Image Processing
8. Interdisciplinary Programs in Materials Science, Direct Energy Conversion, Stability and Control/Automatic Controls, Bioengineering, and Computer Science.

ELECTRICAL ENGINEERING

The program is designed to satisfy the needs of students pursuing master's and doctoral degrees and to provide for the student seeking to increase his knowledge in areas of electrical engineering related to his engineering practice.

DEGREE REQUIREMENTS

Students wishing to major in electrical engineering at the graduate level should have the Bachelor of Science degree in electrical engineering from an approved school. Applicants with degrees in other disciplines may qualify for graduate study in electrical engineering after completion of a faculty-approved program of undergraduate courses.

Master's level students will ordinarily be expected to complete the requirements for the master's degree with thesis. In some cases, with express written approval of the department, the master's degree without thesis will be allowed. Consult the department Graduate Advisor for details.

The electrical engineering faculty has established a core curriculum for the Master of Science and Master of Engineering degrees. The four courses in the core curriculum are marked with an asterisk. Master's students must take EE 5313 and at least one of the other three core courses. Every Master's student's degree plan in Electrical Engineering must include at least six credit hours of supporting courses in areas other than Electrical Engineering.

General degree requirements for the Master of Engineering are given on page 24.

5300. SELECTED TOPICS IN ELECTRICAL ENGINEERING (3-0). Material may vary from semester to semester. Topics from one of the following fields: Electronics, Power Systems Analysis, Information Theory, Plasma Engineering, Servomechanisms and Controls, Electromagnetic Theory and Practices, Engineering Analysis. May be repeated for credit if different topics are covered for each registration.

5301. MICROPROCESSOR SYSTEMS (3-0). Software developments, hardware design, and applications of 16 bit microprocessor systems. Prerequisite: EE 4310 or consent of instructor.

5302. PRINCIPLES OF COMPUTER-AIDED DESIGN (3-0). Mathematical theory and numerical techniques of problem-oriented languages and automated design. Prerequisite: consent of instructor.

5303. DEVICE THEORY AND NETWORK MODELS I (3-0). Physics of solids based on quantum mechanics, the physical principles of diodes, bipolar and field effect transistors, circuit models for these devices applicable to the analysis of integrated circuits, integrated circuit fabrication techniques and design philosophy, and the application of new quantum electronic devices.

5304. DIGITAL COMMUNICATIONS I (3-0). Analysis and design of digital communication systems. System models, applications of convolution and correlation, matched filters, baseband PAM systems, entropy of sequences, channel capacity, and modulation techniques such as FSK, PSK, FM-PM and AM-PM. Prerequisites: EE 4330 and knowledge of probability and random variables, or consent of instructor.

5305. DIGITAL COMMUNICATIONS II (3-0). Comparisons of digital modulation techniques based upon error rate performance and channel capacity. Applications of coding such as error detection and correction. Digital transmission of analog signals, sampling and reconstruction of signals, quantization of signals, PCM, and delta-modulation systems. Prerequisite: EE 5304 or consent of instructor.

5306. MODULATION SYSTEMS (3-0). Comparison of modulation systems and multiplexing techniques on the basis of complexity, required signal power, required transmission bandwidth, achievable signal-to-noise ratio, threshold effects, etc. Requires background knowledge of Fourier transforms and probability. Prerequisite: EE 5322 or consent of instructor.

5308. ANALYSIS OF COMMUNICATIONS CIRCUITS (3-0). Nonlinear effects in amplifiers and mixers, system and device noise analysis, band pass filter theory, and demodulator analysis. Prerequisite: EE 4330 or equivalent.

5309. DESIGN OF COMMUNICATIONS CIRCUITS (3-0). Design methods for r-f small signal amplifiers, r-f power amplifiers, oscillators, mixers, and detection circuits (including phase locked loops). Covers use of Linville chart, and considerations of impedance matching, stability, conversion efficiency, etc. Prerequisite: EE 5333 or consent of instructor.

5310. PROPERTIES OF NOISE SOURCES (3-0). A study of physical mechanisms that produce random voltage or current fluctuations in passive and active components; circuit modeling of electrical noise sources; measures of noise and noise reduction techniques. Prerequisite: EE 4330 or consent of instructor.

5311. ADVANCED MICROCOMPUTER SYSTEMS (3-0). Study of advanced software devel-

opment techniques and hardware design using microcomputers, 16-bit microprocessors, and modern peripheral components. Prerequisite: EE 5301 or consent of instructor.

5312. PROPAGATION AND SCATTERING (3-0). Diffraction, reflection, and refraction of electromagnetic waves at plane and spherical boundaries; scattering of EM waves from rough surfaces and inhomogeneous volumes; physical optics, geometric optics, small perturbation and radiative transfer. Prerequisite: EE 3319 or consent of the instructor.

***5313. ADVANCED ENGINEERING ANALYSIS** (3-0). Problem course dealing with selected analytical methods not normally included in undergraduate electrical engineering curricula.

5314. NON-LINEAR SYSTEMS ANALYSIS (3-0). Introduction to analytical and topological methods of non-linear analysis, including phase plane, limit cycles, describing functions, subharmonic oscillations, etc.

***5315. LINEAR SYSTEMS ENGINEERING** (3-0). Introduction to mathematical foundations of systems engineering. Both continuous and discrete data systems considered.

5316. STATISTICAL DESIGN OF LINEAR SERVOMECHANISMS (3-0). Analysis and synthesis techniques applicable to feedback control systems in which portions of the system and/or its input signals are nondeterministic. Prerequisite: EE 4314 or equivalent.

5317. DISCRETE DATA SYSTEMS (3-0). Analysis of non-continuous dynamic systems described by difference equations, Z-transform theory, and including applications of signal flow graph theory. Prerequisite: EE 4314 or equivalent.

5318. NETWORK SYNTHESIS II (3-0). Continuation of passive network driving point and transfer function synthesis, extending the introductory material of EE 4317. Prerequisite: EE 4317 and MATH 4322.

5319. NETWORK SYNTHESIS III (3-0). Continuation of passive network synthesis, with emphasis on transfer function synthesis. Related topics such as predistortion, single and double terminations, and low-pass to band-pass transformations are included. Prerequisite: EE 5318 or equivalent.

5320. MODERN CONTROL THEORY (3-0). Linear algebra, Euclidian spaces, properties of sets, vector functions, function spaces, etc. Concepts of system state, state representation, definition of the control problem, controllability, observability. Variational approach, optimality conditions, Pontryagin's maximum principle, and the Hamilton-Jacobi equation. Prerequisite: EE 4314 or equivalent.

5321. MODERN CONTROL DESIGN TECHNIQUES (3-0). Minimum time problems, minimum fuel problems, minimum energy problems and the derivation of necessary conditions. The design of time optimal and fuel optimal systems, and the design of optimal linear systems with quadratic criteria. Prerequisite: EE 5320.

5322. RANDOM SIGNALS AND NOISE (3-0). Probability, random variables, stochastic processes in physical systems, signal detection, design of optimum filters.

5323. STATISTICAL DETECTION AND ESTIMATION THEORY (3-0). Statistical detection or decision theory and estimation theory as applied to modern communications systems, radar/sonar systems, stochastic control theory, and data processing systems. Prerequisite: EE 5322.

5324. DIGITAL COMPUTER DESIGN (3-0). Organization and design of digital computer systems and subsystems, using MSI and bit-slice devices. Prerequisite: EE 5328.

5325. STATISTICAL SIGNAL PROCESSING (3-0). Estimation of autocorrelations and cross-correlations; estimation of power spectral densities using the DFT; design of IIR and FIR deconvulution filters; design of Wiener filters, and robjust filters; maximum likelihood estimation. Prerequisites: EE 4318 and EE 5322 or consent of instructor.

5326. ADVANCED COMMUNICATION THEORY (3-0). Continuation of study of communications problems and techniques, with emphasis shifting to specific areas such as radar detection, space communications, etc. Prerequisite: EE 5322.

5327. INFORMATION THEORY AND CODING (3-0). Transmission of information over noisy channels, Shannon's coding theorems, techniques of coding and decoding for reliable transmission over noisy channels, error-detecting and error-correcting codes. Prerequisite: EE 5322.

5328. ADVANCED LOGIC CIRCUITS (3-0). Selected topics in switching theory and logical design, with emphasis on sequential machines and digital system implementation using integrated circuits. Prerequisite: EE 3336 or equivalent.

5329. DIGITAL SIGNAL PROCESSING (3-0). Discrete linear systems; advanced design techniques for digital filters; signal flow graphs; analysis of the FFT; effects of finite wordlength on filtering operations. Prerequisite: EE 4318 or consent of instructor.

5330. APPLICATIONS OF OPTIMIZATION THEORY (3-0). Various search techniques for obtaining numerical solutions to the two-point boundary value problem are developed. Linear (simplex), nonlinear, and dynamic programming methods are applied. Prerequisite: EE 5320 or equivalent.

5331. DIGITAL IMAGE PROCESSING (3-0). Image processing as applied to image coding, image restoration, image data extraction, image enhancement and image analysis. Application of orthogonal transforms and other techniques in image processing are emphasized. Prerequisite: EE 5334 or consent of instructor.

***5332. ELECTROMAGNETIC THEORY** (3-0). Advanced study of electromagnetic theory, its content, methods, and applications. Topics include boundary value problems, propagation in bounded structures, forces in quasi-static systems, scattering and diffraction.

***5333. ADVANCED ELECTRONICS** (3-0). Advanced study of electronic devices, modeling, and analysis techniques. Topics include large and small signal device characterization, quiescent point problem, linear systems design, and nonlinear systems analysis.

5334. DISCRETE ORTHOGONAL TRANSFORMS AND THEIR APPLICATIONS (3-0). Development of discrete orthogonal transforms such as DFT, BIFORE, Complex BIFORE, and Chirp Z-Transforms, and the application of such transforms in signal processing. Also, the development of efficient algorithms for fast computation of transforms will be discussed. Prerequisite: graduate standing or consent of instructor.

5335. MICROWAVE SYSTEMS ENGINEERING (3-0). Radar range equation; detection of signals in noise, radar design techniques, scattering and emission, backscatter cross section, measurement techniques, errors in radar cross section, measurements, polarimetric radar processing. Prerequisite: EE 3319 or consent of instructor.

5336. DIGITAL IMAGE RESTORATION (3-0). Study of imaging, image formation and recording, and image representations and models. Covers sources and models of image degradation and emphasizes image restoration techniques. Prerequisite: EE 5331.

5337. ANTENNA SYSTEM ANALYSIS (3-0). Fundamental parameters of antennas, potential functions and radiation integrals, wire and loop antennas, array antennas and antenna measurements. Prerequisite: EE 4327 or consent of the instructor.

5339. DEVICE THEORY AND NETWORK MODELS II (3-0). Advanced treatment of wave mechanics and the theory of solids, semiconductor devices including diodes, bipolar and field effect transistors and quantum electronic devices and their applications. Prerequisite: EE 5303.

5340. INTEGRATED CIRCUIT TECHNOLOGY (1-5). Fundamentals of integrated circuit processing. Prerequisite: EE 4332 or 5303 or equivalent.

5341. MICROWAVE DEVICES (3-0). Device physics and applications of microwave semiconductors and vacuum tubes; topics include varactors, PIN diodes, avalance devices, Gunn effect devices, transistors, traveling wave tubes, klystrons, and other active and passive devices. Prerequisite: EE 4329 or consent of the instructor.

5342. MICROWAVE CIRCUITS (3-0). Theory of microwave circuit design; techniques include use of Kuroda identities, Richard's transformation, filters, and ABCD parameters; topics include design of couplers, transformers, filters, and resonators in coaxial lines, strip-lines, and microstrips. Prerequisite: EE 4329 or consent of instructor.

5345. ANALYSIS OF ELECTROMECHANICAL SYSTEMS (3-0). Development of electromechanical equations and analysis of electromechanical systems. Development of linear models by perturbation techniques. Small signal linear analysis of electrical machines. Application of feedback control techniques.

5346. CONTROL OF POWER SYSTEMS (3-0). Feedback control in power systems. Application of feedback in dynamic stability problems, automatic generation control and experimental testing methods. Prerequisite: EE 5345 and 4314 or permission of instructor.

5360. POWER SYSTEM LOAD FLOW ANALYSIS (3-0). Solution of large sparse matrix equations and application of load flow study to power system planning and operation. Prerequisite: EE 4333 or EE 4303.

5361. POWER SYSTEM DYNAMICS (3-0). Advanced theory of synchronous machines, steady-state stability, transient stability and dynamic stability of a power system. Prerequisite: EE 4333 or EE 4303.

5362. POWER SYSTEM OPERATIONS (3-0). Economic and security methods in power system operation. Prerequisite: EE 4333 or EE 4303.

5363. SHORT CIRCUIT ANALYSIS AND PROTECTION OF AN ELECTRICAL POWER SYSTEM (3-0). Power system short circuit calculations with symmetrical component models and bus impedance matrix representation. Application of system protection to faulted power system components. Prerequisite: EE 4333 or EE 4303 and knowledge of fundamentals of power system protection.

5364. INDUSTRIAL POWER SYSTEMS (3-0). Primary and secondary distribution systems, power systems for commercial buildings, modernization and expansion of existing power systems, system grounding, selection of system voltages, power factor improvement and system protection.

5365. D.C. TRANSMISSION (3-0). Analysis and application of D.C. transmission links in A.C. power systems. Operation of A.C.-D.C. converters.

5366. APPLICATION OF STOCHASTIC METHODS FOR POWER SYSTEM ANALYSIS (3-0). Application of statistical techniques to evaluate integrity of power system networks. Planning and operation of power systems for maximum reliability.

5367. SELECTED TOPICS IN POWER SYSTEM ENGINEERING (3-0). Wide variety of topics in generation, transmission, and distribution.

5390. ELECTRICAL ENGINEERING GRADUATE SEMINAR (3-0). Topics may vary from semester to semester. May be repeated for credit. Prerequisite: graduate standing or consent of the department. Graded P/F.

5445. SYNTHESIS OF LINEAR SERVOMECHANISMS (3-3). Extension of the introductory material in 4314, with emphasis on compensation techniques and a-c carrier systems. Prerequisite: EE 4314 or equivalent. **$5 lab fee.**

5452. ELECTROMAGNETIC RADIATION (3-3). Theory of electromagnetic radiation at microwave frequencies. **$5 lab fee.**

5191, 5291, 5391. RESEARCH IN ELECTRICAL ENGINEERING. Individually approved research projects leading to preparation and submission of a master's thesis in electrical engineering.

5193. MASTER'S COMPREHENSIVE EXAMINATION (1-0). Directed study, consultation and comprehensive examination over course work, leading to the non-thesis Master of Science degree in electrical engineering. Graded P/F. Required of all non-thesis M.S. students in the semester when they plan to graduate.

5398, 5698, 5998. THESIS. Prerequisite: graduate standing in electrical engineering.

6197, 6297, 6397, 6697, 6997. RESEARCH IN ELECTRICAL ENGINEERING. Individually approved research projects leading to a doctoral dissertation in the area of electrical engineering.

6399, 6699, 6999. DISSERTATION.

A limited number of the following courses may be applicable toward the graduate program if approved in advance by the Graduate Advisor.

4303. COMPUTER METHODS IN POWER SYSTEM ANALYSIS
4304. ELECTRICAL MACHINERY
4305. PRINCIPLES OF DIRECT ENERGY CONVERSION
4306. INTRODUCTION TO PROTECTIVE RELAYING
4310. MICROPROCESSORS
4312. ADVANCED ELECTROMAGNETIC FIELDS
4314. CONTROL SYSTEMS
4317. INTRODUCTION TO NETWORK SYNTHESIS
4321. COMPUTER AIDED DESIGN
4326. MICROWAVE SYSTEMS
4327. THEORY AND DESIGN OF ANTENNAS
4329. PHYSICAL ELECTRONICS
4330. INFORMATION TRANSMISSION
4331. EFFECTS OF NOISE IN COMMUNICATION SYSTEMS
4332. ELECTRONIC DEVICES
4334. DIGITAL SYSTEM CONTROLLER DESIGN
4337. COMPUTING CIRCUITS
4339. RADIO-FREQUENCY CIRCUIT DESIGN

NOTE: For course offerings in computer software, see Computer Science and Engineering section.

ENGINEERING: INTERDISCIPLINARY

See Interdepartmental and Intercampus Programs, p. 205

ENGINEERING MECHANICS Program

See Interdepartmental and Intercampus Programs, p. 206.

Department of ENGLISH (ENGL)

Areas of Study	*Degrees*
English	M.A.
Humanities (See Interdepartmental and Intercampus Programs.)	M.A., M.A.T., Ph.D.

Master's Degree Plan: Thesis and Non-Thesis

Acting Chairman: Judith McDowell — 203 Carlisle Hall — 273-2692

Graduate Advisor: Robert J. Reddick — 202 Carlisle Hall — 273-2491

Graduate Faculty:

Professors Eichelberger, Estes, Garner, Goyne, Kauffman, Kendall, Littlefield, R. McDowell, Porter, Roemer

Associate Professors Beaudry, Burns, Frank, Golladay, Kneupper, Lacy, Lewis, J. McDowell, Moffett, Reddick, Richardson, Swadley, Turbeville, Vitanza, Zacha

Assistant Professors Delmar, Ryan

OBJECTIVES

The Department of English offers a wide variety of graduate courses to meet the needs of students with a diversity of interests and academic backgrounds who wish to enhance their awareness of their literary and cultural environment by additional formal instruction or to increase their professional competence.

Two programs of study leading toward the Master of Arts in English are available: Modern Literature and Rhetoric/Composition. Both programs emphasize critical reading and writing.

The Master of Arts Program with an emphasis in Modern Literature concentrates specifically on American, British, and Comparative Literature of the last three hundred years, though courses are also available in the works of earlier centuries to supplement and provide background for the study of modern literature. Emphasis on the modern period provides for great flexibility of approach. Course focus may be on broad literary movements and the transmission of ideas and techniques between national cultures and languages, on the history of dominant ideas and philosophies in (or among) the literatures in question, on the development and transformations of genres and motifs, or on single authors or works and their influence on other writers and works. Courses may focus on the relationships between literature and the other arts or examine the impact on literature of other traditions of thought that form the matrix of ideas out of which literature grows. Due to the breadth and depth of its concerns, the emphasis on the modern period offers students an attractive opportunity to expand their literary horizons, to enrich their understanding of the process of human expression, and to develop techniques and methodological approaches that will enable them to deal wisely and efficiently with the literary works of art that constitute a given literature or literary tradition.

The Master of Arts Program with an emphasis in Rhetoric/Composition prepares candidates to teach in and to administer writing programs at the secondary, junior college, and university

levels; it enables students to pursue research in the theory and practice of composition and rhetoric; and it provides a propaedeutic for the study of literature and other disciplines. The common core of studies in the program includes the history of the old and new rhetorics, the processes and pedagogies of reading and writing, the evaluation of student writing, the principles and theories of rhetorical invention, the methods of stylistic analysis, and the advanced principles of expository and argumentative writing. Though the emphasis is upon rhetoric/composition, complementary courses are offered in linguistics and in literary and cultural criticism—specifically in English linguistics and discourse grammar and in the classical and contemporary theories and practices of text production and analysis. Together, the courses among the complements encourage an interdisciplinary view of rhetoric and composition.

ADMISSION OF INTERNATIONAL STUDENTS

In addition to the admission requirements set by the Graduate School, the English Department requires all International Students to have speaking, reading, and writing competence in English, to submit to the Graduate Advisor a portfolio of essays written by the applicant in English, and to complete successfully English 5300, English for International Students, offered annually in the Second Summer Session, before unconditional admission is granted.

DEGREE REQUIREMENTS

For the Master of Arts degree in English, a minimum of 30 semester hours (with Thesis) or 36 semester hours (without Thesis) at the 5000 level is required. Study for the M.A. may be concluded with or without the writing of a thesis. Students intending further graduate study will be advised to register for a minimum of six thesis hours; students who do not intend to go beyond the Master's degree may prefer to choose the non-thesis option.

The courses designated for the M.A. Program in Modern Literature are the following:

5304. 18th Century English Literature
5305. The Romantic Period in English Literature
5306. English Literature of the Victorian Age
5313. 20th Century British Literature
5311. World Literature Written in English
5321. American Literature from 1800 to the Civil War
5322. American Literature from the Civil War to 1910
5323. American Literature since 1910
5335. Research and Bibliography
5340. Literary Criticism: The Major Traditional Texts
5360. Contemporary Critical Theory
5345. Comparative Literature of the 18th Century
5346. Comparative Literature of the 19th Century
5347. Comparative Literature of the 20th Century

For a 30 hour program including six hours of Thesis, the student is to take eight of the above courses, one of which must be 5335. For a 36 hour program without Thesis, the student is to take 12 of the above courses. In both thesis and non-thesis programs, the student must take a minimum of two courses from each of the three divisions—American, British, and Comparative Literature.

The courses designated for the M.A. Program in Rhetoric/Composition are the following:

5350. Advanced Technical Communication
5351. History of Rhetorical Theory
5352. Major Figures in Modern Rhetorical Theory
5353. Principles and Theories of Invention

5334. Stylistics
5354. English Linguistics
5355. Studies in English Discourse
5356. Rhetoric of Composing
5357. Rhetoric of Reading
5358. Principles and Methods of Evaluation
5359. Advanced Argumentative Writing
5336. Current Topics in Rhetoric
5389. Issues in Teaching Composition
5340. Critical Theory: The Major Traditional Texts
5360. Contemporary Critical Theory

For a 30 hour program including six hours of Thesis, the student is to take eight of the above courses, one of which must be 5354. For a 36 hour program without Thesis, the student is to take 12 of the above courses, two of which must be 5354 and 5340 or 5360.

The course work of the master's candidate will be approved in advance by the Graduate Advisor, who should be consulted on all problems related to the student's program. Three regular counseling sessions will be scheduled each year, in December, April, and August. Notification of specific time and place will be sent to all students who have been accepted in the graduate program.

Those students who elect to write a thesis must select a topic in consultation with the supervising professor. Before the student registers for thesis, the names of the readers, the title of the thesis, a prospectus, and a bibliography of major sources must be approved by the Graduate Studies Committee.

Graduate standing is prerequisite for the courses listed below. Courses so designated may be repeated for credit as often as their subject matter changes. The titles are general descriptions. Students should consult the Department of English each semester for more specific information about the individual offerings.

5300. ENGLISH FOR INTERNATIONAL STUDENTS (3-0). An intensive course in reading and writing English for International Students seeking graduate degrees in the Humanities; may not be applied toward a graduate degree in English.

5301. MEDIEVAL ENGLISH LITERATURE (3-0).English literature of the period before 1500. May include Old English poetry, Anglo-Latin prose, William Langland, the alliterative revival, romances, Malory, and Chaucer.

5302. TUDOR AND JACOBEAN LITERATURE (3-0). English literature from the reigns of Henry VII through James I. May change according to the chosen emphasis on major figures such as Spenser; development of one or more genres, excluding drama; representative works; or significant themes and ideas.

5303. SEVENTEENTH-CENTURY ENGLISH LITERATURE (3-0). Poetry and prose of the 17th Century. May include a detailed study of Milton or a comprehensive study of writers and motifs of the period.

5304. EIGHTEENTH-CENTURY ENGLISH LITERATURE (3-0). Age of Enlightenment, Reason, Satire, Neoclassicism. Varies from an intensive study of the entire period to highly concentrated work in a particular genre or in one or more major authors (Dryden, Pope, and Swift; Defoe and Fielding; Johnson and Boswell).

5305. THE ROMANTIC PERIOD IN ENGLISH LITERATURE (3-0). Works of one or more of the major romantic poets (Blake, Wordsworth, Coleridge, Byron, Shelley, Keats), supplemented by readings in the general literature and criticism of the period.

5306. ENGLISH LITERATURE OF THE VICTORIAN AGE (1830- 1890) (3-0). Ideas, themes, and forms in such writers as Carlyle, Arnold, Mill, Tennyson, Browning, and Clough, with attention to the Victorians as descendants of romanticism and precursors of modernism.

5307. TWENTIETH-CENTURY ENGLISH POETRY (3-0). Major poetry or non-fiction prose of this century. May vary from a concentration on certain writers such as Yeats and Eliot to significant movements or themes.

5308. SHAKESPEARE (3-0). Representative works of Shakespeare. May vary from compre-

hensive readings in the dramatic literature to intensive examination of certain plays, or to other related topics.

5309. ENGLISH DRAMA (3-0). English drama, *excluding Shakespeare,* constituting both major playwrights and principal types of drama, in one of these periods: (1) Medieval and Tudor drama, from the beginnings to about 1590; (2) Elizabethan and Jacobean drama, 1590-1642; (3) Restoration and 18th Century drama, 1660-1800; (4) modern drama.

5310. ENGLISH FICTION (3-0). British fiction which may vary according to (1) historical periods, (2) a major figure or figures, (3) development of themes or types.

5311. WORLD LITERATURE WRITTEN IN ENGLISH (3-0). English-language literature outside England and the United States: works by writers from African nations, Australia, Canada, India, New Zealand, the West Indies, and other areas significant for English-language writing.

5313. TWENTIETH CENTURY BRITISH LITERATURE (3-0). A study of English and Irish fiction and drama in the twentieth century; may focus on major authors, themes, or topics; may concentrate on the period before or the period after 1950.

5320. SELECTED READINGS IN AMERICAN LITERATURE BEFORE 1800 (3-0). Designed to establish the diversity of our early literature. Includes Indian oral literature, travel accounts, Puritan writings, diaries, autobiography (Franklin), poetry, drama, and fiction. Cultural context stressed. Recommended for students who have not previously studied this period at the undergraduate level.

5321. AMERICAN LITERATURE FROM 1800 TO THE CIVIL WAR (3-0). Literature of the young republic and of the American Renaissance, the flowering in American letters which began with the publication of Emerson's *Nature* in 1836. Recommended for students who have not studied the period previously at the undergraduate level.

5322. AMERICAN LITERATURE FROM THE CIVIL WAR TO 1910 (3-0). Prose literature which expresses in theme and form the evolving cultural consciousness of America. Recommended for students who have not previously studied the period at the undergraduate level.

5323. AMERICAN LITERATURE SINCE 1910 (3-0). Primarily fiction; typically includes representative works of multiple authors selected for the study of patterns in theme and method.

5324. AMERICAN POETRY (3-0). Concentrates each semester on two or three major poets such as Taylor, Longfellow, Dickinson, Whitman, Frost, Stevens, Williams, Eliot, Pound, and Plath. Subject poets to be announced prior to registration.

5325. AMERICAN DRAMA (3-0). Representative American drama from O'Neill to the present; emphasis on the contributions of culture to dramatic structure.

5326. MAJOR FIGURES IN NINETEENTH-CENTURY AMERICAN LITERATURE (3-0). An intensive study of one or two major writers—such as Poe, Hawthorne, Melville, Twain, Howells, James—based on both primary and secondary materials. Subject authors to be announced prior to registration.

5327. MAJOR FIGURES IN TWENTIETH-CENTURY AMERICAN LITERATURE (3-0). An intensive study of one or two major writers—such as Faulkner, Fitzgerald, Hemingway, Steinbeck, Bellow—based on both primary and secondary materials. Subject authors to be announced prior to registration.

5330. THE COMPUTER AND NATURAL LANGUAGE (3-0). Also listed as LING 5330 and CSE 5330. Credit will be granted for one of the courses only.

5331. HISTORY OF THE ENGLISH LANGUAGE (3-0). Internal history of our language. Chronological treatment of the phonological, morphological, and syntactical development from prehistoric times to the present.

5332. TOPICS IN ENGLISH LINGUISTICS (3-0). Topics announced prior to registration; may be repeated for credit when subject matter changes.

5333. COMPARATIVE STUDY OF ENGLISH GRAMMATICAL THEORIES (3-0).

5334. STYLISTICS (3-0). A study of the stylistic features of discourse. Attention may be given to the development of English prose style, to metrical and prosodic theory, to linguistic-rhetorical-computational-affective approaches as well as other, newer methods such as narratology and phenomenological analysis. Assignments include the extensive analysis of texts. May be repeated for credit when subject changes.

5335. RESEARCH AND BIBLIOGRAPHY (3-0).

5336. CURRENT TOPICS IN RHETORIC (3-0). A seminar in historical and theoretical/metatheoretical studies of rhetoric. May include one or more topics such as irony, ethos, tropes/schemes, the rhetoric of science, the Sophists, metaphor, and rhetoric as epistemic. May be repeated for credit as topic changes.

5340. CRITICAL THEORY: THE MAJOR TRADITIONAL TEXTS (3-0). A study of literary

and cultural theory and practice from the Greco-Roman period to the early 20th Century. May include such theorists as Plato, Aristotle, Horace, Longinus, Dante, Sidney, B. Jonson, Dryden, Pope, Johnson, Coleridge, Arnold, Richards, Eliot, and others.

5341. INTRODUCTION TO COMPARATIVE LITERATURE (3-0). Introduces students to the theories and methodologies of comparative literature. Includes investigation of the means of transmission of literary information, and theory and practice of translation.

5342. THE CLASSICAL INFLUENCE (3-0). Hellenic, Alexandrian, and Latin masterpieces that have influenced Western literature; may concentrate on the epic, on tragedy and comedy, on lyric poetry, on the romance, and on other literary genres such as satire; may also include literature's relationship to the other arts or to historical, philosophical, or sociological structures; emphasis on Greek and Roman mythology and the various theories of myth. Course may be repeated for credit when content changes.

5343. MEDIEVAL COMPARATIVE LITERATURE (3-0). Neo-Lation and vernacular literatures from the fifth century to the end of the fifteenth century; may concentrate on major figures and their milieus or focus on particular genres, themes, or topics; may also include treatment of literature's relationship with the other arts or with its historical, theological, philosophical, or sociological context.

5344. COMPARATIVE LITERATURE OF THE RENAISSANCE AND OF THE BAROQUE AGE (3-0). From the fourteenth century to Rococo; in different semesters, genres, themes, authors, topics, or literary movements may be considered, such as the Petrarchan tradition, the Romantic epic of the sixteenth century, Marinism, and Gongorism; individual courses may also treat the relationship between literature and the other arts. Course may be repeated for credit when content changes.

5345. COMPARATIVE LITERATURE OF THE EIGHTEENTH CENTURY (3-0). The development of European literature during the century of literary ferment that sees the Age of Reason give way to the Age of Romanticism; early Romantics are contrasted to Enlightenment and Neoclassical writers; emphasizes, though not exclusively, the literatures of France, England, and Germany.

5346. COMPARATIVE LITERATURE OF THE NINETEENTH CENTURY (3-0). Poetry and prose of this rich, contradictory era; may focus on major authors, genres, themes, topics, or literary movements such as Romanticism, Realism, Naturalism, Symbolism, and Decadence; may treat the relationships between literature, philosophy, science, politics, economics, technology, and the fine arts.

5347. COMPARATIVE LITERATURE OF THE TWENTIETH CENTURY (3-0). Literature in a radically pluralist environment; may focus on literary movements, major genres, and the rupture of genres, critical, philosophical, and psychological schools, and the influence on literature of politics, science, technology, and economics.

5348. COMPARATIVE LITERATURE: THE SOUTH ASIAN INFLUENCE (3-0). A study of the earliest literature—the Vedas, the Mahabharata, and the Ramayana—and of the development of later literatures in South Asia; the influence of these writings on European and American authoros.

5350. ADVANCED TECHNICAL COMMUNICATION (3-0). Interdisciplinary course focusing on writing required of scientists, engineers, and managers in industry. Includes research methods; preparation of bibliographies, abstracts, proposals, formal reports, and technical papers; correspondence; and technical presentations.

5351. HISTORY OF RHETORICAL THEORY (3-0). History of rhetoric from the Greco-Roman through Neoclassical periods, ending with Whately in the 19th Century; attention given to major figures, texts, and movements.

5352. MAJOR FIGURES IN MODERN RHETORICAL THEORY (3-0). Intensive study of one or more modern theorists whose interests can be interpreted as rhetorical, e.g., Burke, Weaver, Richards, Perelman, Booth, Cassirer, Ricoeur, Derrida, and others. May be repeated for credit when subject changes.

5353. PRINCIPLES AND THEORIES OF RHETORICAL INVENTION (3-0). Examination of the art, method, and theory of rhetorical invention, with special attention given to its historical development, from the classical topoi and doctrine of stasis to more contemporary approaches; assignments include the use of such methods.

5354. ENGLISH LINGUISTICS (3-0). Introduction to the analysis of grammatical structures in English, concentrating on the goals and methods of contemporary analysts operating according to a variety of current theories, including structuralism, tagmemics, transformationalism, discourse grammar, and others.

5355. STUDIES IN ENGLISH DISCOURSE (3-0). Analysis of English grammatical structures above the level of the clause, including the sentence, the paragraph, and the whole text; examina-

tion of the work of major discourse theorists—Dik, Harris, Halliday, Longacre, Pike, van Dijk, and others. Prerequisite: English Linguistics or permission of instructor.

5356. RHETORIC OF COMPOSING (3-0). Study of research into the composing process and of the available methods of conducting research; special attention given to such researchers as Emig, Britton, Flower and Hayes, Scardamalia, Bereiter, Perl, and others; intensive self-analysis of the student's own composing process.

5357. RHETORIC OF READING (3-0). Study of the phenomenology of reading, focusing on the literature about and research into the reading process; attention given to aesthetic response to literary texts and the relationship between reading and composing; special attention given to Iser, Kintsch, DeMan, van Dijk, Barthes, Schank, Ingarden, Holland, Derrida, and others; intensive self-analysis of the reading process.

5358. PRINCIPLES AND METHODS OF EVALUATION (3-0). Study of the available means of evaluating writing; special attention given to evaluating individual student-writing in and out of conferences and to evaluating large groups of student-writers, with such methods as holistic and primary-trait scoring; may include peer and curriculum evaluation; evaluation of student papers.

5359. ADVANCED ARGUMENTATIVE WRITING (3-0). Emphasis on writing that aims to persuade and convince; attention given to invention, audience, logic (deductive, inductive, dialectic, and the Toulmin model), to case construction, revision, and ethical appeal; analysis of arguments and the writing and rewriting of several sustained pieces of argumentative and persuasive discourse.

5360. CONTEMPORARY CRITICAL THEORY (3-0). Study of contemporary theories of interpretation, concentrating on one or more schools of critical and cultural theory; may include, e.g., New Criticism, the Neo-Aristotelians, Marxist Critical Theory, hermeneutics, psychoanalysis, Russian Formalism, semiotics, speech-act theory, phenomenology, structuralism, and post-structuralism. May be repeated when subject changes.

5387. APPROACHES TO THE TEACHING OF ETHNIC LITERATURE (3-0). Literature of three major ethnic groups in Texas: Afro-American, Chicano, and American Indian.

5388. SEMINAR IN TEACHING COLLEGE ENGLISH (3-0). Enrollment restricted to Teaching Assistants and Teaching Associates. May be taken for credit a second time when course content changes; may not be counted for credit towards degree requirement.

5389. ISSUES IN TEACHING COMPOSITION (3-0). Seminar for investigating problems of and approaches to teaching composition. Special attention given to current compositional theories. May be repeated for credit when subject changes.

5390. ISSUES IN TEACHING LITERATURE (3-0). Seminar for investigating problems of and approaches to teaching literature.

5391. GRADUATE READINGS IN LITERATURE (3-0). May be taken only with the permission of the instructor and after consultation with the Graduate Advisor.

5398, 5698, 5998. THESIS. The graduate student must be registered for this course (a) when in consultation over the thesis with the supervisory committee, and (b) in the semester or term in which the Master of Arts degree will be conferred. Prerequisite: permission of Graduate Advisor in English.

6307. SEMINAR IN SIXTEENTH-CENTURY ENGLISH LITERATURE (3-0).

6309. SEMINAR IN SEVENTEENTH-CENTURY ENGLISH LITERATURE (3-0).

6311. SEMINAR IN RESTORATION AND EIGHTEENTH-CENTURY ENGLISH LITERATURE (3-0).

6313. SEMINAR IN NINETEENTH-CENTURY ENGLISH LITERATURE (3-0).

6325. SEMINAR IN NINETEENTH-CENTURY AMERICAN LITERATURE (3-0). Figures, genres, and movements in early or late 19th Century literature, the topic of which will be announced in advance registration. Master's candidates welcome when space is available.

6326. SEMINAR IN TWENTIETH-CENTURY AMERICAN LITERATURE (3-0). Figures, genres, and movements in early or late 20th Century literature, the topic of which will be announced in advance of registration. Master's candidates welcome when space is available.

6329. MAJOR THEMES IN COMPARATIVE LITERATURE (3-0). Themes such as "Literature and Revolution," "Psychoanalysis and Literature," "The Quest," "Alienation," or "The Initiation Experience," traced through the literatures of Western Europe, in order to illuminate cultural differences and similarities, to demonstrate intellectual, aesthetic, and social trends, and to provide a cohesive element in the formal examination of several genres; may be repeated for credit when course content changes.

6331. MAJOR FIGURES IN COMPARATIVE LITERATURE (3-0). Writers whose work has strongly influenced individual writers and movements and had a significant and lasting effect on Western culture; may be repeated for credit when content changes.

6333. GENRE STUDY IN COMPARATIVE LITERATURE (3-0). Theory of literary forms or types and the conventions they embody or expectations they generate; may focus on epic, autobiography, satire, the lyric, the short story, the novel, etc.; may be repeated for credit when course content changes.

6335. SEMINAR IN SPECIAL TOPICS IN LITERATURE (3-0). May be repeated for credit when topic changes.

6391. GRADUATE READINGS IN LITERATURE (3-0). Supervised individual study at the Ph.D. level. May be repeated for credit when the content changes. Prerequisite: permission of instructor and Graduate Advisor.

6400. SEMINAR IN OLD ENGLISH LITERATURE (4-0).

Department of FINANCE AND REAL ESTATE

Areas of Study	*Degrees*
Business Administration (See Interdepartmental and Intercampus Programs.)	M.B.A.
Administration (See Interdepartmental and Intercampus Programs.)	Ph.D.

Chairman: Vincent Apilado 107 Business 273-3705

Graduate Faculty:

Professor Apilado

Associate Professors Edgar, McInish, Ordway

Assistant Professors Herbst, Isakson, Schwendiman, Swanson

FINANCE (FINA)

5311. BUSINESS FINANCIAL MANAGEMENT (3-0). Study of providing the organization with funds necessary for its operation and of achieving effective utilization of funds. Primary emphasis on financial decision-making within organizations, and techniques of financial analysis and forecasting. Prerequisite: ACCT 5301 and ECON 5309 or equivalents.

5320. SEMINAR IN CENTRAL BANKING (3-0). Emphasizes the development of the Federal Reserve System and the purposes and functions which justify its existence. Analyzes evidence of the incidence of monetary policy and examines the effects of the Federal Reserve System policies on business and financial institutions. Prerequisite: FINA 5311 or equivalent.

5322. ADVANCED BUSINESS FINANCIAL PROBLEMS (3-0). Analysis of financial problems of business concerns, presented in case materials. Considers determination of capital needs, choosing among alternative capital investments, planning methods of financing new capital expenditures, and planning recapitalizations, mergers, and reorganizations. Prerequisite: FINA 5311 or equivalent.

5323. INVESTMENT MANAGEMENT PROBLEMS (3-0). Application of principles and techniques of investment management in solving investment problems of individuals and financial institutions. Considers apportionment of investment funds among alternatives, analysis of risk, valuation timing of security acquisitions. Prerequisite: FINA 5311 or equivalent.

5324. SEMINAR IN FINANCIAL THEORIES (3-0). Intensive research in selected areas of business finance, investment analysis and management, financial markets, commercial banking, and non-bank financial institutions. Prerequisite: FINA 5311 or equivalent.

5325. MANAGEMENT OF FINANCIAL INSTITUTIONS (3-0). General management problems and policies of financial institutions, emphasizing the role of the major financial institutions. Use of analytical techniques through case method of instruction as an aid to the solution of significant financial problems. Prerequisite: FINA 5311 or equivalent.

5326. COMMERCIAL BANKING (3-0). Overview of the management process and the operations in many areas of the modern commercial bank. Emphasizes the economic significance of the industry and its contribution to business development. Prerequisite: FINA 5311 or equivalent.

5327. RISK MANAGEMENT AND SPECULATIVE MARKETS (3-0). Nature and functions of the various futures and options markets; hedging for risk reduction, speculative trading for profit; the role of futures and options in overall portfolio strategy, along with fundamental concepts such as basis, spreading, normal and inverted markets and money management. Prerequisite: FINA 5311 or equivalent.

5331. MULTINATIONAL FINANCIAL MANAGEMENT (3-0). Examines ways in which financial decision-making processes are altered by operation in a multinational environment. Includes the effects of devaluation expectations, foreign exchange and investment controls. Also, case study materials related to actual decisions by multinational firms. Prerequisite: FINA 5311 or equivalent.

5182, 5282, 5382. INDEPENDENT STUDIES IN FINANCE. Extensive analysis of a finance topic. Prerequisite: consent of faculty member and department chairman.

5192, 5292, 5392. SELECTED TOPICS IN FINANCE. In depth study of selected topics in finance. May be repeated when topics vary. Prerequisite: consent of instructor and Graduate Advisor.

REAL ESTATE (REAE)

5311. REAL ESTATE DECISION MAKING (3-0). Introduction to real estate law, appraisal and valuation, finance, market analysis, and other phases of the real estate development/management process; emphasis on the institutional context in which market-oriented real estate decisions are made. Cannot be taken for credit by students with an undergraduate major in real estate.

5321. REAL ESTATE INVESTMENT (3-0). Introduction to analytical techniques, sources of financing, and other factors related to real estate investment. Stresses current developments and topics. Prerequisite: FINA 5311 or equivalent and REAE 5311 or equivalent.

5334. ADVANCED REAL ESTATE EVALUATION (3-0). Market, cost, and income approaches with stress on income forecasting and capitalization. Prerequisite: REAE 5311 or equivalent.

5335. ADVANCED REAL ESTATE FINANCE (3-0). Study of real property financing methods; analysis of cost of borrowing, sources of funds, and mortgage terms; emphasis on construction and permanent financing of commercial and industrial properties. Prerequisite: FINA 5311 and REAE 5311 or equivalent.

Department of FOREIGN LANGUAGES AND LINGUISTICS

Areas of Study	*Degrees*
French	M.A.
German	M.A.
Spanish	M.A.
Linguistics	M.A.
Humanities (See Interdepartmental and Intercampus Programs.)	MA., M.A.T., Ph.D.

Master's Degree Plans: Thesis, Thesis Substitute, and Non-Thesis

Chairman: Ronald N. Werth	230 Hammond Hall	273-3161
Graduate Advisor: Ted E. Frank	226 Hammond Hall	273-3161

FOREIGN LANGUAGES AND LINGUISTICS

Graduate Faculty:

Professors Adams, Jett, Longacre, Monostory, Stuart, Werth
Associate Professors Acker, Edmondson, Frank, Gibson, Keilstrup, Ordoñez, Poulter, Sanchez, Steinecke, Studerus
Assistant Professors Burquest, Chiasson, Evans, Feigenbaum, Holder, Nogueira-Martins, Vina
Adjunct Professors Merrifield, K. Pike, Rensch
Adjunct Associate Professors Davis, Greenlee, Hale, Huttar, Peck, Robbins, Thomas
Adjunct Assistant Professors Allison, Bascom, Bendor-Samuel, Bergen, Crowell, Deibler, Derbyshire, Fleming, Franklin, Gordon, Gregerson, Larson, Lee, McElhanon, McKinney, E. Pike, Shaw, K. Smith, R. Smith, Wendell, Wheatley, Yost

OBJECTIVES

Foreign Languages (French, German, Spanish)

Graduate programs in foreign languages are designed to enhance the student's competence in the language and literature of his major language field. The specific objectives are to prepare the student for a career in teaching or in any area in private or public life in which the knowledge of a foreign language is essential, and to help him to develop the techniques of independent research necessary for work beyond the master's level.

Linguistics

Graduate programs in linguistics are primarily designed for those with a background in one or more foreign languages and/or a background in the linguistic aspects of the English language, but others who are willing to fulfill the listed prerequisites are invited to apply. Linguistic science has applications in language learning and teaching, literary analysis and criticism, psychology, communication, anthropology, philosophy, neurology, sociology, and some other areas.

DEGREE REQUIREMENTS

In addition to the Graduate School requirements for Master's degree programs, the following requirements apply to foreign language and linguistics students:

Thesis: A written comprehensive examination may be given at the discretion of the student's committee.

Thesis Substitute: There will be a written comprehensive examination on the course work and appropriate reading list. An oral defense of the thesis substitute may be required at the discretion of the student's supervising committee.

Non-thesis: There will be a comprehensive written examination on the course work and an appropriate reading list.

A minor is optional for degrees in foreign languages and linguistics. A maximum of one-quarter of the total number of course hours may be taken in an approved minor field outside the Department of Foreign Languages and Linguistics or in an approved language, literature, or linguistics area within the department.

Foreign Languages (French, German, Spanish)

Those wishing to major in a foreign language or literature must upon admission have a baccalaureate degree with a major in that foreign language or have a minimum of 18 advanced hours, or the equivalent in language proficiency and course content.

A knowledge of a second foreign language will be required, including listening, speaking, reading, and writing skills, as demonstrated by the successful completion of two semesters of course work at the second year level or by an appropriate examination.

Linguistics

Candidates, upon admission or early in the graduate program, must present the following prerequisite undergraduate courses (or pass appropriate examinations): introductory courses in articulatory phonetics, phonology, grammar, and a problems course in grammatical analysis, or equivalents.

THE INTERNATIONAL LINGUISTIC CENTER

(THE SUMMER INSTITUTE OF LINGUISTICS)

The International Linguistic Center in Dallas (near Duncanville) and The University of Texas at Arlington offer cooperatively a program in linguistic training and research. This program leads to the MA degree at UTA with a major or minor in Linguistics, to the MA, MAT, or PhD in Humanities with a concentration in Linguistics, or to an undergraduate minor in Linguistics. The curricula are listed in the UTA undergraduate and graduate catalogs. ILC requirements and procedures appear in ILC catalogs, but degree requirements are those specified by UTA. Participants must apply for admission to UTA. Courses may be taken for credit by students who are not pursuing a degree, provided they qualify for admission.

Persons who wish to pursue the program at ILC but who are not eligible for admission to UTA may register as auditing students by arrangement with ILC.

Registration is administered by UTA on campus. Students may take the courses on either or both campuses. Refer to the semester Schedule of Classes for location of courses.

FRENCH (FREN)

Students pursuing the MA degree in French are encouraged to take at least one course in each of: (1) History of the French Language; (2) French Literature through the Renaissance or Structure of the French Language; (3) Seventeenth-Century Literature; (4) Eighteenth-Century Literature; (5) Nineteenth-Century Literature; (6) Twentieth-Century Literature.

4332. FRENCH FOR GRADUATE STUDENTS. (3-0). Designed for graduate students preparing for the foreign language reading examinations. Basic elements of grammar and syntax presented with emphasis on rapid and accurate translation. May not be counted toward fulfillment of the undergraduate language requirement. Graduate students may not take this course for credit.

5101. TEACHING PRACTICUM I (1-0). Required of all Teaching Assistants in French in their first semester. May not be counted toward a master's degree.

5102. TEACHING PRACTICUM II (1-0). Required of all Teaching Assistants in French in their second semester. May not be counted toward a master's degree.

5135. INTRODUCTION TO ROMANCE BIBLIOGRAPHY AND METHODS OF RESEARCH (1-0). Designed to aid graduate students in preparing theses or dissertations.

5190. CONFERENCE COURSE IN FRENCH LANGUAGE AND LITERATURE (1-0). Graded P/F. Prerequisite: permission of Graduate Advisor.

5300. HISTORY OF THE FRENCH LANGUAGE (3-0). Brief French phonology. A vertical tracing of the birth and development of the French language from Roman times to modern French. Includes short readings of documents representing Romance, Old French, middle and Renaissance and classical French at various stages in the development of the language.

5301. OLD PROVENCAL (3-0). Study of the phonology of Old Provencal followed by readings in Old Provencal love lyrics.

5302. OLD FRENCH (3-0). Old French phonology, morphology and syntax followed by reading and in-depth study of the *Chanson de Roland.*

5303. READINGS IN OLD FRENCH (3-0). May include works by Marie de France, Chretien de Troyes, selected *Fabliaux*, Lives of Saints, and other works. Materials vary to suit needs of students.

5304. STUDIES IN FRENCH GRAMMAR, PHONETICS, CONVERSATION I (3-0).

5305. STUDIES IN FRENCH GRAMMAR, PHONETICS, CONVERSATION II (3-0).

5307. THE TEACHING OF FRENCH (3-0). Advanced methodology course for high school and college teachers of French.

5315. STRUCTURE OF THE FRENCH LANGUAGE (3-0). Advanced French grammar for

graduate students with special emphasis on contrastive elements. Especially useful to teachers and future teachers of French in its treatment of difficulties in translation and special problems of grammar.

5320. STUDIES IN FRENCH LITERATURE THROUGH THE RENAISSANCE (3-0).

5321. SEVENTEENTH CENTURY (3-0). Seminar on Racine; in-depth analysis of the major plays of Racine including *Andromaque, Bajazet, Phedre, Britannicus,* and others.

5322. FRENCH DRAMA OF THE SEVENTEENTH CENTURY (3-0). Stresses the works of Corneille and Racine. *Le Cid, Horace, Polyeucte, Andromaque, Phedre,* and *Britannicus* read and analyzed.

5323. DEVOTIONAL, MORAL, AND EPISTOLARY LITERATURE IN THE SEVENTEENTH CENTURY (3-0). Religious revival in France at the beginning of the *Grand Siecle:* Francois de Sales and Vincent de Paul, Port-Royal, Pascal and Jansenism; the art of oratory: Bossuet, Fenelon, the quietist quarrel, Malebranche, minor religious writers, La Rochefoucauld and La Bruyere, the letters of Busey-Rabutin, Mme. de Sevigne and Mme. de Maintenon.

5324. THE NOVEL AND THE POETRY IN THE SEVENTEENTH CENTURY (3-0). The *precieux* movement. Authors include: Voiture, Viau, La Ceppede, Maynard, Urfe, Scudery, Regnier and Scarron. The non-dramatic poetry of Corneille and Racine included. Conspicuous figures such as Malherbe, Boileau, La Fontaine and Mme. de La Fayette stressed.

5325. STUDIES IN FRENCH LITERATURE OF THE SEVENTEENTH AND EIGHTEENTH CENTURIES (3-0).

5326. THE NOVEL IN THE EIGHTEENTH CENTURY (3-0). Literary centers, tendencies in the fine arts and scientific investigations, foreign influences, the novel of manners, the realism of Marivaux and Abbe Prevost, Rousseau and Diderot as novelists, pre-romantic strains, the exotic novel, and moral analysis.

5327. VOLTAIRE (3-0). Examines a select few of the vast number of works, pamphlets, letters, essays, and poems of this great man of the century. Students are assigned certain areas for which they are responsible and for which they must account to the class. Philosophical and political movements of the century stressed.

5328. TWENTIETH CENTURY (3-0). Theatre of the Absurd; a study of the most influential movement in contemporary French drama, including the works of Beckett, Ionesco, Vian, and others.

5329. MARCEL PROUST (3-0). Work of France's best-known 20th Century novelist, specifically his chef d' oeuvre *A la recherche du temps perdu.*

5330. STUDIES IN FRENCH LITERATURE OF THE NINETEENTH AND TWENTIETH CENTURIES (3-0).

5335. EXISTENTIALISM (3-0). Sources of existentialism as philosophy. Students prepare in depth reports on such thinkers as Kierkegaard, Nietzsche, Heidegger, Ortega y Gasset, and others.

5336. L'EXISTENTIALISME FRANCAIS (3-0). Works of Sartre, Camus, Simone de Beauvoir, and others studied and evaluated. Post-war impact of these writers on the new generation stressed.

5337. SPIRITUAL REVIVAL IN THE TWENTIETH CENTURY POETRY, NOVEL, AND DRAMA (3-0). Origins of the renouveau in French literature: Leon Bloy, poetry of Charles Peguy, poetry and dramatic works of Paul Claudel, novels and plays of Francois Mauriac, Georges Bernanos, and Julien Green.

5338. SELECTED TOPICS IN FRENCH LITERATURE (3-0).

5339. FRENCH ART CRITICISM (3-0). Interdisciplinary study of the development and influence of French Art Criticism in the 17th, 18th, 19th and 20th Centuries. For students of French who use original texts, and for art history students who use corresponding texts in English translation.

5362. TOPICS IN SECOND LANGUAGE LEARNING (3-0). Linguistic, psychological and Sociocultural factors in second language learning. Emphasis on contrastive analysis of English and French in order to prepare teachers to teach English and/or French as a second language.

5391. CONFERENCE COURSE IN FRENCH LINGUISTICS AND LITERATURE.

5398, 5698, 5998. THESIS. Prerequisite: permission of Graduate Advisor.

6310. SEMINAR IN FRENCH LITERATURE (3-0).

6311. SEMINAR IN FRENCH LANGUAGE (3-0).

6391. READINGS IN FRENCH (3-0). Supervised individual study at the PhD level. May be repeated when content changes.

A course may be repeated for credit when the topic changes.

GERMAN (GERM)

4331. GERMAN FOR GRADUATE STUDENTS I (3-0). Designed for graduate students preparing for the foreign language reading examinations. Basic elements of grammar and syntax presented with emphasis on rapid and accurate translation. May not be counted toward the fulfillment of the undergraduate language requirement. Students majoring or minoring in German may not take this course for credit.

4332. GERMAN FOR GRADUATE STUDENTS II. (3-0). Continuation of GERM 4331. May not be counted toward the fulfillment of the undergraduate language requirement. Students majoring or minoring in German may not take this course for credit.

5101. TEACHING PRACTICUM I (1-0). Required of all Teaching Assistants in German in their first semester. May not be counted toward a master's degree.

5102. TEACHING PRACTICUM II (1-0). Required of all Teaching Assistants in German in their second semester. May not be counted toward a master's degree.

5190. CONFERENCE COURSE IN GERMAN LANGUAGE AND LITERATURE (1-0). Graded P/F. Prerequisite: permission of Graduate Advisor.

5300. HISTORY OF THE GERMAN LANGUAGE (3-0).

5301. HISTORY OF GERMAN LITERATURE I (3-0). From the beginnings through 1832.

5302. HISTORY OF GERMAN LITERATURE II (3-0). From 1832 to the present.

5304. STUDIES IN GERMANIC LINGUISTICS AND LITERATURES (3-0). Transformational grammar, viking literature, and colonial and continental dialects.

5307. THE TEACHING OF GERMAN (3-0). Advanced methodology for high school and college teachers of German.

5309. GERMAN LITERATURE OF THE MIDDLE AGES (3-0).

5310. STUDIES IN GERMAN GRAMMAR, PHONETICS, CONVERSATION I (3-0).

5311. STUDIES IN GERMAN GRAMMAR, PHONETICS, CONVERSATION II (3-0).

5312. STYLISTICS AND ADVANCED GERMAN GRAMMAR (3-0).

5317. METHODS IN THE STUDY OF GERMAN LITERATURE AND LINGUISTICS (3-0).

5318. STUDIES IN GERMAN CULTURE (3-0).

5320. TOPICS IN GERMAN LITERATURE (3-0). Includes the literature of West and East Germany, exile literature, German-American writers, the occult, and the role of women.

5321. GERMAN DRAMA UP TO THE NINETEENTH CENTURY (3-0).

5322. NINETEENTH AND TWENTIETH CENTURY GERMAN DRAMA (3-0).

5327. GERMAN LYRIC (3-0).

5329. GERMAN NOVEL AND NOVELLE UP TO THE NINETEENTH CENTURY (3-0).

5330. NINETEENTH AND TWENTIETH CENTURY GERMAN NOVEL AND NOVELLE (3-0).

5362. TOPICS IN SECOND LANGUAGE LEARNING (3-0). Linguistic, psychological and sociocultural factors in second language learning. Emphasis on contrastive analysis of English and German in order to prepare teachers to teach English and/or German as a second language.

5391. CONFERENCE COURSE IN GERMANIC LINGUISTICS AND LITERATURE.

5398, 5698, 5998. THESIS. Prerequisite: permission of Graduate Advisor.

6308. MASTER TEACHER SEMINAR (3-0). Personal contact and study with outstanding guest teachers in the field of German.

6310. SEMINAR IN GERMAN LITERATURE (3-0).

6311. SEMINAR IN GERMAN LANGUAGE (3-0).

6391. READINGS IN GERMAN (3-0). Supervised individual study at the PhD level. May be repeated when the content changes.

SPANISH (SPAN)

All students pursuing the M.A. in Spanish must take SPAN 5300, 5312, 5313, and either SPAN 5302 or 5303.

5101. TEACHING PRACTICUM I (1-0). Required of all Teaching Assistants in Spanish in their first semester. May not be counted toward a master's degree.

5102. TEACHING PRACTICUM II (1-0). Required of all Teaching Assistants in Spanish in their second semester. May not be counted toward a master's degree.

5190. CONFERENCE COURSE IN SPANISH LANGUAGE AND LITERATURE (1-0). Graded P/F. Prerequisite: permission of Graduate Advisor.

5300. HISTORY OF THE SPANISH LANGUAGE (3-0). Development of the Spanish language from its earliest forms to the present. Required for the MA in Spanish, the MA in Humanities with Spanish concentration, and for the MAT with Spanish concentration.

5301. READINGS IN OLD SPANISH (3-0). Reading and linguistic analysis of early texts.

5302. SPANISH DIALECTOLOGY (3-0). Phonological, lexical, and grammatical features in Iberia, South and North America, the Philippines, and in Sephardic dialect. Required for the MA in Spanish and the MA in Humanities with Spanish concentration unless SPAN 5303 taken.

5303. APPLIED SPANISH LINGUISTICS (3-0). Pedagogy, pronunciation and orthography, morphology, syntax, semantics, and culture. Required for the MA in Spanish and the MA in Humanities with Spanish concentration unless 5302 taken.

5306. GRAMMAR AND COMPOSITION (3-0).

5307. THE TEACHING OF SPANISH (3-0). Advanced methodology for high school and college teachers of Spanish.

5312. SELECTED MASTERPIECES OF HISPANIC LITERATURE I (3-0). Selected major works from medieval times through the seventeenth century. Includes works of major writers of Colonial Spanish America. Required for the MA in Spanish, the MA in Humanities with Spanish concentration, and for the MAT with Spanish concentration.

5313. SELECTED MASTERPIECES OF HISPANIC LITERATURE II (3-0). Selected major works of eighteenth through twentieth century Spanish and Spanish American literature. Required for the MA in Spanish, the MA in Humanities with Spanish concentration, and for the MAT with Spanish concentration.

5316. MEXICAN LITERATURE OF THE COLONIAL PERIOD (3-0).

5317. MEXICAN LITERATURE OF THE TWENTIETH CENTURY (3-0).

5318. TOPICS IN HISPANIC LITERATURE AND CULTURE (3-0).

5319. TWENTIETH CENTURY SPANISH-AMERICAN NOVEL AND SHORT STORY (3-0).

5321. TWENTIETH CENTURY SPANISH NOVEL (3-0).

5322. TWENTIETH CENTURY SPANISH THEATRE (3-0).

5323. MODERNISM (3-0).

5325. THE GENERATION OF 1898 (3-0).

5326. TWENTIETH CENTURY SPANISH POETRY (3-0).

5328. CHICANO CULTURE (3-0). Most salient aspects of Mexican American achievements. Chicano culture as an extension of Hispanic (chiefly Mexican) culture. Considerations of Chicano culture as a renaissance and as a new phenomenon.

5329. CHICANO LITERATURE (3-0). Chicano novel, short story, theater, poetry and literary essay. Their affinities with Mexican and other Hispanic literatures. Originality and tradition in the Chicano literary work.

5331. SPANISH-AMERICAN POETRY AFTER MODERNISM (3-0).

5340. CERVANTES (3-0).

5341. GOLDEN AGE DRAMA (3-0).

5350. THE ROLE OF WOMEN AS SEEN IN HISPANIC LITERATURE (3-0).

5351. THE NINETEENTH CENTURY SPANISH NOVEL (3-0).

5360. THE BILINGUAL STUDENT IN THE CLASSROOM (3-0). Analysis of linguistic, social and cultural difference. Intensive teacher preparation in understanding psychological aspects of the bilingual learner. Learning and motivation techniques are emphasized.

5361. FOUNDATIONS OF BILINGUAL/BICULTURAL EDUCATION (3-0). Analysis of historical, legislative, linguistic, psychological and curricular foundations of bilingual bicultural education.

5362. TOPICS IN SECOND LANGUAGE LEARNING (3-0). Linguistic, psychological and sociocultural factors in second language learning. Emphasis on contrastive analysis of English and Spanish in order to prepare teachers to teach English and/or Spanish as a second language.

5391. CONFERENCE COURSE IN SPANISH LINGUISTICS AND LITERATURE.

5398, 5698, 5998. THESIS. Prerequisite: permission of Graduate Advisor.

6320. SEMINAR IN SPANISH LITERATURE (3-0).

6321. SEMINAR IN SPANISH-AMERICAN LITERATURE (3-0).

6322. SEMINAR IN SPANISH LANGUAGE (3-0).

6391. READINGS IN SPANISH (3-0). Supervised individual study at the PhD level. May be repeated when content changes.

A topics course may be repeated for credit when the topic changes.

LINGUISTICS (LING)

Students pursuing the MA degree in Linguistics must take (1) LING 5320 or History of a language (FREN 5300, GERM 5300, SPAN 5300, or ENGL 5331); (2) LING 5332 or 5333; (3) LING 5301; (4) LING 5303 or 5306.

Students choosing the option in Applied Linguistics must take (1) LING 5301 and 5303 or 5306, or LING 5309; (2) LING 5308 or equivalent; (3) LING 5332 or 5333.

Students interested in the teaching of English as a Foreign Language (EFL) or English as a Second Language (ESL) should take the following courses: LING 5353, 5354, 5355, and 6353.

Further, all degree candidates must demonstrate analytical knowledge of the linguistic structure of a non-Indo European language. This requirement may be fulfilled by taking LING 5340. A student may be exempt from taking LING 5340 by successfully completing (1) a master's thesis on the linguistic structure of a non-Indo European language, or (2) a detailed examination on the structure of a non-Indo European language together with a substantial paper (in finished manuscript form) on the structure of the language examined.

5101. TEACHING PRACTICUM I (1-0). Required of all Teaching Assistants in Linguistics in their first semester. May not be counted toward a master's degree.

5102. TEACHING PRACTICUM II (1-0). Required of all Teaching Assistants in Linguistics in their second semester. May not be counted toward a master's degree.

5190. CONFERENCE COURSE IN LINGUISTICS (1-0). Graded P/F. Prerequisite: permission of Graduate Advisor.

5301. PHONOLOGICAL THEORY (3-0).

5302. ADVANCED ARTICULATORY PHONETICS (3-0). Theoretical and practical study of human speech sounds for students with a background in foreign language, speech, or linguistics. Some knowledge of phonetics is presumed.

5303. GRAMMATICAL THEORY (3-0).

5305. FIELD METHODS (3-0).

5306. APPLIED ANALYSIS (3-0). Data-oriented explorations and readings in the semantic and sociolinguistic aspects of language and how these are realized by grammatical, phonological, kinesic, etc. structures. Semantic structures treated include discourse, paragraph, interproposition, conversation, and the cognitive network (fields of meaning).

5307. TOPICS IN LINGUISTICS AND LANGUAGE TEACHING (3-0).

5308. TOPICS IN SOCIOLINGUISTICS (3-0). Selected topics relating the scientific methodologies of linguistics to the larger concerns of society and culture including cognition, motivation, description and analysis.

5309. ADVANCED STRUCTURAL LINGUISTICS (3-0). Phonological and grammatical language structures in relation to theoretical and methodological concerns (traditional and contemporary). Not open to students who have taken LING 5301 and 5303.

5310. ACOUSTIC PHONETICS (3-0).

5311. PRINCIPLES OF TRANSLATION I (3-0). Theory and procedures in cross-language transfer with emphasis on basic linguistic notions such as form vs. meaning, multiple senses, and types of lexical equivalences and sociolinguistic factors involved in idiomatic translation. Prerequisite: LING 4313, 4314, 4315, 4316, or permission of the instructor. May not apply toward degree requirements if LING 5336 and SOCI 5342 are applied.

5312. MORPHOLOGY (3-0). Stem and word structure along with morphophonemic variation. An attempt will be made to consider a diversity of morphological structure from several distinct linguistic areas.

5313. CASE GRAMMAR AND CLAUSE STRUCTURE (3-0). Readings in the literature of case grammar as developed from the early 1960's to the present, along with consideration of the surface structures of clause units.

5314. PRINCIPLES OF TRANSLATION II (3-0). Principles of the semantic analysis of discourse structure such as referential coherence, relational coherence, and prominence, and its use in translation; theory and practice of translation evaluation. Prerequisite: LING 5311 or consent of instructor.

5317. INTRODUCTION TO SOCIOLINGUISTICS (3-0). An overview of the study of language in its social context, including topics such as linguistic variation, address and reference, speech levels, bilingualism, special vocabularies and styles, pidgins and creoles, speech acts, conversational discourse.

5319. HISTORY OF LINGUISTICS (3-0). Views and theories of language throughout history, from ancient India to classical Greece and Rome to medieval Europe to the modern era.

5320. HISTORICAL AND COMPARATIVE LINGUISTICS (3-0).

5323. SENTENCE STRUCTURE (3-0). Survey of the sentence as a unit in which clauses combine into larger complexes. Both the surface structure form of sentences and the underlying notional structure will be considered. The course emphasizes sentence structures of diverse sorts from several distinct linguistic areas.

5324. PARAGRAPH ANALYSIS (3-0). Examines the evidence for believing that paragraphs are grammatical as well as lexical units. Besides English, data are considered from several non-Indo European languages.

5330. THE COMPUTER AND NATURAL LANGUAGE (3-0).

5332. SURVEY OF LINGUISTIC THEORIES (3-0).

5333. READINGS IN LINGUISTICS (3-0).

5334. ADVANCED LINGUISTIC ANALYSIS (3-0).

5335. AREA LINGUISTICS (3-0).

5336. PRINCIPLES OF LITERACY (3-0). Principles involved in the introduction of literacy to pre-literate societies. Includes consideration of motivational factors, stimulation of indigenous authorship, orthography design, elements of reading methodology and alternative strategies for literacy programs. May not apply toward degree requirements if LING 5311 and SOCI 5342 are applied.

5338. LITERACY MATERIALS: READING THEORY AND LINGUISTICS (3-0). Survey of reading theory, with practical application to the preparation of literacy materials for preliterate societies. Attention given to specific linguistic and psycholinguistic factors involved. Prerequisites: LING 5336 and 5301.

5339. SOCIOLINGUISTIC ASPECT OF LITERACY PROGRAMS (3-0). Survey of the linguistic and social factors involved in the development of literacy programs for preliterate speakers of vernacular languages. Special attention given to the effect of using the mother tongue and/or a second language in such programs, and accompanying measurement and documentation. Prerequisite: LING 5336.

5340. NON-INDO EUROPEAN LINGUISTIC STRUCTURES (3-0). Theoretical study of a selected non-Indo European language, language family, or language area based on descriptive linguistic analysis. May be repeated once for credit as the topic varies.

5342. READINGS IN NON-INDO EUROPEAN LANGUAGE (3-0). May not be used to fulfill the non-Indo European language requirement. Prerequisites: LING 5340 or equivalent.

5345. SEMANTICS (3-0). Considerations of meaning in language with special reference to words and concepts in relation to semantic domains, componential features of meaning, and case roles, with resulting implications for cross-cultural communication.

5346. DISCOURSE GRAMMAR (3-0). To acquaint the student with a representative cross-section of some of the recent writings (American and European) in the field of discourse grammar. A variety of approaches and insights are covered.

5348. TEXT ANALYSIS (3-0). Text analysis developed from the perspective of multiple strata. Includes examining kinds of data observed in a variety of languages and genres and guided experience in analysis procedures applied to data from several languages. Prerequisite: LING 5306. Recommended: LING 5346.

5353. METHODOLOGY OF TEACHING ENGLISH AS A SECOND OR FOREIGN LANGUAGE (3-0). Presentation and critique of methodologies of teaching English to speakers of other languages; emphasis on techniques of teaching aural comprehension, speaking, reading, and writing skills; attention to testing, language laboratory, and linguistic-cultural differences. Prerequisite: introductory course in linguistics or permission of instructor.

5354. METHODS AND MATERIALS TO TEACH ENGLISH AS A SECOND OR FOREIGN LANGUAGE. (3-0). Systematic study of the application of linguistic theory and findings; emphasis on pedagogical strategies, materials, and tests; attention to current and past research and practices. Prerequisite: LING 5353.

5355. CONTRASTIVE ANALYSIS AND ERROR ANALYSIS IN THE TEACHING OF ENGLISH AS A SECOND OR FOREIGN LANGUAGE (3-0). A study of contrastive analysis and error analysis as means of defining student problems and progress; emphasis on current research; application to specific problems and contexts. Prerequisite: LING 5353.

5391. CONFERENCE COURSE IN LINGUISTICS.

5392. COMPUTER-AIDED NATURAL LANGUAGE RESEARCH. Individually approved research projects involving some linguistic aspect(s) of natural language data. Prerequisite: consent of instructor and Graduate Advisor.

5601. DISCOURSE ANALYSIS OF THE GREEK TEXT (6-0). Prerequisites: two years of undergraduate level Greek and LING 5301, 5303, 5305, 5334 or equivalent, or permission of the instructor.

5631. LINGUISTIC WORKSHOP (6-0).

5398, 5698, 5998. THESIS. Prerequisite: permission of Graduate Advisor.

6305. SEMINAR IN DISCOURSE GRAMMAR (3-0). In-depth study of some specific problem or a set of problems in the field of discourse grammar (topic varied from year to year). Prerequisite: LING 5346.

6306. SEMINAR IN HISTORICAL AND COMPARATIVE LINGUISTICS (3-0). Advanced investigation into the processes and results of language change, with a major emphasis on grammatical phenomena. Theoretical discussion is supplemented with illustrative material, with applications reconstruction from primary sources. Prerequisite: LING 5320 or equivalent.

6308. SEMINAR IN SOCIOLINGUISTICS (3-0). Insights of the major theorists of anthropology and linguistics as they relate to language study and linguistic and cultural analysis.

6309. PROSEMINAR IN LINGUISTICS (3-0).

6310. SEMINAR IN LINGUISTICS (3-0).

6353. SEMINAR IN TEACHING ENGLISH AS A SECOND OR FOREIGN LANGUAGE (3-0). Advanced, in-depth investigation of a problem or a set of problems in the theory and/or application of the theory. Prerequisites: LING 5353 and either 5354 or 5355.

6391. READINGS IN LINGUISTICS (3-0). Supervised individual study at the PhD level. May be repeated when content changes.

A course may be repeated for credit when the topic changes.

RUSSIAN (RUSS)

4332. RUSSIAN TECHNICAL AND SCIENTIFIC TRANSLATION (3-0). An intensive service course designed primarily to prepare PhD candidates and other graduate students in the functional use of the Russian language. Emphasis is placed on translating current, non-adapted Soviet publications by training the student to develop rapid translation techniques, approved short cuts, and an in-depth understanding of key grammatical concepts. Graduate students may not take this course for graduate credit.

Department of GEOLOGY (GEOL)

Area of study		*Degree*
Geology		M.S.
Master's Degree Plan: Thesis only		
Chairman: Charles I. Smith	107 Geoscience	273-2987
Graduate Advisor: Burke Burkart	107 Geoscience	273-2987

Graduate Faculty:

Professors Burkart, Perkins, Smith
Associate Professors Crick, Ellwood, McPherson, Nestell, Reaser, Self
Assistant Professor Wolff
Adjunct Professors Cooper, Denison, Miller

OBJECTIVE

The Master of Science program in geology is designed to give an up-to-date basic geologic background to students interested in a professional career in exploration or development in the minerals or energy industry or to provide the background for further graduate studies elsewhere.

GEOLOGY

With the master's thesis as a focus, the program integrates coursework and research to give the student not only a broad foundation but a specific area of competence through participation in a meaningful research experience.

ADMISSION

Students entering the graduate program in geology must meet the general Graduate School admission requirements and also present a Graduate Record Examination Advanced Test score in geology.

DEGREE REQUIREMENTS

Applicants with degrees in geology are required to have had the following foundation courses or their equivalents as a part of the bachelor's program, or to make up these deficiencies in residence: mineralogy (2445), petrology-petrography (2446), paleontology (3441), stratigraphy (3442), structural geology (3443), summer field course (3687); one year each of physics and chemistry and math through calculus II are required, also.

A program of work including foundation courses will be designed by the graduate studies committee for students entering the program with bachelor's degrees in a field other than geology.

In the first year, candidates must file an approved degree plan which includes coursework for the program, including undergraduate course deficiencies. Twenty-four semester hours of approved graduate level courses are required in addition to the thesis. Enrollment in Technical Sessions, Geology 5199, is required each semester a student is enrolled in classes. A thesis proposal, written thesis and thesis defense are required.

5200. SEMINAR ON SCIENCE AS A PROFESSION (2-0). Use of scientific literature including computer data bases, fundamentals of technical writing including grants and proposals, investigation of scientific societies, exploration of career opportunities in specific diciplines. Graded P/F only. Prerequisite: consent of graduate advisor.

5301. URBAN AND ENVIRONMENTAL GEOLOGY (3-0). Deals with current geologic problems as related to both urban planning and development and the environment.

5302. TECTONICS (3-0). Regional structural features and their origin and development.

5304. ADVANCED STRUCTURAL GEOLOGY (2-3). In-depth study of the various aspects of structural geology including rock mechanics and environments of deformation. **$2 lab fee.**

5308. SOLID EARTH GEOPHYSICS (3-0) The principles of magnetism, seismology, gravity and heat flow will be used in analyzing the earth's dynamics and bulk properties. Topics will include earthquake seismology, geodesy, geomagnetism, heat flow, the composition and state of the earth's interior, development of the continents and ocean basins, and new Global Tectonics. Prerequisites: GEOL 3443 and a physics course or permission of instructor.

5310. GEOCHEMISTRY OF SEDIMENTS (3-0). Geochemical controls in weathering, transport, deposition and diagenesis of sediments. Distribution of trace elements in sedimentary environments.

5311. REGIONAL STRATIGRAPHY (3-0). Chronologic study of the stratigraphic systems, their physical properties and gross facies, their depositional and paleogeographic implications, their correlation and nomenclature, and their biostratigraphy. Coverage given to the stratigraphy and geologic development of each major landmass and continent.

5312. SANDSTONE PETROLOGY (2-3). Petrologic examination of terrigenous clastic sandstones, including textural, compositional, and diagenetic aspects. Emphasis on paleogeographic, tectonic and environmental interpretation. Prerequisites: GEOL 4443 and 5345 or equivalent. **$2 lab fee.**

5313. CARBONATE PETROLOGY (2-3). Nature and composition of carbonate sediments and rocks in terms of their genesis, depositional environments, and processes involved in transport, deposition, diagenesis, and lithification. Prerequisites: GEOL 4443 or equivalent and 5345 or concurrent enrollment. **$2 lab fee.**

5315. ORGANIC GEOCHEMISTRY (3-0). Chemistry of carbon compounds. Nature and distribution of organic materials, including petroleum and coal, in sediments. Techniques used for studying petroleum source beds. Chemical evolution of life. Prerequisite: consent of instructor.

5316. METALLIC ORE DEPOSITS (3-0). Detailed study of the geochemical controls, petrography and field relationships of selected types of ore deposits.

5330. ENGINEERING GEOLOGY (3-0). Geologic principles and techniques applied to evaluation of geological hazards and construction such as dams, highways and foundations.

5340. BIOSTRATIGRAPHY (2-3). The separation and differentiation of rock units in time and space on the basis of the fossils they contain; emphasis on biostratigraphically significant fossil groups during each Phanerozoic epoch. Prerequisites: GEOL 3441 and 3442 or permission of instructor.

5341. INTRODUCTION TO MICROPALEONTOLOGY (2-3). Survey of selected taxa with emphasis upon the foraminifers. **$2 lab fee.**

5342. PALEOBIOLOGY (2-3). Analysis of fossils as biologic systems: the species concept, formal systematic procedures, ontogeny, population statistics, functional morphology, and speciation. **$2 lab fee.**

5343. PALEOECOLOGY (2-3). Origin of fossil assemblages, definition and environmental significance of fossil associations, interpretation of ancient communities, and reconstruction of depositional environments. **$4 lab fee.**

5344. DEPOSITIONAL ENVIRONMENTS: TERRIGENOUS CLASTICS (3-0). Depositional processes, physiographic and environmental components, and facies characteristics and relationships of alluvial, eolian, deltaic, clastic shoreline, shallow siliciclastic sea, and deep sea clastic depositional systems. Emphasis on interpretation of ancient analogues. Prerequisite: GEOL 4443 or equivalent.

5345. OPTICAL MINERALOGY (2-4). Principles of optical crystallography and mineral identification. The relationships of optical characteristics to the structure and chemistry of minerals. Prerequisite: GEOL 2445. **$2 lab fee.**

5346. ADVANCED MINERALOGY (2-3). Study of structural crystallography and x-ray crystallography of minerals; major and trace element chemistry and structural state of minerals are studied utilizing concepts and techniques of crystal chemistry, thermodynamics and x-ray crystallography; paragenesis and petrologic relationships will be examined. **$2 lab fee.**

5347. PETROLEUM GEOLOGY (2-3). Origin, migration, and entrapment of hydrocarbons. **$2 lab fee.**

5348. MARINE GEOLOGY (3-0). Geologic processes of the oceans. Sedimentation in the oceans including biologic processes that relate to sediment production, chemistry of seawater, geochemical cycles in the oceans. Origin of seafloor topography. Seafloor spreading.

5349. AIR PHOTO AND MAP INTERPRETATION (2-3). Geologic analysis of selected areas using vertical aerial photographs, topographic maps, oblique satellite photography, and radar imagery. **$2 lab fee.**

5350. GEOSTATISTICS (3-0). Statistics and multivariate techniques as practical research tools in the solving of problems in the earth sciences; emphasis on techniques currently used in academic and industrial research; analysis of sequences of data; map analysis and analysis of multivariate data. Prerequisite: MATH 3310 or equivalent, or permission of instructor.

5351. EARTH SCIENCE EDUCATION I (2-3). Introduction for teachers to the physical aspects of geology and related sciences. Emphasizes study of the fields of mineralogy and petrology, structure and geomorphology, and meteorology. Weekly field trips integrate lecture and laboratory work. Offered during summer only and cannot be taken for credit toward an MS degree in geology. Prerequisite: permission of instructor. **$2 lab fee.**

5352. EARTH SCIENCE EDUCATION II (2-3). Introduction to earth history and the relationship between man and his environment. Emphasizes astronomy, paleontology and stratigraphy, oceanography, and various aspects of environmental geology. Weekly field trips integrate lecture and laboratory work. Offered during summer only and cannot be taken for credit toward an MS degree in geology. Prerequisite: GEOL 5351 or concurrent enrollment. **$2 lab fee.**

5353. BIOSTRATIGRAPHIC MICROPALEONTOLOGY (2-3). Use of foraminifera, ostracoda and plant micro-fossils in local, regional and cosmopolitan stratigraphic correlation and zonation. **$2 lab fee.**

5355. CLAY MINERALOGY (2-3). Crystalline structure of clay minerals, properties, and methods of identification of the clay minerals by means of x-ray diffraction and differential thermal analysis. **$2 lab fee.**

5357. ADVANCED IGNEOUS PETROLOGY (2-3). Origin and behavior of magmas, with emphasis on magmas as dynamic systems; geochemical and mineralogical characteristics of igneous rock types; physical models of magmatic processes; detailed case histories from individual igneous centers. **$2 lab fee.**

5358. VOLCANICLASTIC SEDIMENTATION (3-0). Volcaniclastic rocks and depositional processes. Primary and reworked deposits from different volcanic environments. Facies evaluation and models for selected major sequences. Prerequisites: GEOL 4443 and 2446 or equivalents.

5360. ANALYTICAL GEOCHEMISTRY (1-6). Techniques in rock, mineral, soil and water analysis. **$2 lab fee.**

5365. SPECIAL TOPICS IN GEOLOGY (2-3). May be repeated for credit when topics vary. Prerequisite: consent of the instructor. **$2 lab fee.**

5407. PALEOMAGNETISM (3-3). Application of the principles of rock magnetism and paleomagnetism as a geological tool. Topics include: magnetic minerals, magnetization of rocks, the geomagnetic field, magnetic reversals, data analysis, and polar wandering. Application of rock magnetism to a specific laboratory problem. Prerequisites: GEOL 3443 and a physics course or permission of the instructor.

5409. APPLIED GEOPHYSICS (3-3). Geophysical Techniques used to determine the presence and extent of deposits of minerals and the subsurface structure of selected localities from field methods. Prerequisites: GEOL 3443 and a course in physics, or permission of the instructor.

5446. IGNEOUS AND METAMORPHIC PETROLOGY (3-3). Hand specimen and thin section study of igneous and metamorphic rocks; emphasis on theoretical principles governing the origin and evolution of crustal rocks. Prerequisite: GEOL 5345 or permission of instructor. **$2 lab fee.**

The following research courses will be graded either PFR or ABCDFR as designated by the instructor at the beginning of the semester or session. Only three hours of research course credit may be applied to the degree.

5170, 5270, 5370. RESEARCH IN PALEONTOLOGY. Conference course which may include laboratory or field work and may be repeated. **$2 lab fee.**

5171, 5271, 5371. RESEARCH IN STRATIGRAPHY. Conference course which may include laboratory or field work and may be repeated. **$2 lab fee.**

5173, 5273, 5373. RESEARCH IN TECTONICS. Conference course which may include laboratory or field work and may be repeated. **$2 lab fee.**

5174, 5274, 5374. RESEARCH IN STRUCTURAL GEOLOGY. Conference course which may include laboratory or field work and may be repeated. **$2 lab fee.**

5175, 5275, 5375. RESEARCH IN SEDIMENTOLOGY. Conference course which may include laboratory or field work and may be repeated. **$2 lab fee.**

5176, 5276, 5376. RESEARCH IN GEOCHEMISTRY. Conference course which may include laboratory or field work and may be repeated. **$2 lab fee.**

5177, 5277, 5377. RESEARCH IN PETROLOGY. Conference course which may include laboratory or field work and may be repeated. **$2 lab fee.**

5178, 5278, 5378. RESEARCH IN GEOPHYSICS. Conference course which may include laboratory field work and may be repeated. **$2 lab fee.**

5179, 5279, 5379. RESEARCH IN VOLCANOLOGY. Conference course which may include laboratory or field work and may be repeated. **$2 lab fee.**

5181, 5281, 5381. RESEARCH IN GEOLOGY. Conference course with laboratory which may be repeated. **$4 lab fee.**

5398, 5698, 5998. THESIS.

5199. TECHNICAL SESSIONS (1-0). Forum for presentation of results of graduate students and faculty research. Required each semester of all graduate students. Graded P/F.

Department of HISTORY (HIST)

Areas of Study	*Degrees*
History	M.A.
Humanities (See Interdepartmental and Intercampus Programs.)	M.A., Ph.D.
Archival Administration	*Certificate*

Master's Degree Plans: Thesis and Non-Thesis

Chairman: Stanley H. Palmer 202 University Hall 273-2861

Graduate Advisor: Gary D. Stark 201 University Hall 273-2861

Graduate Faculty:

Professors Chester, Green, Kerr, Lackner, Myres, Philp, Rodnitzky
Associate Professors Bock, Palmer, Reinhartz, Richmond, Stark
Assistant Professors Anders, Anguizola, Fairbanks, Glymph, Goldberg, Kushma, Maizlish, Moch, Underwood
Adjunct Associate Professor Colley

OBJECTIVE

The general purpose of the Master of Arts in History program is to provide the student with a greater breadth of understanding of both the past and the contemporary world and a greater depth of experience in historical methods and techniques. Specific objectives are to prepare the student for a career in business, government, research, teaching, and further graduate study.

DEGREE REQUIREMENTS

Courses taken toward a master's degree should fit into a unified program aimed at providing a student with both a comprehensive background and depth of understanding in a major field in either American or European history. All students are required to take the historiography course corresponding to their major field. In exceptional circumstances, a student may petition the History Graduate Studies Committee for an alternate field. All students must take a minimum of six hours in both the Colloquium and the Seminar courses. Students must consult with the Graduate Advisor to determine their program.

Competency in a foreign language is required. This may be demonstrated by credit in an approved language through the sophomore level or by successful completion of an examination administered by the Department of Foreign Languages and Linguistics.

The following requirements are in addition to the Graduate School requirements:

The thesis degree plan is research-oriented and is designed primarily for students intending to pursue further graduate work. A minimum of 18 hours in a major field is required. With the approval of the Graduate Advisor, a minor of as many as six hours of graduate and/or advanced undergraduate courses in a discipline other than history may be taken to satisfy the minimum requirement of 30 hours for the degree. As many as nine hours (six hours if an outside minor is selected) of advanced undergraduate history course work may be taken for graduate credit. In the event of failure of the oral defense of the thesis required for the degree, the student may petition the Graduate Studies Committee for re-examination.

The non-thesis degree plan requires a minimum of 24 hours in a major field. With the approval of the Graduate Advisor, a minor of as many as nine hours of graduate and/or advanced undergraduate courses in a discipline other than history may be taken to satisfy the minimum requirement of 36 hours for the degree. A maximum of nine hours of advanced undergraduate course work may be taken for graduate credit. In the event of failure of the examination required for the degree, the student may petition the Graduate Studies Committee for re-examination.

CERTIFICATE IN ARCHIVAL ADMINISTRATION

Students desiring a certificate in archival administration as part of the Master of Arts in History degree must take an additional six-hour internship. This may be taken in conjunction with the thesis with archival training projects in the internship program tailored to the student's field of thesis research. Archival administration courses are HIST 5342, 5343, 5344, 5644.

NOTE: A course may be repeated for credit when the topic changes. Graduate standing is a prerequisite to all of the following courses.

5300. COLLOQUIUM IN 17TH AND 18TH CENTURY AMERICAN HISTORY (3-0).

5301. COLLOQUIUM IN 19TH CENTURY AMERICAN HISTORY (3-0).

5302. COLLOQUIUM IN 20TH CENTURY AMERICAN HISTORY (3-0).

HISTORY

5303. COLLOQUIUM IN URBAN HISTORY (3-0).
5304. COLLOQUIUM IN TEXAS AND THE SOUTHWEST (3-0).
5305. COLLOQUIUM IN AMERICAN SOCIAL AND INTELLECTUAL HISTORY (3-0).
5306. COLLOQUIUM IN DIPLOMATIC HISTORY (3-0).
5307. COLLOQUIUM IN AMERICAN LABOR HISTORY (3-0).
5308. COLLOQUIUM IN EUROPEAN HISTORY, PRE-1500 (3-0).
5309. COLLOQUIUM IN EUROPEAN HISTORY, POST-1500 (3-0).
5310. COLLOQUIUM IN BRITISH HISTORY (3-0).
5311. COLLOQUIUM IN LATIN AMERICAN HISTORY (3-0).
5314. COLLOQUIUM IN RUSSIAN HISTORY (3-0).
5320. SEMINAR IN 17TH AND 18TH CENTURY AMERICAN HISTORY (3-0).
5321. SEMINAR IN 19TH CENTURY AMERICAN HISTORY (3-0).
5322. SEMINAR IN 20TH CENTURY AMERICAN HISTORY (3-0).
5323. SEMINAR IN AMERICAN POLITICS (3-0).
5324. SEMINAR IN REGIONAL HISTORY OF THE U.S. (3-0).
5325. SEMINAR IN AMERICAN SOCIAL AND INTELLECTUAL HISTORY (3-0).
5326. SEMINAR IN DIPLOMATIC HISTORY (3-0).
5327. SEMINAR IN AMERICAN LABOR HISTORY (3-0).
5328. SEMINAR IN ANCIENT HISTORY (3-0).
5329. SEMINAR IN MEDIEVAL HISTORY (3-0).
5330. SEMINAR IN MODERN EUROPEAN HISTORY (3-0).
5331. SEMINAR IN BRITISH HISTORY (3-0).
5334. SEMINAR IN LATIN AMERICAN HISTORY (3-0).
5340. AMERICAN HISTORIOGRAPHY (3-0).
5341. EUROPEAN HISTORIOGRAPHY (3-0).
5342. PRINCIPLES OF ARCHIVES AND MUSEUMS I (3-0).
5343. PRINCIPLES OF ARCHIVES AND MUSEUMS II (3-0).
5344, 5644. ARCHIVAL INTERNSHIP.
5349. SELECTED TOPICS ON WORLD CIVILIZATION (3-0).
5350. HISTORY OF CARTOGRAPHY (3-0).
5391, 5691, 5991. INDEPENDENT STUDY. For graduate students whose needs are covered by no course immediately available.
5392. HISTORICAL PERSPECTIVES ON THE HUMANITIES (3-0).
5398, 5698, 5998. THESIS.

HUMANITIES Program

See Interdepartmental and Intercampus Programs, p. 209.

Department of INDUSTRIAL ENGINEERING (IE)

Area of Study — *Degrees*

Industrial Engineering — M.S., M.ENGR., Ph.D.

Master's Degree Plans: Thesis, Thesis Substitute, and Non-Thesis

Chairman and Graduate Advisor:
G. T. Stevens, Jr. — 305 Carlisle 273-3092

Graduate Faculty:

Professors Corley, Meier, Stevens
Associate Professors Deivanayagam, Khan, Pape
Assistant Professor Liles, Priest

OBJECTIVE

The graduate program in industrial engineering is designed to provide the student with fundamental knowledge in the various areas of industrial engineering and with the opportunity to specialize in a particular area. A student pursuing a master's or doctoral degree may specialize in one of the following areas:

1. General Industrial Engineering—The design, analysis and control of modern production systems.

2. Human Factors—The analysis of the physiological and behavioral characteristics of man in the industrial environment.

3. Operations Research and Systems Analysis—The formulation and analysis of quantitative models of engineering and management problems, and their application to complex integrated systems.

4. Engineering Management—The management of resources in technological enterprises.

5. Computer Systems and Applications—The use of the computer in decision making for industry.

In addition, special programs of study may be arranged.

ADMISSION

Applicants for the master's degree who hold a baccalaureate degree in engineering must meet the general requirements of the Graduate School as stated under the section entitled "Admission Requirements and Procedures." Applicants not meeting all criteria will be admitted on provisional or probationary basis only under exceptional circumstances.

For applicants with no prior training in engineering, the same minimum criteria will apply, and, in addition, their records will be reviewed in relation to the intended program of study and specific remedial work may be required.

The acceptance of applicants who have already received a master's degree in engineering will be based on the above-mentioned minimum criteria and results of graduate work.

DEGREE REQUIREMENTS

Students with degrees in other engineering disciplines may qualify for graduate study in industrial engineering after the completion of prescribed deficiency courses. Entering graduate students who are not proficient in engineering economy (IE 5316), probability and statistics (IE 5317), operations research (IE 5323), or industrial engineering design and analysis (IE 5344) may be required to take the deficiency course in parentheses to provide an appropriate background for graduate study in industrial engineering. For applicants with no prior training in engineering, the same deficiency courses will apply, and, in addition, courses in mathematics,

physics, computer science, and engineering science may be required depending on the applicant's background.

Each graduate student will be required to take four courses as part of an industrial engineering core curriculum. The rest of the student's program will be elective, subject to the approval of the student's supervisory committee. The core curriculum is as follows:

(1) Probability and Statistics: IE 5318
(2) Three hours of course work in operations research approved by the Graduate Advisor
(3) Three hours of course work in human factors approved by the Graduate Advisor
(4) Industrial Engineering Design: either IE 5310 or IE 5312.

A final examination covering the coursework is required for each master's candidate. In the option involving a thesis, this final examination will be oral and will also cover the thesis. The final examination involved in the other two options will be written and/or oral.

Master of Science

The Master of Science Degree is a research-oriented program which consists of a thesis option, thesis-substitute option, and a non-thesis option.

Master of Engineering

The Master of Engineering Degree is an engineering practice-oriented program. The degree is a 36 credit-hour program in which a maximum of six credit hours may be earned by an acceptable design project report, internship, or additional coursework. Applicants for this degree must have a baccalaureate degree in an engineering discipline.

General degree requirements for the Master of Engineering are given under the catalog section entitled "Advanced Degrees and Requirements."

Doctor of Philosophy

The Ph.D. degree should normally require four years of full-time study or less after completion of the B.S. degree. There is no foreign language requirement for the Ph.D. degree.

The Ph.D. requirements are listed in the catalog section entitled "Advanced Degrees and Requirements." A student's program will consist of course work, independent study, and a dissertation in fields pertinent to his areas of interest. The program for each student will be planned by the student and a committee of faculty members. Students with undergraduate degrees in fields other than engineering will be required to take the necessary courses to establish a background in science, mathematics, and the engineering courses equivalent to that required in the undergraduate programs.

5301. ADVANCED OPERATIONS RESEARCH (3-0). Advanced techniques in operation research. Identification of current research areas. Prerequisite: IE 5323 or equivalent.

5302. ADVANCED HUMAN FACTORS I (3-0). Application of the principles of systems analysis, human factors and systems evaluation to man-machine systems with emphasis upon the human component as he interacts with the the machine. Prerequisite: IE 4344 or 5345.

5303. TOPICS IN QUALITY CONTROL (3-0). Principles and practices of industrial quality control. Includes the theory of statistical sampling and control. Prerequisite: IE 5317 or equivalent.

5304. ENGINEERING ECONOMY II (3-0). Probabilistic cash flow models and the use of simulation for the evaluation of capital investments. Prerequisite: IE 5316 and 5317 or equivalent.

5305. LINEAR PROGRAMMING AND EXTENSIONS (3-0). Theory of linear programming including the simplex method, duality, sensitivity analysis, decomposition principles, the transportation problem, and integer programming. Prerequisite: IE 5323 or equivalent.

5306. DYNAMIC OPTIMIZATION (3-0). Multi-stage decision problems are characterized as dynamic programming problems. Numerical approximation schemes for dynamic programming problems are discussed. Solution of variational problems studied both from a classical and dynamic programming approach. Prerequisite: IE 5323 or equivalent.

5307. THEORY OF QUEUES (3-0). Theory of queues with particular emphasis on industrial applications. Prerequisite: IE 5317 and 5323 or equivalent.

5308. ADVANCED RESEARCH METHODS (3-0). Statistical analysis of variance with emphasis on both data analysis and on experimental design; factorials, complete and incomplete blocks, Latin squares, and covariate analysis. Examples taken from industrial problems. Prerequisite: IE 5318.

5309. ANALYSIS OF STOCHASTIC PROCESSES (3-0). Background for probabilistic model building. Stationary and non-stationary processes, counting processes, renewal theory, Markov chains, and random walk. Prerequisite: IE 5317 and 5323 or equivalent.

5310. PRODUCTION SYSTEMS DESIGN (3-0). Problems and methods of systems design will be made. Particular emphasis is given to the construction of models representing the system, their optimization, and the presentation of results. Prerequisite: IE 5344 and 5323 or equivalent.

5311. STATISTICAL METHODS FOR INDUSTRIAL DECISION (3-0). Statistical decision theory with applications. Prerequisite: IE 5317 or equivalent.

5312. ADVANCED PRODUCTION AND INVENTORY CONTROL SYSTEMS (3-0). Continuation of the undergraduate course. Emphasis on mathematical model building and optimization. Prerequisite: IE 5323 or equivalent.

5313. RELIABILITY AND ADVANCED QUALITY CONTROL TOPICS (3-0). Includes advanced quantitative topics in reliability design and quality control. Management of reliability and quality control functions are also included. Prerequisite: IE 4308 or 5303.

5315. DATA PROCESSING IN OPERATIONS RESEARCH (3-0). Selected topics in the application of electronic computers to operations research activities.

5316. ECONOMIC DECISION MAKING (3-0). Criteria used for making decisions about proposed capital investments and the implementation of selected criteria in engineering design and investment decisions. Emphasis on model building and optimization.

5317. ENGINEERING STATISTICS I (3-0). Sets and set algebra; sample spaces; combinatorics; random variables; discrete and continuous density functions; emphasis on binomial, Poisson, normal, and gamma distributions; statistical concepts; hypothesis testing; point and interval estimation. Prerequisite: MATH 2325.

5318. ENGINEERING STATISTICS II (3-0). Multivariate normal distribution and related functionsOChi-square, t, and F; a matrix approach to regression analysis and analysis of variance; a survey of nonparametric statistical techniques. Prerequisite: IE 5317.

5320. INDUSTRIAL PLANNING AND FORECASTING (3-0). Analysis of the theory and practice of the managerial function of planning and forecasting in industrial operations. Long-range planning and development of organizational objectives and strategies. Resource allocation planning.

5321. INDUSTRIAL ORGANIZATION AND MANAGEMENT SYSTEMS (3-0). Traditional organization and management theory is reviewed, and the systems approach to management presented. Managerial system approached via decision-making processes in planning and control of organizational activities. Both computational techniques and the behavioral aspects of decision making considered. Prerequisite: IE 5345 or both IE 3316 and 4344, or equivalent.

5322. SIMULATION AND OPTIMIZATION (3-0). Survey and applications of computer languages suitable for Monte Carlo simulation of random processes. Optimization and search techniques of functions introduced. Prerequisite: IE 5317 and consent of instructor.

5323. OPERATIONS RESEARCH (3-0). Introduction for graduate students to the techniques of operations research. Prerequisite: probability and statistics, calculus.

5324. HUMAN FACTORS EVALUATION OF PRODUCTION PROCESSES (3-0). Means of determination of the adequacy of production machinery from a human engineering standpoint, adequacy and availablity of job aids, and analysis of the speed and accuracy with which required communications and technical information are transmitted and utilized in production. Consideration of production as a man-machine system. Prerequisite: IE 5331.

5325. INDUSTRIAL INFORMATION SYSTEMS (3-0). Application of electronic computers and associated input/output devices. Decision processes and data evaluation considered along with the design of systems which gather the data. Prerequisite: knowledge of a computer programming language and consent of the instructor.

5326. BIOMECHANICS (3-0). Fundamentals and objectives of biomechanics. Discussion will concern anthropometry, link system of the body, kinematic aspects of extremity joints, biomechanical aspects of injury and prosthesis.

5327. INFORMATION SYSTEMS FOR ENGINEERING MANAGEMENT DECISIONS (3-0). Rigorous and quantitative treatment of financial information systems to assist engineering managers in capital and cost allocation, cost control, and performance evaluation. Prerequisite: graduate standing.

5328. MANUFACTURING SYSTEMS DESIGN (3-0). Design, analysis, and modeling of advanced manufacturing systems and the development of databases for manufacturing management and operations. Prerequisites: IE 5330 or equivalent and 5322 or equivalent.

5329. MODELING AND CONTROL OF INDUSTRIAL SYSTEMS (3-0). Study and design of mathematical models for the effective control of industrial systems. Prerequisite: IE 5318.

5330. DIGITAL PROCESS CONTROL AND MATHEMATICAL MODELING OF INDUSTRIAL SYSTEMS (3-0). Describes the present status of automatic control in industry with empha-

sis on the application of digital control. Problems involved in use of both supervisory and discrete digital control systems presented and the development of process control by mathematical problems also covered.

5331. ERGONOMICS (3-0). Man in relation to his working environment. Physiological and anatomical characteristics of man. Considerations of fatigue, accidents, and other human problems in industry. Prerequisite: IE 4344 or 5345.

5332. NONLINEAR PROGRAMMING (3-0). Optimization theory for unconstrained, equality constrained, and inequality constrained problems is first developed. Specific techniques then studied. Convex programming, geometric programming, quadratic programming, and optimum seeking methods presented. Prerequisite: IE 5305.

5333. ENGINEERING ADMINISTRATION (3-0). To provide understanding of engineering managers' role in overall corporate budgeting process to include operational as well as capital budgeting. Analysis of engineering operations and design part in finance from a non-financial point of view. These views analyzed in terms of utility management as part of various corporate management philosophies.

5334. HUMAN FACTORS IN SYSTEMS DEVELOPMENT (3-0). Human engineering, staffing, training, testing, and evaluation in relation to systems theory. Psychological, physiological, and social factors relevant to systems planning design, analysis, and management. Methods of increasing systems effectiveness by consideration of personnel subsystems during total system development. Prerequisite: IE 4344 or equivalent and IE 5343.

5335. ADVANCED INDUSTRIAL ENGINEERING ANALYSIS (3-0). Rigorous problem-oriented course covering selected analytical techniques not normally included in undergraduate industrial engineering curricula. Prerequisite: MATH 3318.

5336. INDUSTRIAL AND PRODUCT SAFETY (3-0). Methods and techniques for identifying, testing, and correcting industrial and product hazards, including product and professional liability. Prerequisite: graduate standing.

5337. SYSTEMS ANALYSIS AND DESIGN I (3-0). Rigorous treatment of analytical methods used in systems engineering. Prerequisite: IE 5317 and 5323 or equivalent.

5338. SYSTEMS ANALYSIS AND DESIGN II (3-0). Application of analytical techniques to industrial systems. Prerequisite: IE 5337.

5341. DESIGN WITH HUMAN FACTORS (2-3). Study of factors that affect design of a system at the man/machine interface. Topics include physiological limitations and capability under normal and hostile environments. Design and research projects undertaken. Prerequisite: IE 5343.

5342. JOB DESIGN AND STANDARDIZATION (2-3). Advanced study of work center design and methods of improving human work. Factors affecting work, such as fatigue, learning and physiology considered. Prerequisite: IE 3343 or 5344.

5343. ENVIRONMENTAL BIOTECHNOLOGY (2-3). Physical, physiological, and psychological aspects of interaction between man and thermal, atmospheric, radiant, and mechanical agents and energies in the environment. Biological and physical requirements for engineering design and control of the environment; applications to design of complex systems. Prerequisite: IE 4344 or 5345.

5344. INDUSTRIAL ENGINEERING ANALYSIS AND DESIGN (2-3). Introduction and survey of the classical and current techniques of work measurement, analysis and planning. Topics in plant design considered along with plant location concepts.

5345. HUMAN ENGINEERING (2-3). Background in industrial human factors engineering. Emphasis placed on study of human structural, physiological, and psychological limitations and their effects on design of work systems. Prerequisite: IE 5344 or consent of the instructor and IE 5318.

5442. HUMAN FACTORS AND BEHAVIOR (3-3). Background in human factors engineering and human behavior in industrial organizations. Emphasis placed on the study of human physiological and psychological limitations in industrial environment and on human behavior in industrial organizations, including planning and control functions.

5349. INDUSTRIAL ROBOT APPLICATIONS (2-3). A study of the requirements and selection criteria for the integration of robots into simple and complex industrial activities. Prerequisite: IE 5330 or equivalent.

5191, 5291, 5391. ADVANCED STUDIES IN INDUSTRIAL ENGINEERING. Individually approved research projects selected from the various branches of industrial engineering. Work performed as a thesis substitute normally will be accomplished under IE 5391, with prior approval of the Industrial Engineering Committee on Graduate Studies.

5392. SELECTED TOPICS IN OPTIMIZATION (3-0). May be repeated for credit when content changes. Prerequisite: consent of instructor.

5398, 5698, 5998. THESIS. Prerequisite: graduate standing in industrial engineering.

6197-6997. RESEARCH IN INDUSTRIAL ENGINEERING. Individually supervised research projects directed toward the dissertation. Prerequisite: graduate standing in industrial engineering and approval of advisor.

6301. ANALYSIS OF DECISION PROCESSES (3-0). Methods of making economic decisions under the conditions of risk and uncertainty. Prerequisite: IE 5304 or equivalent.

6302. MANUFACTURING FACILITIES PLANNING (3-0). Advanced techniques for the selection, location, and integration of manufacturing equipment and facilities for developing or expanding manufacturing organizations; significant design project required. Prerequisites: IE 5323, 5329, and 5344 or consent of the instructor.

6303. MODELS FOR DECISION MAKING (3-0). Development of quantitative models to describe human decision-making and predict choices on the basis of relevant situational and subjective variables. Prerequisite: consent of instructor and graduate standing.

6304. THE ANALYSIS AND FINANCING OF ENGINEERING PROJECTS (3-0). Advanced techniques and methods for capital financing, planning, and evaluation of engineering projects. Prerequisites: IE 5304 and 5323 or consent of instructor.

6390. SUPERVISED TEACHING IN INDUSTRIAL ENGINEERING (3-0). Teaching under close supervision, attending group meetings, and individual conferences, and submitting reports as required. May be repeated for credit. Required for all teaching assistants and associates in industrial engineering; however, may not be used for degree credit. Graded P/F only.

6399, 6699, 6999. DISSERTATION.

A limited number of undergraduate courses may be applicable toward the graduate program if approved in advance by the Graduate Advisor.

INTERDISCIPLINARY STUDIES Program

See Interdepartmental and Intercampus Programs, p. 213.

LANDSCAPE ARCHITECTURE Program (LARC)

Area of Study	*Degree*
Landscape Architecture	M.L.A.

Master's Degree Plans: Thesis and Thesis Substitute

Dean, School of Architecture and Environmental Design: George S. Wright	335 Fine Arts	273-2801
Director of Landscape Architecture and Graduate Advisor: Richard B. Myrick	330 Fine Arts	273-2801

Graduate Faculty:

Professors Myrick, G. Wright
Associate Professors Brooks, Henry, McBride, Price, Scherr
Assistant Professors DeJean, Windham

LANDSCAPE ARCHITECTURE

OBJECTIVE

The objective of the Master's degree program in landscape architecture is to provide those advanced technical courses that will equip the student with the expertise to practice in the professional field of landscape architecture. The program is based on a close interrelationship between the design disciplines, particularly architecture. Course work at both the undergraduate and graduate level puts emphasis on the interdisciplinary needs of the design professions.

The 54-hour program requires 15 hours of electives of which 12 plus six hours of thesis or thesis substitute must be in one area of concentration. Because of the location of the school in the middle of a busy metroplex and because of the availability of graduate level courses in planning, urban design, and architecture, this emphasis will normally relate to the urban landscape; or it may concentrate in research under the guidance of a Director of Research and a graduate faculty specializing in urban environmental areas.

Graduates of the four-year undergraduate option enter a two-year course of study leading to the first professional degree in landscape architecture. Graduates of four-year programs in disciplines other than landscape architecture will be required to take leveling courses as determined by the Graduate Advisor. Graduates who already have a first professional degree in landscape architecture can expect that the Master's degree requirements would be modified, based on the kind and quality of their acceptable previous experience.

DEGREE REQUIREMENTS

The applicant must meet the general requirements of the Graduate School and submit a portfolio of work for evaluation by the department. A personal interview is recommended and letters of reference are required. For thesis candidates, the degree program consists of 54 approved semester hours, including a six-hour thesis. For thesis substitute candidates, 57 approved semester hours are required. The core curriculum designed for this program consists of: LARC 5301, 5324, 5331, 5341, 5342, 5363, 5672, 5674, and ARCH 5329, for a total of 33 hours. Additional elective courses (15 hours) approved in advance, and a six hour thesis, make up the 54-hour required total. For thesis substitute candidates, the above courses are required as well as LARC 5194, 5593, ARCH 5363, and 15 hours of electives. Twelve hours of the electives for both thesis and thesis substitute must be in one area of study selected by the student and approved by the Graduate Advisor. A complete degree plan must be planned and approved in advance by the Graduate Advisor.

5194. MASTER'S COMPREHENSIVE EXAMINATION. Directed study, consultation, and comprehensive examination over course work, leading to the thesis-substitute Master of Landscape Architecture degree. Graded P/F. Required of all thesis-substitute M.L.A. students in the semester in which they plan to graduate. Prerequisite: concurrent enrollment in LARC 5593.

5301. MODERN HISTORY AND THEORY OF LANDSCAPE ARCHITECTURE (3-0). In-depth investigation into issues and solutions to contemporary problems (beginning with 19th century) facing the landscape architect and the historical basis for such solutions.

5312. THEORY AND PRACTICE OF LANDSCAPE ARCHITECTURE (3-0). Study of landscape architecture theories, methods, and practice.

5313. HISTORY OF LANDSCAPE ARCHITECTURE (3-0). Survey of the design of the exterior environment as an aspect of the social, cultural, and intellectual life of various historical periods prior to the 19th century. Prerequisite: permission of instructor.

5324. NATIVE PLANT MATERIALS (3-0). Identification of native plant materials and their relationship to ecosystems in the various Texas regions, and the potential for their use to benefit man and his environment.

5331. PROFESSIONAL PRACTICE IN LANDSCAPE ARCHITECTURE (3-0). Ethical, legal, and administrative aspects of the practice of landscape architecture and the professional's relationship to the client.

5336. PLANTING DESIGN (2-4). Application to design of the inherent characteristics and ecological constraints of ornamental plant materials.

5337. LANDSCAPE AND SITE DEVELOPMENT (2-4). An introduction to the major issues of site and landscape construction with emphasis on topography, grading, drainage, road alignment, parking areas, and site utility systems. Paving materials for walks and plazas, low retaining walls, steps, and other site details also covered.

5339. LANDSCAPE PLANT MATERIALS (2-4). Identification of ornamental plant materials

as to growth characteristics and design application. Shade and ornamental trees, shrubs and vines, flowers and ground covering materials covered.

5340. LANDSCAPE CONSTRUCTION: MATERIALS AND METHODS (2-4). Investigation and application of materials and methods of landscape construction; short projects dealing with basic materials such as wood, concrete, masonry, steel, asphalt, irrigation and fountain equipment; working drawing and specification outlines also covered.

5341. ADVANCED LANDSCAPE CONSTRUCTION (2-4). Techniques of special landscape construction problems such as sports and recreational facilities, playgrounds, urban roof-top development, and horizontal and vertical road alignment. Earthwork quantity estimating and watershed analysis also investigated.

5342. ADVANCED ORNAMENTAL PLANTS AND PLANTING DESIGN (2-4). Detailed study of ornamental plants, their visual and growth relationships, and their relationship to structures.

5351. NATURAL RESOURCE ANALYSIS (2-4). An introductory course in the methods and techniques of recording and assessing information used in regional landscape architecture.

5353. LAND AND SUBDIVISION DEVELOPMENT (2-4). A comprehensive study of the physical, legal, and natural environmental aspects of the design and subdivision of property as a part of the developmental process.

5363. RESEARCH METHODOLOGY (3-0). A course designed to provide an understanding of the theories of practical research and methods of pursuing them as they relate to the profession of landscape architecture. Comparable courses at UTA may be substituted by permission of the Graduate Advisor.

5564. DESIGN STUDIO: LANDSCAPE DESIGN (3-6). Studio in the uses of landscape form and material with problems in the design of exterior environments emphasizing inter-relationships with architectural forms. Prerequisite: permission of instructor. **$2 lab fee.**

5565. DESIGN STUDIO: ADVANCED LANDSCAPE DESIGN (3-6). Continuation of LARC 5564. Prerequisites: LARC 5564 with a grade of C or better and permission of instructor. **$2 lab fee.**

5593. INDIVIDUAL PROBLEMS IN LANDSCAPE ARCHITECTURE. Required of all thesis-substitute candidates. Individual study project conducted by a supervising committee with program and statement of intent filed with the Graduate Advisor during the previous semester. Prerequisites: ARCH 5363 and concurrent enrollment in LARC 5194.

5672. DESIGN STUDIO: LANDSCAPE ARCHITECTURE (3-12). Advanced design concepts presented through a series of design problems involving various problem solving techniques. May be repeated for credit.

5674. DESIGN STUDIO: INTEGRATED PROBLEMS (3-12). A series of design problems involving the coordinated effort of team members selected from landscape architecture and other disciplines such as architecture, city and regional planning, environmental design, urban design and sociology.

5381. PRACTICUM. An internship program which would include approved work done in a landscape architect's office or one of the related fields, designed to give the student practical experience in the profession. Placement in offices will be as approved and/or arranged by the School. P/F only. May be used as an elective with Graduate Advisor's approval.

5191-5691. SPECIAL TOPICS IN LANDSCAPE ARCHITECTURE. Special subjects and issues in landscape architecture for independent study, as arranged with individual students and faculty members. May be repeated for credit.

5195, 5295, 5395, 5695. SELECTED TOPICS IN LANDSCAPE ARCHITECTURE. Studio and lecture courses to explore and present selected topics in a wide range of landscape architectural and environmental areas. These may include: urban landscape architecture, natural resource analysis, park and recreation planning, and landscape construction management. May be repeated for credit as topics change.

5698. THESIS. Taken in final semester to assure completion of prescribed professional courses. A problem of research in landscape architecture or related topic may be selected for the thesis.

Department of MANAGEMENT (MANA)

Areas of Study	*Degrees*
Business Administration (See Interdepartmental and Intercampus Programs.)	M.B.A.
Administration (See Interdepartmental and Intercampus Programs.)	Ph.D.

Chairman: Michael A. Hitt 209 Business 273-3166

Graduate Faculty:

Professors Garland, Hitt, Stanley, Wofford
Associate Professors French, Gerloff, Gray, Price, Quick
Assistant Professors Rosenstein, Rudolf, Wheeler

OBJECTIVE

The Management curriculum provides the M.B.A. student a broad exposure to the management field. Courses include theoretical background and practical applications in content areas of business policy, organizational behavior, organizational theory, personnel/industrial relations, operations management, international management, and management of technology. The Ph.D. student may concentrate in business policy, organizational behavior, organizational theory, and personnel/industrial relations.

5311. BEHAVIORAL SCIENCES IN MANAGEMENT (3-0). Examination of the managerial uses of concepts and findings from the disciplines of sociology, psychology, and cultural anthropology. Considers concepts of individual behavior including motivation, perception, and personality; interpersonal behavior; communications; and small group behavior.

5312. MANAGEMENT (3-0). Basic exploration of organizations in their environments. The elementary tools of management, which include: organizational objectives, social responsibility and ethics, policies, plans, and decision making; the design of organizations and jobs; the production and technology aspects of organization; the elements of leadership, behavior, and communication; and the elements of control and performance evaluation.

5320. ORGANIZATIONAL BEHAVIOR (3-0). Systematic study of behavioral problems in the complex organization. Analyzes the interaction of environmental and internal factors and their effects upon organizational behavior. The course is placed within the context of the organization process. Prerequisite: MANA 5312 or equivalent.

5321. COMPLEX ORGANIZATIONS (3-0). Provides the foundation for an in-depth knowledge of several important theories of management and organization. Attention to study of organizations, organizational effectiveness, comparative analysis of organizations, and the organization and its environment. Relates empirical findings and theoretical hypotheses with applied management concepts. Prerequisite: MANA 5312 or equivalent.

5322. COMPENSATION ADMINISTRATION (3-0). Administration of compensation systems in public and private organizations; concepts, models, and practices related to wage and salary levels and structures; perceived equitable payments; individual appraisal, rewards, performance, and satisfaction; benefits and compensation controls.

5324. GROUP AND INTERGROUP RELATIONSHIPS (3-0). A survey of the group dynamics literature. Topics include: individual behavior within groups, group influences on individuals, group problem solving, group composition, conflict, leadership, training groups and work groups within organizations. Prerequisite: MANA 5312 or equivalent.

5325. INDUSTRIAL RELATIONS (3-0). Examines union-management relations and considers the structure and functioning of the economic and social forces of importance at the policy level within both the firm and the union. Also considers non-union employee relationships. Prerequisite: MANA 5312 or equivalent.

5326. ORGANIZATION DEVELOPMENT AND CHANGE (3-0). Examines the process of organization development, change, and renewal at the individual, group, and organization level; central topics including diagnostic and intervention procedures at the three levels of analysis. Prerequisite: MANA 5312 or equivalent.

5328. OPERATIONS MANAGEMENT (3-0). Analysis of managerial decisions in the production function with consideration of the planning and design of systems and processes. Prerequisite: BUSA 5301 and 5302 or equivalents and MANA 5312 or equivalent.

5329. METHODS OF ORGANIZATIONAL RESEARCH (3-0). Experimental methodology and its application to organizational problems. Research design, data collection, test construction and an awareness of experimental methods as applied to organizational problems.

5330. ARBITRATION AND DISPUTE SETTLEMENT (3-0). Theory and practice of dispute settlement, with special attention to the role of voluntary arbitration in the settlement of labor-management disputes over contract rights. Attention to the nature of conflict and conflict resolution generally. Considers economic and public implications of arbitration. Prerequisite: MANA 5312 or equivalent.

5331. MANAGEMENT OF INTERNATIONAL OPERATIONS (3-0). Managerial implications of conducting business in foreign countries. Provides a framework for analyzing and dealing with the management of foreign and multinational organizations as influenced by cultural, political, and economic constraints. Prerequisite: MANA 5312 or equivalent.

5333. MANAGEMENT OF TECHNOLOGY (3-0). Problems of managing research and development of other similar technologies which involve one-of-a-kind products and substantial numbers of professional skills. Explores what is known about the management of professionals and professional enterprises. Should be taken during final semester of course work. Prerequisite: MANA 5312 or equivalent or consent of instructor.

5340. PERSONNEL—HUMAN RESOURCE MANAGEMENT (3-0). Presents modern human resources management from both theoretical and practical viewpoints. Topics include manpower planning, staffing, job design, compensation administration, employment discrimination and affirmative action, training and development, performance appraisal, and occupational health and safety. Prerequisite: MANA 5312 or equivalent.

5182, 5282, 5382. INDEPENDENT STUDIES IN MANAGEMENT. Extensive analysis of a management topic. Prerequisite: consent of faculty member and department chairman.

5192, 5292, 5392. SELECTED TOPICS IN MANAGEMENT. In-depth study of selected topics in management. May be repeated when topics vary. Prerequisite: consent of instructor and Graduate Advisor.

6318. SEMINAR IN ORGANIZATIONAL THEORY AND LABOR RELATIONS (3-0). Advanced study in the theory and research of the organizational theory and labor relations fields. Prerequisite: ADMN 6308 or consent of instructor.

6328. SEMINAR IN BUSINESS POLICY (3-0). Advanced study in the theory and research bases of business policy and strategic management. Prerequisite: ADMN 6308 or consent of instructor.

6329. ADVANCED RESEARCH METHODS (3-0). In-depth coverage of selected topics in the design of research and analysis of data; topics include philosophy of science, theory of measurement, complex experimental and quasi-experimental designs. Prerequisite: BUSA 5325 or equivalent.

6338. SEMINAR IN ORGANIZATIONAL BEHAVIOR (3-0). Advanced study in the theory and research of organizational behavior. Prerequisite: ADMN 6308 or consent of instructor.

6348. SEMINAR IN PERSONNEL/HUMAN RESOURCES MANAGEMENT (3-0). Advanced seminar on the theoretical and research current in human resources management. Prerequisite: ADMN 6308 or consent of instructor.

6392. RESEARCH IN ADMINISTRATION (3-0). Independent research under supervision of a faculty member. Prerequisite: consent of instructor.

MANAGEMENT SCIENCE

See Department of Systems Analysis, p. 176.

Department of MARKETING (MARK)

Areas of Study	*Degrees*
Business Administration (See Interdepartmental and Intercampus Programs.)	M.B.A.
Administration (See Interdepartmental and Intercampus Programs.)	Ph.D.

Chairman: Carl McDaniel 234 Business 273-2876

Graduate Faculty:

Professors Dickinson, Gates, McDaniel, Solomon
Associate Professor Calabro
Assistant Professor Caballero

OBJECTIVE

The comprehensive marketing curriculum allows specialization in product management, retailing, marketing research, and promotion. Specialized courses in international marketing and physical distribution management are available also. A capstone course provides preparation for strategic marketing planning and decision making.

5311. MARKETING (3-0). Survey of all the activities involved in marketing. Emphasis on developing a managerial point of view in planning and evaluating marketing decisions of the firm. Analyzes decisions with respect to products, price, channel, and promotional variables and appraises questions relating to cost efficiency, demand and regulations.

5320. BUYER BEHAVIOR (3-0). Examines the theoretical and empirical material on the individual and group behavior of people performing in the consumer role. Topics covered include perception, learning, attitude formation and change, personality, culture, social class, and reference groups. Behavioral science data provides a basis for the explanation of consumer behavior and the integration of these findings into current marketing practices. Prerequisite: MARK 5311 or equivalent.

5324. SEMINAR: CONTEMPORARY MARKETING PROBLEMS (3-0). Emphasizes projects based on a wide range of marketing developments and trends. Each student is required to write and present a research paper dealing in-depth with marketing topics of current or potential interests. Prerequisite: MARK 5311 or equivalent.

5325. PHYSICAL DISTRIBUTION MANAGEMENT (3-0). Study of distribution systems for firms engaged in marketing and/or manufacturing. Analyzes the logistical components of transportation, warehousing, inventory control, communications, and location theory. Explores the problems in and the development of national policy toward macro- and micro-distribution. Suggests concepts in total physical distribution system design. Prerequisite: MARK 5311 and BUSA 5301 or equivalent.

5326. ADVERTISING AND NONPERSONAL COMMUNICATION (3-0). Takes a managerial approach to the place of advertising in business, audience analysis, advertising media, appeals, campaign development, cost analysis, and legal and ethical problems in advertising. Also examines communications processes, diffusion of innovation and other promotional activities: public relations and publicity, sales promotion devices, and packaging. Prerequisite: MARK 5311 or equivalent.

5327. RESEARCH FOR MARKETING DECISIONS (3-0). Overview of information needs of the marketing decision-maker. Primary emphasis upon the methods and techniques that may be employed for the collection and analysis of primary data. Major topics include design of research projects, generating primary data, questionnaire design, samplings for survey research, experimental design, controlling data collection, and data analysis. Prerequisite: MARK 5311 and BUSA 5301 or equivalents.

5328. PRODUCT MANAGEMENT (3-0). Management of the firm's product or service offerings.

Topics include new product development, new product screening, evaluation of existing products, product line and mix analysis, product abandonment decisions, the brand manager's role, the new product planning department, and others. Emphasis on the development of meaningful criteria for decision-making in the product area and on the development of information systems to suggest, screen, and monitor products. Prerequisite: MARK 5311 or equivalent.

5329. SALES, SALES MANAGEMENT (3-0). Examines the unique characteristics of both the industrial and consumer markets from the personal selling viewpoint, with emphasis upon industrial selling. Covers personal selling fundamentals as well as vital sales management topics. Uses role playing and case analysis. Prerequisite: MARK 5311 or equivalent.

5331. INTERNATIONAL MARKETING (3-0). Management of marketing in international business. Includes marketing research, pricing, promotion, and distribution in the international environment. Examines marketing problems arising from various degrees of foreign involvement (exports, licensing, foreign subsidiaries). Prerequisite: MARK 5311 or equivalent.

5332. INDUSTRIAL MARKETING (3-0). Marketing strategy examined from the standpoint of a firm's transactions with intermediate customers and industrial users. Included are frameworks for analysis of marketing opportunities. Student challenged to develop marketing programs directed toward professional buyers. Prerequisite: MARK 5311 or equivalent.

5335. RETAIL MARKETING MANAGEMENT (3-0). Planning, organizing, directing, and controlling retail institutions. Special emphasis on merchandise management includes quantitative research tools designed to improve the buying, handling, control, and pricing of a store's inventory. Also, concentration on sales promotion and customer services. Prerequisite: MARK 5311 or equivalent. An undergraduate retailing course cannot be substituted for MARK 5335.

5336. ADVANCED RESEARCH ANALYSIS (3-0). Focuses on problems of data analysis in marketing research. Considers application of multivariate statistics, including multiple regression, discriminant analysis and factor analysis to marketing research problems. Considerable time also devoted to multi-attribute preference models such as conjoint analyses. Prerequisite: MARK 5327 or equivalent.

5340. MARKETING STRATEGY (3-0). A case course designed to give the student an opportunity to utilize the material and analytical tools that he has acquired. Uses case studies which require a realistic diagnosis of company problems, development of alternative courses of action, and the formulation of specific recommendations. Prerequisite: MARK 5311 and six hours of advanced marketing.

5182, 5282, 5382. INDEPENDENT STUDIES IN MARKETING. Extensive analysis of a marketing topic. Prerequisite: consent of faculty member and department chairman.

5192, 5292, 5392. SELECTED TOPICS IN MARKETING. In-depth study of selected topics in marketing. May be repeated when topics vary. Prerequisite: consent of instructor and Graduate Advisor.

MATERIALS SCIENCE Program

See Interdepartmental and Intercampus Programs, p. 214.

MATHEMATICAL SCIENCES Program

See Interdepartmental and Intercampus Programs, p. 216.

Department of MATHEMATICS (MATH)

Areas of Study	*Degrees*
Mathematics	M.S.
Mathematical Sciences (See Interdepartmental and Intercampus Programs.)	Ph.D.

Master's Degree Plans: Thesis, Thesis Substitute and Non-Thesis

Chairman: V. Lakshmikantham — 469 Nursing Bldg. — 273-3261

Graduate Advisor: G.S. Ladde — 423 Nursing Bldg. — 273-3261

Graduate Faculty:

Professors Lakshmikantham, Bernfeld, Corduneanu, Dyer, Eisenfeld, Greenspan, Kannan, Han, Ladde, R. Moore

Associate Professors Bolen, Heath, Huggins, Marshall, M. Moore, Nestell, Perryman, Tennison, Williams

Assistant Professors Dean, Gillespie

OBJECTIVE

The objective of the Mathematics Department's program at the master's level is to develop the student's ability to do independent research and prepare for more advanced study in mathematics, to give advanced training to professional mathematicians, mathematics teachers, and those employed in engineering, scientific and business areas in which mathematics at this level is requisite for efficient performance.

Graduate work will be offered in algebra, complex and real variables, differential equations, functional analysis, topology, geometry, numerical analysis, logic, probability and statistics.

DEGREE REQUIREMENTS

The Department of Mathematics offers master's degree programs in traditional mathematics and with additional emphasis in computer science, mathematics education, and statistics.

Students choosing the thesis or thesis substitute degree plan must take MATH 5302, 5317, 5333, 5322 or 5324, and two sequences. Students selecting the thesis substitute plan must register for MATH 5395 or 5695.

The program for students electing the non-thesis plan without specialized emphasis must include MATH 5302, 5317, 5333, 5322 or 5324, 5311 or 5320 or 5321, and three sequences.

The program for students electing the non-thesis degree plan with a specialized emphasis must include the following courses according to the emphasis chosen:

Computer Science: Math 5301, 5302, 5333, 5322 or 5324, 5311 or 5320 or 5321; and CSE 5319; and MATH 5338 and 5339 or CSE 5309 and 5310 or CSE 5322 and 5323, and three additional hours in Computer Science and Engineering.

Mathematics Education: MATH 5302, 5333, and twelve hours from MATH 5341-5346.

Statistics: MATH 5301, 5302, 5311, 5312, 5313, 5317, 5333, and three of the following courses: IE 5303, 5307, 5308, 5309, 5323; MATH 5314, 6313; MASI 5321, 5323.

Students in every degree plan must pass a comprehensive examination. For thesis plan students, this examination is in addition to the thesis defense. Not more than six hours from MATH 5391 or 5392 will be applicable toward a graduate mathematics program.

5200. SEMINAR ON SCIENCE AS A PROFESSION (2-0). Use of scientific literature includ-

ing computer data bases, fundamentals of technical writing including grants and proposals, investigation of scientific societies, exploration of career opportunities in specific disciplines. Graded P/F only. Prerequisite: consent of graduate advisor.

5300. MATHEMATICAL PROGRAMMING—COMPUTER PROGRAMMING AND APPLICATIONS (3-0). Introduction to computing techniques utilizing an algorithmic language such as Fortran. Applications from various areas of numerical analysis. Prerequisite: consent of the instructor.

5301. MATHEMATICAL COMPUTER RESOURCES (3-0). Introduction to hardware and software available to the scientific graduate student whose studies involve numerical computations. Utilization of the various mathematical/statistical libraries is emphasized rather than the programming of mathematical/statistical routines. Prerequisite: MATH 5300 or its equivalent.

5302. FUNDAMENTALS OF MATHEMATICAL SCIENCE I (3-0). Real and complex analysis including series, sequences, differentiation and integration, multivariate calculus, vector and matrix algebra. Prerequisite: consent of Graduate Advisor.

5303. FUNDAMENTALS OF MATHEMATICAL SCIENCE II (3-0). Linear differential equations, partial differential equations, orthogonal functions, elementary functional analysis, integral equations and integral transforms. Prerequisite: consent of Graduate Advisor.

5304. GENERAL TOPOLOGY (3-0). Introduction to fundamentals of general topology. Topics include product spaces, the Tychonoff theorem, Tietzes Extension theorem, and metrization theorems. Prerequisite: MATH 4304 or 4335.

5306. SET THEORY (3-0). Cardinal numbers, ordinal numbers, and equivalences of the Axiom of Choice. Prerequisite: MATH 4321 or 4331, and 4335.

5309. THEORY OF ITERATIVE PROCESSES (3-0). Design and characterization of general iterative processes which will afford approximate solutions to equations. Topics of special interest to the practicing numerical analyst. Prerequisite: MATH 3335.

5310. APPROXIMATION THEORY (3-0). Uniform approximations, best approximations, and least square approximations. Prerequisite: MATH 4335.

5311. PROBABILITY THEORY (3-0). Systematic development of the theory of random variables as well as discussion of the basic probability distributions. The basic limit theorems are developed. Applications of the theory are made to Markov chains, stochastic processes and renewal theory. Prerequisite: MATH 5302 or concurrent registration, MATH 3313 or equivalent.

5312. MATHEMATICAL STATISTICS I (3-0). Basic probability theory, random variables, probability distributions, a classical approach to point estimation theory, confidence intervals, and Bayesian inference. Prerequisite: MATH 5302 or concurrent registration.

5313. MATHEMATICAL STATISTICS II (3-0). Topics include hypothesis testing, an introduction to linear models, analysis of discrete data, nonparametric statistical methods, and decision theory. Prerequisite: MATH 5312.

5314. EXPERIMENTAL DESIGNS (3-0). Completely randomized and randomized complete block designs with fixed and random effects, Latin Squares, factorial experiments, and analysis of covariance. Emphasis placed on development of models from underlying experimental situations and use of the appropriate analysis of variance table. Prerequisite: MATH 4313 or 5312.

5315. GRAPH THEORY I (3-0). Introduction to the theory of simple graphs and directed graphs. Topics include operations on graphs, trees, blocks, partitions connectivity, traversability, and matrices associated with graphs. Applications of graph theory in various areas appropriately examined. Prerequisite: consent of the instructor.

5316. GRAPH THEORY II (3-0). Continuation of MATH 5315. Topics include colorability, planarity, and groups associated with graphs. Applications, current research results, and additional topics examined. Prerequisite: MATH 5315.

5317. REAL ANALYSIS FOR THE MATHEMATICAL SCIENCES (3-0). Integration with respect to a measure, classes of integrable functions, £p spaces, approximations of functions, Fourier series and generalizations, regularizing procedures, generalized solutions to partial differential equations. Prerequisite: MATH 5302.

5320. APPLIED DIFFERENTIAL EQUATIONS (3-0). Basic problems of the theory of ordinary differential equations: existence of solutions, uniqueness, dependence of solutions upon data; stability problems and applications; periodic and oscillatory solutions, with main emphasis on nonlinear oscillations. Prerequisite: MATH 3318 or 5303.

5321. APPLIED PARTIAL DIFFERENTIAL EQUATIONS (3-0). Analytic techniques for elliptic, parabolic, and hyperbolic equations; initial, boundary, mixed, and eigenvalue problems; applications to electrostatics, gravitation, heat transfer, wave propagation, fluid flow, and quantum mechanics. Prerequisite: MATH 3318 or 5303.

5322. COMPLEX VARIABLES I (3-0). Fundamental theory of analytic functions, residues, conformal mapping and applications. Prerequisite: MATH 4334 or 4335.

5323. COMPLEX VARIABLES II (3-0). Analytic continuation. Riemann surfaces, velocity and stream functions with applications, elliptic functions. Prerequisite: MATH 5322.

5324. APPLIED COMPLEX VARIABLES (3-0). Analytic functions of a complex variable; the line integral, residues, applications; conformal mappings; harmonic functions and applications to physical problems; elements of transform theory. Prerequisite: MATH 5302 or consent of the instructor.

5325. OPERATIONAL MATHEMATICS (3-0). Integral transformations such as the Laplace, Bilateral Laplace, and Hankel. Applications of these transforms to boundary value problems. Prerequisite: MATH 3335 or 4325.

5326. OPERATIONAL MATHEMATICS (3-0). Fourier Analysis: including Fourier Series, Fourier integrals, and special functions: including gamma functions, Bessel functions and other orthogonal functions. Prerequisite: MATH 3335 or 4325.

5327. APPLIED FUNCTIONAL ANALYSIS I (3-0). Hilbert space theory, orthogonal bases, linear functionals and their representation, linear operators and infinite matrices, compact operators and introduction to spectral theory, applications to integral equations and boundary value problems; Banach space theory and applications. Prerequisite: MATH 5303.

5328. APPLIED FUNCTIONAL ANALYSIS II (3-0). Nonlinear operators, the differential and its application to variational problems, examples from physical sciences, abstract Newton's method, fixed point theorems and applications to existence theory and behavior of solutions, Hammerstein equations in abstract spaces. Prerequisite: MATH 5327.

5329. ENGINEERING MATHEMATICS (3-0). Designed to acquaint the scientist and engineer with vector analysis, matrices, determinants, tensors, probability, statistics, and numerical methods. Prerequisite: MATH 3318.

5331. ABSTRACT ALGEBRA I (3-0). Groups, rings, fields and modules with emphasis on structure theorems. Prerequisite: consent of the instructor.

5332. ABSTRACT ALGEBRA II (3-0). Linear and multilinear algebra of modules with emphasis on structure theorems. Prerequisite: MATH 5331.

5333. LINEAR ALGEBRA AND MATRICES (3-0). Vector spaces, linear transformations, and matrices. Prerequisite: consent of the instructor.

5334. DIFFERENTIAL GEOMETRY (3-0). Introduction to the theory of curves and surfaces in three dimensional Euclidean space. Prerequisite: MATH 4334 or 4335.

5335. APPLIED VECTOR AND TENSOR ANALYSIS (3-0). Vector algebra, vector and tensor calculus; applications to differential geometry, engineering sciences, and dynamics including surface theory, geodiscs, minimal surfaces, elasticity, particle dynamics, special relativity, and general relativity. Prerequisite: MATH 5302.

5336. LOGIC (3-0). Concept of a normal system and propositional and functional calculi considered. Prerequisite: MATH 3335 or 3336.

5338. NUMERICAL ANALYSIS I (3-0). Solution of equations, interpolation and approximation, numerical differentiation and quadrature, and solution of ordinary differential equations. Prerequisite: MATH 3345.

5339. NUMERICAL ANALYSIS II (3-0). Rigorous treatment of numerical aspects of linear algebra and numerical solution of boundary value problems in ordinary differential equations: also, an introduction to numerical solution of partial differential equations. Prerequisite: MATH 3345.

5341. MATHEMATICS FOR TEACHERS—GEOMETRY (3-0). Selected materials from Euclidean geometry, non-euclidean geometry, and projective geometry.

5342. MATHEMATICS FOR TEACHERS—ALGEBRA (3-0). Selected materials from algebra, including some field theory and theory of equations.

5343. MATHEMATICS FOR TEACHERS—RESEARCH (3-0). Investigation of key research issues associated with mathematics, including the understanding, learning, and reasoning skills used in mathematics.

5344. MATHEMATICS FOR TEACHERS—COMPUTER (3-0). Selected materials from the literature on the usage of micro-computers in the classroom, including an introduction to the BASIC language.

5345. MATHEMATICS FOR TEACHERS—ANALYSIS (3-0). Selected materials from analysis, including investigations in function theory.

5346. MATHEMATICS FOR TEACHERS—PROBLEM SOLVING (3-0). Instruction in the application of various heuristics or general problem-solving strategies.

5350. NUMERICAL TECHNIQUES FOR THE ACTUARIAL SCIENCES (3-0). Topics in interpolation, finite differences, numerical methods of integration and differentiation, difference and differential equations, roots of functions, and system of linear equations. Prerequisite: MATH 3318.

5351. THEORY OF INTEREST (3-0). Topics in simple and compound interest, annuities, perpetuities, amortization schedules and sinking funds, bonds and other securities, yield rates, installment loans, depreciation, depletion, and capitalized cost. Prerequisite: MATH 3318.

5352. LIFE CONTINGENCIES I (3-0). Laws of mortality, mortality tables, net and gross premiums, reserve systems, annuity and insurance plans and population theory. Prerequisite: MATH 3313.

5353. LIFE CONTINGENCIES II (3-0). Continuation of MATH 5352 and considers multiple-life statuses, contingent actuarial functions, and multiple decrement tables and their application to pension, disability, and accidental death benefits. Prerequisite: MATH 5352.

5354. CONSTRUCTION AND GRADUATION OF MORTALITY AND OTHER TABLES (3-0). Techniques for measurement of mortality and various approximating methods for graduation of mortality tables and evaluation of results of graduation. Prerequisites: MATH 5350 and 5353.

5355. STATISTICAL THEORY FOR RESEARCH WORKERS (3-0). Designed for graduate students not majoring in mathematics. Topics include basic probability theory, distributions of random variables, point estimation, interval estimation, testing hypotheses, regression, and an introduction to analysis of variance. Graduate credit not given to math majors. Prerequisite: MATH 2325.

5360. SPECIAL FUNCTIONS (3-0). Orthogonal polynomials: basic properties, generating functions and applications; differential equations in complex domain; linear equations, singular points, hypergeometric functions, Legendre functions, and spherical harmonics; Bessel functions and their applications to mathematical physics. Prerequisite: MATH 5303 or consent of instructor.

5361. APPLIED CALCULUS OF VARIATIONS (3-0). Functionals, variation, extremization, Euler's equation, direct and indirect approximation methods; applications to particle dynamics, vibration theory, elasticity, electrostatics, quantum mechanics, and control theory. Prerequisite: MATH 5302.

5362. MATHEMATICS OF LINEAR PROGRAMMING (3-0). Basic theory and techniques related to linear programming, the simplex method, and duality; applications made to problems in transportation, assignment, games, network flow, economic theory, and various industrial optimization problems. Prerequisite: MATH 5333.

5363. TRANSFORM METHODS IN MATHEMATICAL SCIENCES (3-0). Fast Fourier transforms, Walsh-Hadamard transforms, and discrete orthogonal transforms; computationally efficient algorithms for these transforms; application to digital filtering, bandwidth and information compression, feedback controls, and pattern recognition. Prerequisite: MATH 5303.

5365. BIOMATHEMATICS (3-0). Mathematical techniques used in modeling such as perturbation theory, dimensional analysis, Fourier analysis, and differential equations. Applications to morphogenetics, population dynamics, compartmental systems, and chemical kinetics. Prerequisite: consent of instructor.

5371. NUMERICAL LINEAR ALGEBRA (3-0). Methods and theory related to the numerical solution of linear algebraic systems and eigenvalue-eigenvector problems. Both direct and iterative techniques are developed and discussed for full and sparse systems. Convergence, convergence rates, and error analysis. Prerequisite: MATH 5333 or consent of instructor.

5372. NUMERICAL FUNCTIONAL ANALYSIS (3-0). Numerical implementation of abstract operator methods, including Newton's method for linear and nonlinear algebraic, transcendental, differential, integral, and functional equations. Prerequisite: MATH 5327 or consent of instructor.

5373. NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS (3-0). Theoretical analysis of methods for approximating solutions of initial value problems, boundary value problems, and problems with periodic solutions; existence, uniqueness, convergence, stability, and error analysis are stressed for both single equations and for systems. Prerequisite: MATH 5338 or consent of instructor.

5374. NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS (3-0). Theoretical analysis for numerical methods for approximating solutions of elliptic, parabolic, hyperbolic, mixed, and systems of partial differential equations problems; existence, uniqueness, convergence, stability, and error analysis are stressed. Prerequisite: MATH 5339 or consent of instructor.

5391. SPECIAL TOPICS IN MATHEMATICS (3-0). Topics in mathematics assigned individual students or small groups. Faculty members closely supervise the students in their research and study. In areas where there are only three hours offered, the special topics may be used by students to continue their study in the same area. Prerequisite: permission of instructor.

5392/5492. SELECTED TOPICS IN MATHEMATICS (3-0)/(3-1). May vary from semester to semester depending upon need and interest of the students. May be repeated for credit. Prerequisite: permission of instructor.

5193-5693. MATHEMATICS CONFERENCE. May be repeated for credit. Prerequisite: permission of Graduate Advisor.

5395, 5695. SPECIAL PROJECT. Graded P/F. Prerequisite: permission of Graduate Advisor.

5398, 5698, 5998. THESIS. Prerequisite: permission of Graduate Advisor.

6301. TOPICS IN DIFFERENTIAL EQUATIONS (3-0). May be repeated for credit when the content changes.

6305. TOPICS IN NON-LINEAR ANALYSIS (3-0). May be repeated for credit when the content changes.

6307. TOPICS IN MATHEMATICAL CONTROL THEORY AND DIFFERENTIAL GAMES (3-0). May be repeated for credit when the content changes.

6313. TOPICS IN PROBABILITY AND STATISTICS (3-0). May be repeated for credit when the content changes.

6321. TOPICS IN APPLIED MATHEMATICS (3-0). May be repeated for credit when the content changes.

6325. TOPICS IN MATHEMATICAL ASPECTS OF COMPUTING (3-0). Mathematics with application in computing. Use of the computer to mathematics research considered. May be repeated for credit when the content changes.

6331. TOPICS IN ALGEBRA (3-0). May be repeated for credit when the content changes.

6335. TOPICS IN ANALYSIS AND APPLICATIONS (3-0). May be repeated for credit when the content changes.

6391. SPECIAL TOPICS IN MATHEMATICS (3-0). Faculty directed individual study and research. May be repeated for credit when the content changes.

DISSERTATION—See Mathematical Sciences.

A limited number of undergraduate mathematics courses may be applicable to a graduate program in mathematics if approved by the graduate advisor. These must be chosen from the following list and shall not exceed six hours total credit.

4303. INTRODUCTION TO TOPOLOGY
4311. MATHEMATICAL PROBABILITY
4313. APPLICATIONS OF MATHEMATICAL STATISTICS
4320. ADVANCED DIFFERENTIAL EQUATIONS
4321. INTRODUCTION TO ABSTRACT ALGEBRA II
4322. INTRODUCTION TO COMPLEX VARIABLES
4323. VECTOR ANALYSIS
4324. INTRODUCTION TO PARTIAL DIFFERENTIAL EQUATIONS
4325. OPERATIONAL MATHEMATICS
4331. INTRODUCTION TO LINEAR ALGEBRA
4334. ADVANCED MULTIVARIABLE CALCULUS
4335. ANALYSIS II
4345. NUMERICAL ANALYSIS AND COMPUTER APPLICATIONS II

Department of MECHANICAL ENGINEERING (ME)

Areas of Study — *Degrees*

Mechanical Engineering — M.S., M.ENGR., Ph.D.

Master's Degree Plans: Thesis (M.S.), Thesis Substitute (M.ENGR.), and Non-Thesis (M.ENGR.)

Chairman: D.Y.S. Lou — 335 Engineering — 273-2561

Graduate Advisor: Kent L. Lawrence — 335 Engineering — 273-2019

Graduate Faculty:

Professors Barker, Blackwell, Haji-Sheikh, Johnson, Lawrence, Lou, Wiseman, Woolf
Associate Professors Goolsby, Hullender, Lawley, Wang, Woods
Assistant Professors Nomura, Sadat, Tong

OBJECTIVE

The graduate program provides opportunities for professional development in such forms as: instructional courses to enhance technical competence in areas of mechanical engineering practice; training through a variety of experiences in design, development, research, experimentation, and/or analysis in joint efforts with faculty and peers; specialized courses of study required for entry into career fields allied to the mechanical engineering discipline; guided individual study under faculty supervision; and supportive course work for programs leading to careers that require interdisciplinary competence.

A student with aid from a faculty advisor plans a program which will be consistent with his technical interests and the available facilities and course offerings. Typically, programs are classified as:

1. Heat Transfer
2. Fluid Mechanics
3. Thermodynamics
4. Solid Mechanics and Dynamics
5. Automatic Control and Systems
6. Design
7. Manufacturing Processes

ADMISSION REQUIREMENTS

Applicants for the Master's degree who hold a baccalaureate degree in engineering must meet the general requirements of the Graduate School as stated in the section entitled "Admission Requirements and Procedures." Applicants not meeting all criteria will be admitted on provisional or probationary basis only under exceptional circumstances.

For applicants with no prior training in engineering, the same minimum criteria will apply and, in addition, their records will be reviewed in relation to the intended program of study. Probationary status with specific remedial work required may be a basis for acceptance of such applicants.

The acceptance of applicants who have already received a master's degree in engineering will be based on the above-mentioned minimum criteria and results of graduate work, including the master's thesis.

DEGREE REQUIREMENTS

The following coursework is required of all M.S. and M.Engr. candidates in Mechanical Engineering:

1. One course in each of the following areas (12 credit hours):
   Thermal Sciences: ME 5301 Transport Processes, or ME 5321 Advanced Classical Thermodynamics, or ME 5316 Thermal Conduction
   Fluid Science: ME 5313 Fluid Dynamics, or ME 5342 Advanced Gas Dynamics I, or ME 5344 Viscous Flows, or AE 5317 Viscous Flow Mechanics
   Design, Mechanics & Manufacturing: ME 5339 Structural Aspects of Design, or EM 5311 Elasticity, or ME 6314 Machine Dynamics, or ME 5336 Engineering Design, or ME 5329 Metal Forming
   Controls & Systems: ME 5303 Classical Methods of Control Systems Analysis and Synthesis, or ME 5305 Dynamic Systems Modeling, or ME 5307 Modern Methods of Control System Analysis and Synthesis
2. Two courses (six credit hours) in Engineering Analysis (ME 5331 and ME 5332 or approved mathematics courses).

Master of Science in Mechanical Engineering

The Master of Science Degree is a research oriented program in which completion of a thesis is mandatory; the program consists of a minimum of six credit hours of thesis and at least 24 credit hours of coursework distributed in four general areas. In addition to the general requirements listed above, M.S. candidates must take two elective courses (six credit hours), selected in concert with the faculty advisor, to serve as a degree of specialization in mechanical engineering.

Master of Engineering in Mechanical Engineering

The Master of Engineering Degree is an engineering practice oriented program. The degree is a 36-credit-hour program in which a maximum of six credit hours may be earned by an acceptable design project report, internship, or additional coursework. Students should be able to complete all degree requirements in one year including summer session of full-time study.

Normally the course distribution should include general course requirements as listed above, four elective courses in engineering, mathematics, and science, and six credit hours of design project report, internship, or additional coursework.

General degree requirements for the Master of Engineering are given on page 24.

Doctor of Philosophy

The Ph.D. degree should normally require four years of full-time study or less after completion of the B.S. degree. There is no foreign language requirement for the Ph.D. degree.

To meet the educational goal of a broad-based technical background in mechanical engineering, it is expected that each student will take sufficient coursework to obtain in-depth knowledge in at least two areas of mechanical engineering. Consequently, the Department expects all Ph.D. candidates to complete at least the following minimum requirements:

1. The first 12 credit hours listed above for the M.S. and M.Engr. degrees.
2. A second course (three credit hours) at the graduate level in one of the broad areas of mechanical engineering outside the student's major area of interest.
3. Three additional courses (nine credit hours) in the student's major area of interest in mechanical engineering.
4. Four graduate level courses (12 credit hours) in engineering analysis, mathematics, statistics, or computer science.
5. Six credit hours ENUD 6699 Dissertation, and three credit hours of ME 6397 Research.

Not more than 75% of the student's coursework will be mechanical engineering courses.

Students entering with a master's degree from another institution may, with the assistance of their faculty advisor, make appropriate deletions from items 1 and 4 for courses taken elsewhere.

5301. TRANSPORT PROCESSES (3-0). Theory and application of the transport processes, heat, mass, and momentum. May be repeated for credit as topics change. Prerequisite: ME 3302 and 3311.

5303. CLASSICAL METHODS OF CONTROL SYSTEMS ANALYSIS AND SYNTHESIS (3-0). Intended to equip the student with detailed familiarity with historically significant tools of the control engineer. Detailed discussion of block diagram algebra, signal flow algebra, the amplitude ratio-frequency and phase shift angle-frequency plots, the Bode diagram, the Nyquist diagram, the Nichols chart and the root locus presented.

5305. DYNAMIC SYSTEMS MODELING (3-0). To equip the student with the capability of determining the necessary equations to model a system of mixed physical types in an orderly, logical fashion. Framework of the linear graph used to pursue the modeling equations of mechanical, thermal, fluid, and electrical lumped parameter systems (some discussion of less frequently encountered systems is included).

5306. FLUID POWER CONTROL (3-0). Mathematical models for hydraulic and pneumatic control components and systems synthesized including hydraulic pumps, motors and spool valves. Application of electrohydraulic and hydromechanical servomechanisms for position and velocity control are treated. Theory supported by laboratory demonstrations and experiments. Prerequisite: ME 4310.

5307. MODERN METHODS OF CONTROL SYSTEM ANALYSIS AND SYNTHESIS (3-0). To equip the student with knowledge of systems applications of the state-space concept and real-time solution techniques. State-space formulations, reference trajectory, linearization, linear vector spaces, the state transition matrix and its properties; and controllability and observability concepts treated.

5309. INTRODUCTION TO SYSTEMS OPTIMIZATION (3-0). Fundamental theorems of the classical calculus of variations, and of the Maximum Principle of Pontryagin are essential content of course. Examples from area of mechanical engineering systems serve to demonstrate the applications.

5310. STRUCTURAL STATICS (3-0). Finite element method in the study of the static response of complex structures and of continuua; applications to field problems; analytical methods emphasized, and digital computer application undertaken. Also offered as EM 5317.

5311. STRUCTURAL DYNAMICS (3-0). Natural frequencies; forced and random response of complex structural systems studied through the use of the finite element method; computational aspects of these problems discussed, and digital computer applications undertaken. Also offered as EM 5318.

5312. CONTINUUM MECHANICS (3-0). Study of the underlying physical and mathematical principles relating to the behavior of continuous media; interrelationships between fluid and solid mechanics. Also offered as EM 5332.

5313. FLUID DYNAMICS (3-0). Advanced study of the kinematics and dynamics of fluid motion, stresses in fluids and surface flow.

5314. MHD POWER GENERATION (3-0). Development of MHD equations and Ohm's law for electrical conduction in ionized gases. Application to the design and performance analysis of MHD power generator channels. MHD cycle studies, integration with conventional fossil and nuclear power plants. Also offered as AE 5314. Credit may not be received for both courses.

5315. PLASMADYNAMICS (3-0). Review of electromagnetic field theory, development of equilibrium and non-equilibrium kinetic theory of an ionized gas, study of interactions between an ionized gas and electromagnetic field, application of plasmadynamics to MHD power generation, gasdynamic lasers, and controlled fusion. Previously listed as ME 5310. Offered also as AE 5315. Credit may be received for only one of AE 5315, ME 5310, or ME 5315.

5316. THERMAL CONDUCTION (3-0). Fundamental laws, initial and boundary conditions, basic equations for isotropic and anisotropic media, related physical problems and steady and transient temperature distributions in solid structures.

5317. CONVECTION HEAT TRANSFER (3-0). Equations of motion of viscous fluids are reviewed and the energy equations are introduced. Exact and approximate solutions are made for forced convective problems with non-isothermal and unsteady boundaries. Free convection and combined free- and forced-convection problems are solved.

5318. RADIATIVE TRANSFER (3-0). General equations of radiative transfer derived and solved for special problems, and the elements of atomic, molecular and continuum radiation are introduced.

5319. HEAT TRANSFER DESIGN (3-0). Application of fundamental principles toward the analysis and synthesis of complex thermal systems such as rocket nozzles, nuclear reactors and ablation heat shields.

5320. NUCLEAR REACTOR THEORY (3-0). Principles of nuclear reactions and radiations, diffusion and slowing down of neutrons, the steady state reactor, control of nuclear reactors, and radiation protection and reactor safeguards.

5321. ADVANCED CLASSICAL THERMODYNAMICS (3-0). Fundamentals of thermodynamics reviewed. Different treatments of principles studied, compared and formal relationships developed and applied to chemical, magnetic, electric and elastic systems.

5322. NUCLEAR POWER ENGINEERING (3-0). Continuation of ME 5320. Reactor energy removal, reactor structural materials and moderator materials, reactor fuels, reactor shielding, and reactor systems and power costs. Prerequisite: ME 5320.

5323. STATISTICAL THERMODYNAMICS (3-0). Statistical mechanics and kinetic theory related to thermodynamics and Maxwell-Boltzman, Bose-Einstein and Fermi-Dirac statistics introduced and applied.

5324. THE SCIENCE AND ECONOMICS OF ENERGY SYSTEMS (3-0). Thermodynamics of heat power and heat pump systems, sources of energy, economics of energy supply and distribution, nuclear power plants, direct conversion systems, and solar energy and future systems.

5325. COMBUSTION (3-0). Fundamental treatment of problems involving simultaneous occurrence of chemical reaction and transfer of heat, mass, and momentum. Also offered as AE 5325. Credit may not be received for both courses.

5326. ADVANCED PROPULSION (3-0). Development of the thrust and efficiency equations, thermodynamic cycle analysis, cycle design methods of aerospace propulsion systems, component performance analysis methods, component matching and dynamic interactions, and vehicle/propulsion-system interactions. Also offered as AE 5326. Credit may not be received for both courses.

5327. NUMERICAL CONTROL OF MACHINE TOOLS (3-0). Basic elements of numerical control of metal processing systems studied; programs for point to point and contouring machines developed; the interactions between geometry and machinability decisions determined.

5328. ADVANCED MANUFACTURING ANALYSIS I (3-0). Technical aspects of manufacturing, emphasizing process design and equipment. Prerequisite: ME 4307 or equivalent.

5329. FORMING OF METALS (3-0). Theoretical studies of various metal forming processes; elastic and plastic stress-strain relations developed; the effects of strain hardening considered. Offered also as EM 5313.

5330. MACHINING THEORY (3-0). Theory and application of metal machining; topics include mechanics of machining, temperature generated, tool life and tool wear, lubrication, grinding process, electrical machining process, surface integrity, economics, nomenclature of cutting tools.

5331. ANALYTIC METHODS IN ENGINEERING (3-0). Introduction to advanced analytic methods. Applied transform and matrix methods, and elements and engineering applications of complex variables. Prerequisite: undergraduate degree in engineering, physics, or mathematics.

5332. ENGINEERING ANALYSIS (3-0). Construction of mathematical models of physical situations of interest to the engineer and the subsequent reduction of the mathematical problem to a numerical solution.

5333. MECHANICAL ENGINEERING ANALYSIS TECHNIQUES (3-0). To add depth to the students' capability in the use of general transform techniques. Topics include the Fourier, Laplace, and Z transforms as well as the computer-oriented Fast Fourier transforms. Prerequisite: undergraduate degree in engineering, physics, or mathematics.

5334. APPLICATIONS OF THE THEORY OF STATISTICS AND PROBABILITY TO MECHANICAL ENGINEERING SYSTEMS (3-0). Fundamentals of probability theory and statistics as related to conventional mechanical engineering problems. These principles applied to problems in random vibrations and in the behavior of dynamic systems due to random disturbances and conditions.

5335. OPTIMAL LINEAR SYSTEMS (3-0). Detailed coverage of the work to date on that type of problem. Subjects are the Kalman Regulator and others in this class, optimal parameters, non-analytic criteria and gradient techniques. Prerequisite: ME 5309.

5336. ENGINEERING DESIGN (3-0). Introduction to the philosophy of comprehensive design. Creative process and factors that influence it emphasized with a discussion of the attitudes and viewpoints of the designer and an investigation of techniques of analysis, synthesis, and evaluation. Major vehicle is a group semester design project requiring a written proposal, an oral progress report, and final written and oral design reports.

5337. DESIGN ANALYSIS I (3-0). Analysis methods of current and future use to the mechanical designer introduced. Topics include applications of mechanical logic design (Boolean Algebra) and digital computer simulation for mechanical design.

5338. DESIGN ANALYSIS II (3-0). A companion to ME 5337. Topics include design applications of calculus of variations, and design optimization. Enrollment in ME 5338 is not dependent upon current or prior enrollment in ME 5337.

5339. STRUCTURAL ASPECTS OF DESIGN (3-0). Emphasis on analytical and experimental determination of stresses in machine and structural components. Survey of stress-strain-strength relations, pertinent material properties and such special topics as stress corrosion, fretting corrosion, creep, hydrogen embrittlement, brinelling, corrosion fatigue, heat treating,

stress relieving, inspection procedures, combined stresses, fatigue design, thermal stresses, dynamic loads.

5341. CONTROL SYSTEM COMPONENTS (3-0). The components and hardware used in electronic, hydraulic, and pneumatic control systems; techniques of amplification, computation, compensation, actuation, and sensing; modeling of multiport systems as well as servo systems analysis.

5342. ADVANCED GASDYNAMICS I (3-0). Review of fundamental compressible flow theory. Introduction to compressible flow with friction and heat transfer, linearized two-and three-dimensional flow theory, and method of characteristics for perfect gases. Previously listed as ME 5311. Also offered as AE 5342. Credit may be received for only one of AE 5309, AE 5342, ME 5311 or ME 5342.

5343. ADVANCED GASDYNAMICS II (3-0). Survey of kinetic theory, statistical mechanics, and chemical reaction rate theory. Application to the prediction of thermo-dynamic properties of gases and the analysis of problems in high-temperature gas-dynamics. Previously listed as ME 5312. Also offered as AE 5343. Credit may be received for only one of AE 5343, ME 5312, or ME 5343.

5344. VISCOUS FLOWS (3-0). Navier-Stokes equations and Prandtl's boundary layer approximations; laminar and turbulent boundary layers including internal and external flows.

5345. DESIGN PROJECT I (2-3). Student uses rational and intuitive problem-finding procedures to identify a design project, presents a project proposal, performs research, and prepares a design program. The creative aspects of design emphasized.

5346. DESIGN PROJECT II (2-3). Continuation of ME 5345 in which a project is carried to the working prototype. Cost and production considered.

5348. FUNDAMENTALS OF COMPOSITES (3-0). Fundamental relationships between the mechanical behavior and the composition of multiphase media; failure criteria discussed. Also offered as EM 5333.

5349. APPLIED COMPOSITES (3-0). Practical use of composite materials in the design of load carrying parts and structures.

5390. SPECIAL TOPICS IN MECHANICAL ENGINEERING (3-0). Seminar to provide formal instruction in special topics pertinent from semester to semester depending on the availability of faculty. May be repeated provided topics differ.

5191, 5291, 5391. ADVANCED STUDIES IN MECHANICAL ENGINEERING. May be repeated for credit as topics change. Work performed as a thesis substitute will normally be accomplished under this course number, with prior approval of the Committee on Graduate Studies. May be graded P/F.

5192, 5292, 5392. ADVANCED TOPICS IN HEAT TRANSFER. May be repeated for credit as topics change. Graded P/F.

5195, 5295, 5395. ASSIGNED TOPICS IN MECHANICAL ENGINEERING. Students entering the mechanical engineering graduate program may be required to take this course in order to satisfy background requirements normally satisfied by mechanical engineering graduates of this institution. Participation in a specified organized course may be required. May not be used for graduate degree credit but may be repeated for credit.

5398, 5698, 5998. THESIS. Prerequisite: graduate standing in mechanical engineering.

6301. NONLINEAR PROBLEMS IN ENGINEERING (3-0). Survey of nonlinear problems arising in mechanical engineering systems, and the methods of characterizing such typical nonlinearities as friction, backlash, and dead zone.

6302. FLUID LOGIC (3-0). Theory for synthesis and design of digital control systems with emphasis on fluid controlled switching circuits. Topics include sequential machine control, synthesis of asynchronous sequential circuits, hydraulic logic components, fluidics, and timing considerations in circuit design.

6303. INDUSTRIAL APPLICATIONS OF SYSTEMS THEORY IN ANALYSIS AND CONTROL (1-6). Advanced concepts pertaining to the modeling, analysis, and design of dynamic systems is covered in one hour of lecture per week. Throughout the semester, the students are involved in the solution of advanced design and control problems supplied by industry.

6314. MECHANISMS (3-0). Rational design of linkages to satisfy various design requirements is studied. Two- and three-dimensional motions considered. Computer-aided mechanism design used as a tool.

6315. MACHINE DYNAMICS (3-0). Design problems as influenced by the response of machine systems and their components. Topics include reciprocating and rotating machinery, flexible mechanisms, mechanical impedance methods, and machine signature analysis.

6317. ADVANCED TOPICS IN HEAT TRANSFER (3-0). Includes analytical treatment of ad-

vanced radiation and convection problems using exact and approximate mathematical techniques. Prerequisites: ME 5317 and 5318.

6319. SOLAR AND DIRECT ENERGY CONVERSION (3-0). Energy alternatives with emphasis on solar energy. Solar radiation, energy storage, load requirements, and system design discussed in detail. Also includes economic evaluation of such systems. Prerequisite: graduate standing or instructor's permission.

6327. JOINING MATERIALS OF MANUFACTURE (3-0). Studies of surface bonding, welding metallurgy, effect of rate of energy input on properties, residual stress and distortion, economics and process capabilities.

6331. COMPUTER METHODS IN SYSTEMS ANALYSIS (3-0). Background and experience in the use and development of Fortran-coded digital computer programs for large-scale systems analysis and synthesis. Prerequisite: ME 5307, 5303.

6332. ESTIMATION THEORY (3-0). Means of treating measurements to obtain a best estimate of the quantities measured. Emphasis on application to dynamic systems. Prerequisite: ME 5303, 5307, 5334.

6335. FLUIDICS (3-0). Foundations and concepts of fluidics are presented for both proportional and binary devices. A systems theory approach utilized to discuss amplifier transfer and impedance characteristics. Methods of Fluidic sensing, computation, and actuation discussed. Fluid mechanics and fluid circuit theory utilized for a broader understanding of systems. Amplifier characteristics and staging emphasized.

6336. FRICTION AND WEAR (3-0). Wear and other types of surface attrition considered in this course with reference to surface nature and combinations, friction, absorbed gases, contaminants and surface heating.

6337. COMPUTER AIDED DESIGN (3-0). Role of graphics; image representation, batch and interactive computing, methods of automated mathematical model generation, mainframe and microcomputing in engineering design. Application in mechanical, structural, thermal, controls areas of mechanical engineering are considered.

6339. OPTIMIZATION FOR DESIGN (3-0). Optimization methods in computer aided design. Mathematical programming methods applied to design optimization in mechanical, structural, thermal, etc. systems.

6390. SUPERVISED TEACHING IN MECHANICAL ENGINEERING (3-0). Involves teaching under close supervision, attending group meetings, and individual conferences, and submitting reports as required. May be repeated for credit. Required for all teaching assistants and associates in mechanical engineering; however, it may not be used for degree credit. Graded P/F.

6197-6997. RESEARCH IN MECHANICAL ENGINEERING. May be repeated for credit.

6399, 6699, 6999. DISSERTATION.

Department of MUSIC (MUSI)

Area of Study		*Degrees*
Humanities (See Interdepartmental and Intercampus Programs.)		M.A., Ph.D.
Chairman: Linton Powell	101 Fine Arts	273-3471

Graduate Faculty:

Professors Richards, Taliaferro
Associate Professors Ebensberger, Powell, Lee

OBJECTIVE

The graduate course offerings in music are provided to support other graduate degree programs and to meet the express needs of students. No program leading to a graduate degree in music exists at this time.

5303. HISTORICAL AND ACOUSTICAL ASPECTS OF MUSIC THEORY (3-0). Studies in historical and acoustical aspects of music theory. May be repeated for credit when the content changes.

5394. HISTORY OF MUSIC INTERPRETATION AND STYLE (3-0). Study of the various aspects of style and interpretation as related to music performance with emphasis upon the historical and sociological phenomena from which music evolved. May be repeated for credit as the topic changes.

School of NURSING (NURS)

Area of Study		*Degree*
Nursing		M.S.N.
Master's Degree Plans: Thesis and Non-Thesis		
Dean: Myrna R. Pickard	669 Nursing	273-2776
Assistant Dean/Graduate Advisor: Samuel T. Hughes, Jr.	659 Nursing	273-2776

Graduate Faculty:

Professors Field, Pickard
Associate Professors Burns, Hughes, Lane, Reed, Thompson, Wyers
Assistant Professors Courtney, Grove, Hawley, Hegstad, Okimi Tolbert, Wright
Specialist Barnes

NURSING

OBJECTIVE

The objective of the Graduate Program in Nursing is to provide instruction and facilities for nurses to do advanced study in a clinical specialty. The intent is to develop competent practitioners in nursing who are capable of providing health care, teaching and directing others, and developing skills in the areas of adult nursing, psychosocial nursing, family nursing, nursing administration, or gerontological nursing.

ACCREDITATION

The Master of Science in Nursing degree program is accredited by the National League for Nursing.

DEGREE REQUIREMENTS

The applicant for the Master's degree in Nursing must meet the general requirements of the Graduate School and have the Bachelor of Science in Nursing degree from a program accredited by the National League for Nursing or proof of equivalent education at a foreign institution. Individual consideration may be given to applicants who hold a BSN degree from non-NLN accredited programs.

In addition to the general admission requirements of the Graduate School, applicants must have completed a basic statistics course with a satisfactory grade prior to enrolling or during the first semester of graduate study, and present evidence of inclusion of basic physical assessment content in the undergraduate program or completion of a course in physical assessment. A copy of current Texas RN license and professional liability insurance coverage must be on file. Foreign students, whose native language is not English, must take, in addition to the Test of English as a Foreign Language (minimum score of 550), the Test of Spoken English. The foreign student must possess a current Texas RN license and have professional liability insurance coverage before registering for the selected clinical nursing area courses. Students are required to have each semester's planned program approved by the Graduate Advisor prior to registration. A minimum of 43 semester hours, thesis or non-thesis, is required for the degree. Six semester hours of course work must be taken outside the School of Nursing and approved by the Graduate Advisor. Family Nursing and Gerontological Nursing majors who elect thesis are required to complete 49 semester hours for the degree. Family Nursing and Gerontological Nursing majors must select Primary Nursing as their functional area.

All non-thesis candidates for the degree of Master of Science in Nursing shall pass a written examination over the candidate's graduate course work as determined by the School of Nursing. All thesis candidates for the degree of Master of Science in Nursing shall present the completed thesis in a final oral examination.

Required Courses

		Credit Hours
NURS 5301.	Fundamentals of Research	3
NURS 5205.	Professional Nursing-Issues and Influences	2
NURS 5207.	Family Foundations	2
NURS 5327.	Theoretical Foundations of the Nursing Process I	3
NURS 5328.	Theoretical Foundations of the Nursing Process II	3

Nursing Areas

Each student must complete the required courses in at least one nursing area.

Adult Nursing: NURS 5419, 5420, 5421

Family Nursing: NURS 5531, 5532, 5833

Gerontological Nursing: NURS 5545, 5546, 5847

Nursing Administration: NURS 5311, 5439, 5240, 5341

Psychosocial Nursing: NURS 5206, 5424, 5425, 5226

Functional Areas

Each student must complete the required courses in at least one functional area:

Administration: NURS 5303, 5330

Clinical Specialization: NURS 5336, 5337

Primary Nursing: NURS 5323, 5335

Teaching: NURS 5302, 5329

Electives/Independent Study

Elective courses may be taken in an area of concentration in other departments of the University. Independent study offers the student the opportunity to explore topics of special interest.

5205. PROFESSIONAL NURSING-ISSUES AND INFLUENCES (2-0). Exploration and evaluation of contemporary issues and trends relevant to nursing. Prerequisite: Senior or graduate standing.

5206. PSYCHOSOCIAL NURSING: THEORIES OF HUMAN BEHAVIOR (2-0). Theoretical foundations for understanding the psychodynamics of human behavior. Prerequisite: NURS 5425.

5207. FAMILY FOUNDATIONS (2-0). Focus on family system theory for the study of behavioral responses to health, illness, and crisis. Prerequisite: Graduate standing.

5226. PSYCHOSOCIAL NURSING: FOCAL SITUATIONS (1-3). Advanced skills in psychotherapeutic intervention with individuals, families, and/or groups. Prerequisites: NURS 5425 and 5206 or may be taken concurrently.

5240. NURSING ADMINISTRATION III: LEADERSHIP AND ORGANIZATIONAL BEHAVIOR (1-3). Examination of leadership theories and practices and organizational behavior in nursing. Prerequisites: NURS 5301 and NURS 5439.

5301. FUNDAMENTALS OF RESEARCH (3-0). An overview of logic, methods, and techniques of research with the development of a research proposal. Prerequisite: Graduate standing and Elementary Statistics.

5302. CURRICULUM DEVELOPMENT IN NURSING (3-0). Explores the nature of nursing education; curriculum process and its application to a variety of nursing education programs. Prerequisite: NURS 5301 or permission of instructor.

5303. ROLES AND FUNCTIONS OF THE ADMINISTRATOR IN NURSING (3-0). Investigation of the roles and functions of the nurse administrator. Prerequisites: NURS 5211 or MANA 5311 or MANA 5312.

5311. NURSING ADMINISTRATION I: FOUNDATIONS IN ORGANIZATION AND ADMINISTRATION (3-0). Considers development of management thought and organizational theories as applied to health care organizations. Prerequisite: NURS 5327 or may be taken concurrently.

5323. PRIMARY NURSING I (2-3). Field work and study of primary health care systems focusing on family nursing roles. Prerequisites: NURS 5301 or 5327 or may be taken concurrently.

5327. THEORETICAL FOUNDATIONS OF THE NURSING PROCESS I (2-3). Relationship of philosophical and theoretical foundations from nursing behavioral, natural, and applied sciences to concepts and operations in the nursing process. Prerequisite: Graduate standing.

5328. THEORETICAL FOUNDATIONS OF THE NURSING PROCESS II (3-0). Clarifies ways in which theory confronts and establishes the empirical world of nursing in research and practice; theory components and their interrelationships are emphasized.

5329. ROLES AND FUNCTIONS OF THE TEACHER IN NURSING (1-6). Roles and functions of the teacher in contemporary nursing; directed teaching experiences provided. Prerequisite: NURS 5302.

5330. PROBLEMS AND FIELD STUDY IN NURSING ADMINISTRATION (1-6). In-depth study of a selected aspect of nursing administration in a health care setting. Prerequisite: NURS 5303.

5335. PRIMARY NURSING II (1-6). Field work and study of community health system focusing on family nursing roles. Prerequisites: NURS 5323 and 5328 or may be taken concurrently.

5336. CLINICAL NURSE SPECIALIZATION I (2-3). Examination of the standards of practice, legal aspects, and health care delivery systems as they relate to the development of the role of the clinical nurse specialist. Prerequisites: NURS 5327 or may be taken concurrently and enrolled in clinical major.

5337. CLINICAL NURSE SPECIALIZATION II (1-6). Development of the practice parame-

ters of the clinical nurse specialist through research, teaching, and consultation. Prerequisite: NURS 5336.

5341. NURSING ADMINISTRATION IV: SEMINAR AND PRACTICE (1-6). Practicum experience with a preceptor in administration; seminars provide opportunities for situational analyses and problem solving. Prerequisite: NURS 5340.

5371. NURSING ADMINISTRATION IN HEALTH CARE ORGANIZATIONS (3-0). Analysis of the planning and organizational processes in health care administration. Prerequisites: NURS 5211, 5439, 5340, or equivalent.

5380. NURSING ADMINISTRATION IN HIGHER EDUCATION (3-0). Examination of contemporary issues and trends affecting the planning and organizational processes in educational administration. Prerequisite: graduate standing.

5381. PROGRAM EVALUATION IN NURSING (3-0). Examination of program evaluation in academic and staff development program. Prerequisite: NURS 5302 or permission of Graduate Advisor.

5391. THEORY DEVELOPMENT IN NURSING (3-0). Examination of the role of theory in nursing as a practice discipline and strategies for theory development. Prerequisites: NURS 5327 and NURS 5328.

5392. NURSING EDUCATION AND NURSING SERVICE: ISSUES AND ANALYSIS (3-0). Issues and contemporary trends affecting the relationship between nursing education and nursing service. Prerequisite: Graduate standing.

5419. ADULT NURSING I (3-3). Analysis of concepts relevant to the nursing care of the adult; clinical application of pathophysiologic concepts in providing holistic nursing care to the adult. Prerequisite: NURS 5327.

5420. ADULT NURSING II (1-9). Analysis of emergency and acute conditions and their effects on the individual, family, and community; implementation of the nursing process in clinical settings to assist client/patient and family to make effective health choices. Prerequisites: NURS 5419 and NURS 5207 or may be taken concurrently.

5421. ADULT NURSING III (1-9). Analysis of chronic illness in adults and its effect on the individuals, families and community; implementation of the nursing process in clinical settings to assist clients and families to make effective health choices. Prerequisite: NURS 5420.

5424. PSYCHOSOCIAL NURSING WITH INDIVIDUAL CLIENTS (2-6). Application of theories of human behavior in therapeutic interaction with individual clients. Prerequisite: NURS 5327 or may be taken concurrently.

5425. PSYCHOSOCIAL NURSING WITH GROUPS AND FAMILIES (2-6). Knowledge and skill necessary for therapeutic intervention with groups and families. Prerequisites: NURS 5424 and NURS 5328 or may be taken concurrently.

5439. NURSING ADMINISTRATION II: MANAGEMENT FUNCTIONS AND PROCESSES (2-6). Examination of management functions and processes from a nursing perspective. Prerequisites: NURS 5211 and NURS 5328 or may be taken concurrently.

5531. FAMILY NURSING I (4-3). Refinement of clinical nursing judgment and management of acute illness, chronic health, and restorative/rehabilitative problems of the family embracing selected theories. Prerequisites: NURS 5323 and 5207 or may be taken concurrently.

5532. FAMILY NURSING II (4-3). Current concepts associated with the clinical judgment in the nursing management of childrearing, mid-life, and older families. Prerequisite: NURS 5531.

5545. GERONTOLOGICAL NURSING I (4-3). Explores theories of aging in clinical nursing practice, encompassing management of bio-psychosocio cultural economical aspects of the health needs and common problems.

5546. GERONTOLOGICAL NURSING II (4-3). Advanced study and clinical nursing management of long term health and environmental problems of elderly individuals and groups within the community; collaboration with community agencies and groups in the delivery of health care to the elderly.

5833. FAMILY NURSING III (0-24). Educational experience in family nursing practice with instruction offered by preceptor or campus-based faculty members. Offered subsequent to classroom instruction, the practicum offers an opportunity for a student to integrate and utilize classroom content in the context of primary family nursing practice. Prerequisite: NURS 5532.

5847. GERONTOLOGICAL NURSING III (0-24). Clinical preceptorship experience in selected primary health gerontological practice sites offering opportunities to apply knowledge and concepts in a guided, progressive context of nursing practice.

5170, 5270, 5370, 5470. INDEPENDENT STUDY IN NURSING. Detailed in-depth study in a specific topic area. Topic and mode of study are agreed upon by student(s) and instructor prior to registration. May be repeated for credit when topics vary.

5190, 5290, 5390, 5490. TOPICS IN NURSING. Selected topics in advanced nursing. May be repeated for credit as topics change.

5398, 5698, 5998. THESIS.

5696, 5996. INTERNSHIP IN NURSING ADMINISTRATION. Exploration and participation in the role of a nurse administrator in planning, organizing, and analyzing nursing education or nursing service. Prerequisite: approval of the Graduate Advisor.

Department of PHILOSOPHY (PHIL)

Area of Study	*Degrees*
Humanities (See Interdepartmental and Intercampus Programs.)	M.A., Ph.D.

Chairman: Thomas W. King — 209 University Hall — 273-2774

Graduate Faculty:

Associate Professor Langsdorf
Assistant Professors Lee, Reeder

OBJECTIVE

The graduate course offerings in philosophy are provided to support other graduate programs, particularly those in Humanities and in the Social Sciences, and to meet the expressed needs of students. The courses are designed to provide the theoretical background necessary to the complete understanding and use of professional skills in these areas. No program leading to a graduate degree in philosophy exists at this time.

5301. PHILOSOPHY OF THE SOCIAL SCIENCES (3-0). What is a scientific account of society? What is its object? Are the social sciences ideological distortions or a body of knowledge? Such questions examined by reading both the defenders and the critics of the social sciences and their dominant methodologies.

5302. PHILOSOPHICAL BASIS OF THE HUMANITIES (3-0). Fundamental methodological problems which arise in inter-disciplinary studies. Particular attention will be given to alternate hermeneutical approaches (theories of interpretation), to techniques of logical and conceptual analysis, and to differing epistemological questions and demands which arise in the humanistic sciences.

5303. PROBLEMS IN THE PHILOSOPHY OF THE LITERARY ARTS (3-0). A specific problem or related group of problems in aesthetics and the philosophy of art considered. Problems may be defined in terms of a genre—e.g. philosophy of literature—or in terms of an aesthetic problem which cuts across generic distinctions—e.g., the definition of art.

5388. CRITICAL THINKING: THEORY AND PRACTICE (3-0). Approaches to and methods for applying critical thinking in particular subject areas of student interest and at various educational levels. Concurrent participation in undergraduate classes.

5389. ISSUES IN TEACHING CRITICAL THINKING (3-0). Developing techniques for teaching critical thinking. Focus on practical problems of teaching reasoning skills. Registration limited to Teaching Assistants. Prerequisite: PHIL 5388.

5391. CONFERENCE COURSE IN PHILOSOPHY. May be taken only with the permission of the instructor and the Graduate Advisor.

5392. TOPICS IN THE HISTORY OF PHILOSOPHY (3-0). Consideration in depth of the work of a single philosopher or a related philosophical school against the background of the development of philosophy. May be repeated for credit as the topic changes.

Department of PHYSICS (PHYS)

Areas of Study	*Degrees*
Physics	M.S.
Radiological Physics (See Interdepartmental and Intercampus Programs.)	M.S.
Mathematical Sciences (See Interdepartmental and Intercampus Programs.)	Ph.D.

Master's Degree Plans: Thesis and Non-Thesis

Acting Chairman: J. L. Fry — 108 Science Hall — 273-2972

Graduate Advisor: B. C. Thompson — 108 Science Hall — 273-2469

Graduate Faculty:

Professors Black, Diana, Fry, Rayburn, Rubins
Associate Professors Thompson
Assistant Professors Brener, Fletcher, Sharma
Adjunct Professor Chuang
Adjunct Associate Professors Dowdey, Schachar

OBJECTIVE

The objective of graduate work in physics is to prepare the student for continued professional and scholarly development as a physicist. The Physics MS Degree Program is designed to give the student a foundation in all fundamental areas of physics through formal courses and to give the student the experience of participating in original research in one of a variety of projects directed by the faculty.

DEGREE REQUIREMENTS

For admission to the Master of Science program in physics, the candidate must satisfy the general admission requirements of the Graduate School. In addition, the candidate must have satisfactorily completed at least 24 hours of advanced physics and supporting courses. Deficiencies must be removed.

A minimum of 30 hours is required for the Master of Science degree, of which 18 hours, including a six hour thesis (minimum registration), will be in physics, and 12 hours may be selected from physics, mathematics, chemistry, geology, biology or engineering as approved by the Graduate Advisor.

5190. PHYSICS COLLOQUIUM (1-0). Lectures by students, faculty and invited speakers on current topics in physics. May be repeated for credit. Graded P/F only.

5200. SEMINAR ON SCIENCE AS A PROFESSION (2-0). Use of scientific literature including computer data bases, fundamentals of technical writing including grants and proposals, investigation of scientific societies, exploration of career opportunities in specific disciplines. Graded P/F only. Prerequisite: consent of Graduate Advisor.

5306. CLASSICAL MECHANICS (3-0). General principles of analytical mechanics, the kinematics of rigid bodies, canonical transformations, Hamilton-Jacobi theory. Prerequisite: PHYS 4319 or permission of Graduate Advisor.

5307. QUANTUM MECHANICS I (3-0). Matrix formulation, theory of radiation, angular momentum, perturbation methods. Prerequisite: permission of Graduate Advisor.

5308. QUANTUM MECHANICS II (3-0). Approximate methods, symmetry and unitary groups, scattering theory. Prerequisite: PHYS 5307 or permission of Graduate Advisor.

5309. ELECTROMAGNETIC THEORY I (3-0). Boundary value problems in electrostatics and magnetostatics, Maxwell's equations. Prerequisite: permission of Graduate Advisor.

5310. STATISTICAL MECHANICS (3-0). Fundamental principles of statistical mechanics, Liouville theorem, entropy, Fermi-Dirac distribution, Bose-Einstein distribution, Einstein condensation, density matrix, quantum statistical mechanics, kinetic methods, and transport theory. Prerequisite: PHYS 4315 or permission of Graduate Advisor.

5311. MATHEMATICAL METHODS IN PHYSICS I (3-0). Algebraic and analytical methods used in modern physics. Algebra: matrices, groups, and tensors, with application to quantum mechanics, the solid state, and special relativity. Analysis: vector calculus, ordinary and partial differential equations, with applications to electromagnetic and seismic wave propagation. Prerequisite: permission of Graduate Advisor.

5312. MATHEMATICAL METHODS IN PHYSICS II (3-0). Continuation of PHYS 5311 with a selection from the following topics. Algebra: matrix representations of the symmetric and point groups of solid state physics, matrix representations of the continuous groups O(3), SU(2), SU(3), SL(2,C), general covariance. Analysis: further study of analytic functions, Cauchy's theorem, Green's function techniques, orthogonal functions, integral equations. Prerequisite: PHYS 5311 or permission of Graduate Advisor.

5313. ELECTROMAGNETIC THEORY II (3-0). Modern tensorial treatment of classical electrodynamics, force on and field of a moving charge, derivation and application of 4-vector potential, Maxwell's equations in tensor form, field momentum and radiation. Prerequisite: PHYS 5309 or PHYS 5311 or permission of Graduate Advisor.

5314. ADVANCED OPTICS (3-0). Electromagnetic wave equations, theory of diffraction, radiation scattering and dispersion, coherence and laser optics. Additional advanced topics of current interest. Prerequisite: permission of Graduate Advisor.

5315. SOLID STATE I (3-0). Crystal structure, lattice vibration, thermal properties, and band theory of solids. Prerequisite: permission of Graduate Advisor.

5316. SOLID STATE II (3-0). Electrical and magnetic properties of crystalline solids, magnetic resonance, and optical phenomena. Prerequisite: permission of Graduate Advisor.

5317. RELATIVITY (3-0). Geometry of special relativity; particles in fields; collisions of particles; experiments and applications of relativity in optics, electrical engineering, atomic and nuclear physics, and space physics; fluids; fields; introduction to general relativity and the needed differential geometry. Prerequisite: permission of Graduate Advisor.

5318. ADVANCED NUCLEAR PHYSICS (3-0). Properties of nuclei, nuclear two-body problems, meson theory of nuclear forces, nuclear models, nuclear structure, and nuclear transitions. Prerequisite: PHYS 3446, PHYS 4326, or permission of Graduate Advisor.

5320. THEORETICAL PHYSICS (3-0). Meaning of physical theory, space and time in physics, the foundations of mechanics, probability and statistics, and continua. Prerequisite: PHYS 5306 or permission of Graduate Advisor.

5321. MODERN PHYSICS (3-0). Unified approach to the principal fields of modern physics, relativity, quantum mechanics, atomic spectroscopy, quantum statistics, solid state physics, particle physics, and nuclear physics. Prerequisite: permission of Graduate Advisor.

5323. ELEMENTARY PARTICLES (3-0). Production, detection, and classification of elementary particles. Qualitative study of strong, electromagnetic, and weak interactions, and their respective conservation laws. Semi-quantitative treatment of the SU(3) symmetry. Prerequisite: PHYS 5307 or permission of Graduate Advisor.

5325. QUANTUM FIELD THEORY (3-0). Quantized field description of elementary particles and their interactions, developed from the principles of quantum mechanics and Lorentz invariance. Quantitative applications to electromagnetic and weak interactions. Prerequisite: PHYS 5308 or permission of Graduate Advisor.

5349. METHODS OF EXPERIMENTAL PHYSICS (3-0). Selected experimental methods used in modern research in cryogenics, lasers, nuclear instrumentation, magnetic resonance, particle accelerators, positron physics, surface physics, x-rays, and statistical analysis of data. May be repeated for credit. Prerequisite: permission of Graduate Advisor.

5350. SPECIAL TOPICS IN PRECOLLEGE PHYSICAL SCIENCE INSTRUCTION (1-6). For experienced teachers of precollege physical science and/or physics. Considers special problems in precollege physical science instruction and exposes teachers to new laboratory-oriented precollege curricula. May be repeated for credit as the subject matter changes. May not be used to satisfy any of the requirements for the Master of Science degree in physics. Prerequisite: a bachelor's degree, teaching experience or an intent to teach, and permission of Graduate Advisor.

5390. SURVEY OF INTRODUCTORY CLASSICAL AND MODERN PHYSICS (3-0). Selected areas from mechanics, heat, sound, electricity, magnetism, light, special relativity and atom-

ic physics will be covered. May not be used to satisfy any of the requirements for the Master of Science degree in physics. Prerequisite: permission of instructor.

5391. SPECIAL TOPICS IN PHYSICS (3-0). Topics in physics, particularly from areas in which active research is being conducted, are assigned to individuals or small groups for intensive investigations. May be repeated for credit. Prerequisite: permission of Graduate Advisor.

5392. SELECTED TOPICS IN PHYSICS (3-0). Topics may vary depending on the needs and interest of the students. May be repeated for credit. Prerequisite: permission of Graduate Advisor.

5193-5693. READINGS IN PHYSICS. Conference course. May be repeated for credit. Prerequisite: permission of instructor.

5194-5694. RESEARCH IN PHYSICS. Conference course with laboratory. May be repeated for credit. Prerequisite: permission of instructor.

5398, 5698, 5998. THESIS. Prerequisite: permission of Graduate Advisor.

The following courses may be applicable toward the graduate program if approved in advance by the Graduate Advisor.

4325. SOLID STATE PHYSICS

4326. INTRODUCTION TO QUANTUM MECHANICS

DISSERTATION—See Mathematical Sciences.

Department of POLITICAL SCIENCE (POLS)

Areas of Study	*Degree*
Political Science	M.A.
Humanities (See Interdepartmental and Intercampus Programs.)	M.A., Ph.D.

Master's Degree Plan: Thesis and Non-Thesis

Chairman: Irving O. Dawson — 206 University Hall — 273-2991

Graduate Advisor: John J. S. Moon — 401 University Hall — 273-2991

Graduate Faculty:

Professors Cole, Dawson, Hagard, Hamlett
Associate Professors Knerr, Marshall, Moon, Odom, Van Cleve
Assistant Professors Clark, Hekman, Katsikas, Story

OBJECTIVE

The program leading to a Master of Arts degree in Political Science emphasizes preparation for service in many areas of our national life, both public and private. Students interested in careers in teaching and research or in leadership roles in the public or private sectors may pursue programs adapted to their individual objectives. The Department of Political Science endeavors to equip students with the research techniques and subject pursuits undertaken beyond the master's level. Particular attention is given newer methodologies and approaches employed by scholars in the field.

DEGREE REQUIREMENTS

Twenty-four hours of course work must include three hours of the conference course in Scope and Methods in Political Science for those who have not had POLS 4329 or its equivalent (POLS 3310 does not satisfy this requirement). Of the remaining 21 hours, at least three hours must be taken from each of four of the following six areas:

Political Behavior and Processes—5305, 5310, 5315, 5316, 5350, 5391.
Comparative Politics—5336, 5337, 5353, 5391.
International Politics and Organization—5327, 5354, 5391.
Public Law and Jurisprudence—5320, 5355, 5391.
Public Administration and Policy Studies—5303, 5322, 5332, 5330, 5331, 5335, 5356, 5391.
Political Theory (Thoughts and Methodology)—5338, 5339, 5357, 5391.

Six hours of supporting work from upper-division undergraduate courses or graduate courses in other disciplines may be substituted for course work in Political Science on the advice of the departmental graduate advisor. No more than three semester hours of advanced undergraduate work shall be taken in the area of supporting work.

A maximum of nine semester hours of advanced undergraduate work in Political Science and supporting areas may be included.

The non-thesis degree plan requires a minimum of 36 hours in Political Science and related disciplines approved by the Graduate Advisor. Non-thesis students may elect, with the Graduate Advisor's approval, a maximum of six hours in internship.

All candidates for the Degree of Master of Arts with a major in Political Science must pass a final comprehensive examination, written, oral, or both written and oral. The scope, content, and form of the examination will be determined by the student's supervising committee. In the event of failure of the final comprehensive examination, the student may petition the Committee on Graduate Studies to retake the examination on a date no sooner than 60 days after the first examination. Effective September, 1979, students will not be permitted more than one re-examination after failure of the initial examination.

Public Policy and Administration Option

The Public Policy and Administration option of the Master of Arts program in Political Science emphasizes public administration and public policy within the framework of Political Science. The option requires courses from three of the six areas of Political Science and 12 hours in public administration and policy studies.

5197. MASTER'S COMPREHENSIVE EXAMINATION. Required of all non-thesis Master of Arts students in the semester of their graduation. Graded P/F.

5303. ORGANIZATIONAL THEORY AND DEVELOPMENT (3-0). Evolution of organization theory; models of human and managerial behavior; contemporary theories of organization and change; and implications of concepts of the public interest for decision-making. Also offered as URBA 5303 and CRJU 5309.

5305. STATE AND LOCAL POLITICS (3-0). Problems and policies relating to American politics at the state and local level. Field research with and for area governments emphasized where practical.

5310. FEDERALISM AND INTERGOVERNMENTAL RELATIONS (3-0). Theory and practice of federal systems, with attention paid to selected contemporary problems of intergovernmental relations arising under American federalism.

5315. POLITICAL PARTIES (3-0). The issue, electoral, and organizational bases of contemporary parties in various political systems; their development and recent changes. Particular focus directed to U.S. parties.

5316. ELECTORAL BEHAVIOR (3-0). The role of elections as a means of expressing citizen preferences. Candidate strategies, the effect of electoral institutions, and alternative explanations of electoral behavior reviewed. Survey research may be used to explore specific topics in electoral research.

5320. CONTEMPORARY JUDICIAL POLITICS AND BEHAVIOR (3-0). Process and decision-making of the American judiciary with emphasis on contemporary constitutional issues.

5322. URBAN PUBLIC FINANCE (3-0). Tax, revenue, and fiscal problems of cities and local governments in metropolitan areas. Problems of matching costs and benefits in providing public services among different local governments analyzed. The increasingly complex dimensions of intergovernmental fiscal relations and public budgeting systems explored. Also offered as URBA 5322.

5327. POLITICS OF INTERNATIONAL ECONOMIC RELATIONS (3-0). Political aspects and implications of the international economic system and the role of international organizations and institutions in international political economy. Focuses on the political impact of economic

aid, trade, and investment, the influence of multinational corporations and international economic cartels.

5330. THE ADMINISTRATIVE SYSTEM (3-0). Role and scope of administration in public organizations and in various cultural contexts. The system's characteristics as a decision-making mechanism analyzed, with emphasis upon processes, regulations, and responsibility.

5331. URBAN GOVERNMENT ADMINISTRATION (3-0). Problems of governmental administration at all levelsOnational, state, and localOin urban areas, with emphasis on metropolitan and regional approaches in political decision-making.

5332. PUBLIC POLICY ANALYSIS (3-0). Contemporary public policy analysis, focusing upon policy system modeling, the policy process as a descriptive phenomenon, and upon the profession of policy analysis. Oriented toward equipping students with analytic skills essential to analysis of public policies.

5335. LABOR RELATIONS IN THE PUBLIC SECTOR (3-0). Rise and growth of labor unions in government, the nature of the collective bargaining process and the role of third parties in mediation, conciliation and arbitration.

5336. THE POLITICAL SYSTEM OF THE SOVIET UNION (3-0). Development of Soviet political theory and social, political, and governmental structure from 1917 to the present.

5337. COMPARATIVE POLITICAL SYSTEMS (3-0). Theories and concepts relating to the scope of comparative politics and methods of comparing various aspects of the political system.

5338. CONTEMPORARY POLITICAL PHILOSOPHY (3-0). Approaches to problems in contemporary political philosophy. Emphasis given to linguistic analysis, phenomenology, and current issues in the philosophy of social science.

5339. EMPIRICAL THEORY AND METHODOLOGY (3-0). Selected empirical theories and research methods. Systems theory, structural-functional theory, and other empirical theories and such methodological concerns as research design, data collection, and data analysis and interpretation.

5350. SEMINAR IN POLITICAL BEHAVIOR AND PROCESSES (3-0).

5353. SEMINAR IN COMPARATIVE POLITICS (3-0).

5354. SEMINAR IN INTERNATIONAL POLITICS AND ORGANIZATION (3-0).

5355. SEMINAR IN PUBLIC LAWS AND JURISPRUDENCE (3-0).

5356. SEMINAR IN PUBLIC ADMINISTRATION AND POLICY STUDIES (3-0).

5357. SEMINAR IN POLITICAL THEORY (THOUGHTS AND METHODOLOGY) (3-0).

A seminar in each of the fields represented by the six courses above will be offered at least once in any four-semester span. The course may be repeated for credit as the topic changes.

5391. CONFERENCE COURSE IN POLITICAL SCIENCE. Research and reading in a specialized field under the direction of a member of the graduate faculty.

5393, 5693. INTERNSHIP. Under faculty supervision, a non-thesis degree student may elect an internship program in the student's major area of interest; a substantial internship report applying research procedures expected. Graded P/F.

5398, 5698, 5998. THESIS. Original research designed to augment existing studies of problems or topics related to one of the major fields of study.

Department of PSYCHOLOGY (PSYC)

Area of Study	*Degrees*
General Experimental Psychology	M.S., Ph.D.
Mathematical Sciences (See Interdepartmental and Intercampus Programs.)	Ph.D.

Master's Degree Plans: Thesis and Non-Thesis

Chairman: Verne C. Cox — 315A Life Science — 273-2281

Graduate Advisor: James N. Bowen — 402 Life Science — 273-3200

Graduate Faculty:

Professors Amster, Bernstein, Bowen, Cox, Erickson, McCain, Paulus
Associate Professors Kopp, Ickes
Assistant Professors Bomba, Jackson, Nairne
Adjunct Associate Professor Mabli

OBJECTIVE

The objective of graduate work in psychology is to educate the student in the methods and basic content of the discipline and to give him an apprenticeship in the execution of creative research.

Graduate work in the doctoral and master's programs will be offered in general experimental psychology. Student's individual programs may be arranged to give emphasis to a particular aspect of the general program.

Deadline for Financial Aid Applications—Students who wish to be considered for assistantships must have their applications and departmental forms sent to The University of Texas at Arlington by March 1 for the Fall Semester and November 1 for the Spring Semester. Students who do not desire financial aid may apply at any time up to one month before the semester in which they plan to enroll.

DEGREE REQUIREMENTS

In addition to the requirements outlined elsewhere, the Department of Psychology will require undergraduate courses in statistics and in experimental methods. These courses may be taken as deficiency courses.

Degree requirements for the Department of Psychology are established by the Committee on Graduate Studies in Psychology, and supplement those established by the University (see general requirements of the Graduate School as stated under the section entitled "Admission Requirements and Procedures").

Each entering graduate student will be furnished a copy of the departmental rules which will serve as guidelines for departmental actions and recommendations.

International Students—All students for whom English is not a native language and who graduated from a foreign institution are required to take the Test of English As A Spoken Language offered by the Educational Testing Service. The Psychology Department uses this test to determine if remedial work in English is necessary, and not as a selection device.

Master of Science Degree

The Department of Psychology offers two specialty areas at the master's level:

General Experimental (Thesis)—This program is designed to form the basis of the doctoral program. It is, however, open to those seeking a terminal master's degree. PSYC 5405 and

5406 (Advanced Statistics I and II) will be required of all students as well as 12 hours of core courses from 5411, 5422, 5431, and 5433.

Applied Behavior Analysis (Non-Thesis)—This program is designed to provide students with a knowledge of the principles and techniques which are propaedeutic to the application of behavior modification in education, training, and rehabilitation settings. Completion of the degree will require a minimum of 43 semester hours including 12 hours of supervised practicum experience. Courses required are PSYC 5304, 5315, 5360, 5363, and one course from 5411, 5422, 5431, and 5433. An additional 15 hours of graduate level lecture hours in psychology are required as electives. Three hours of non-psychology coursework may be substituted as electives with the prior approval of the Graduate Advisor. PSYC 3309 or its equivalent is a prerequisite.

As soon as practicable a student should decide on his or her area for concentration and research. After discussion with a staff member, and with the staff member's consent, the student selects a supervising professor. With the aid and advice of the supervising professor the student will prepare and present a proposed program to the proper committee within the department. The objective of the program is to give the student a broad exposure to various areas in psychology in addition to his or her area of concentration.

Doctor of Philosophy

The degree of Doctor of Philosophy in experimental psychology requires distinguished attainments both in scholarship and original research, and the deep understanding of the strategic role of thoughtful experimentation in the development of an empirical science. Although the student must meet the minimum requirements of a planned course of study, the ultimate basis for conferring the degree must be the demonstrated ability to do independent and creative work and the exhibition of a profound grasp of the subject matter of the field.

Foreign Language—Because of the growing importance of computers in psychology, all students who enter the program seeking a doctorate will be required to demonstrate proficiency in computer programming. This may be accomplished by a passing grade in CSE 2306 (Computer Programming and Applications) which may be taken on a pass-fail basis. The grade in this course will not be used to determine a student's grade point average. Students who have a prior background in computer programming may elect to take an equivalency examination. This computer science requirement is in lieu of a foreign language requirement.

Mathematics—Experimental psychology is requiring increasing sophistication in mathematics. All prospective students are encouraged to recognize this trend and prepare themselves as well as possible. Mathematics through Introductory Calculus is desirable but not required.

Course requirements—Entering graduate students will be required to take the following courses during their first two semesters or 18 hours of enrollment. Exceptions may be made only with written permission of the departmental graduate committee.

Advanced Statistics I (5405).
Advanced Statistics II (5406).
Three of the following four courses:
Learning (5411).
Advanced Social Psychology (5422).
Perceptual Processes (5431).
Advanced Physiological Psychology (5433).

Students with prior graduate work may be exempt from any or all of the above requirements by taking a departmental test which is the equivalent of the final examination in that course. Having fulfilled the above, the following are required:

(a) Experimental Design (PSYC 5307)
(b) Five courses (15 hours) from among those numbered PSYC 5310 through 5347 and 5370.
(c) Two six-hour research courses. These may be taken from among PSYC 5698 and PSYC 5640 through 5647. Students who plan to obtain the MA should elect PSYC 5698 as one of the research courses and students who do not plan to obtain the MA should select their courses from the latter set of courses. If the student does not elect to obtain the M.A., one of the research courses must result in a formal thesis-equivalent paper, which will be evaluated by a committee and defended in an oral examination. In either event, a thesis or thesis equivalent must be completed before the student takes the qualifying examination. The two research courses are a minimum requirement.

Students are also strongly encouraged to take PSYC 5391 before taking one of the six-hour courses.

(d) Nine hours of PSYC 6300.

(e) Additional hours of course work to be determined by the Graduate Advisor and dissertation committee. The student should plan to take approximately 90 hours including either 6399, 6699, or 6999.

A student has completed the core requirements when he or she has:

(a) Received at least a B average in his or her core area courses.

(b) Received at least a B average in all other courses.

(c) Received a positive evaluation in his two major research courses.

5200. SEMINAR ON SCIENCE AS A PROFESSION (2-0). Use of scientific literature including computer data bases, fundamentals of technical writing including grants and proposals, investigation of scientific societies, exploration of career opportunities in specific disciplines. Graded P/F only. Prerequisite: consent of graduate advisor.

5302. LEADERSHIP (3-0). Designed for entrants in the Women in Science program to provide training in leadership and small group dynamics. May not be applied toward advanced degrees in psychology.

5304. DESIGN AND EVALUATION IN APPLIED BEHAVIOR ANALYSIS (3-0). Survey of quantitative skills essential to the application of behavior change techniques in applied settings.

5405. ADVANCED STATISTICS I (3-2). Preview of essential mathematical ideas and techniques, a survey of the basic concepts of probability theory, mathematical expectation, special distributions; parametric estimation theory.

5406. ADVANCED STATISTICS II (3-2). Statistical hypothesis testing, Bayesian inference, decision theory, linear regression and correlation; analysis of variance; distribution-free techniques.

5407. EXPERIMENTAL DESIGN (3-2). Statistical aspects of complex experimental designs used in psychological research. Prerequisite: PSYC 5406.

5308. QUANTITATIVE METHODS (3-0). Survey of techniques for analyzing multivariate data; particular topics include partial and multiple correlation, factor analysis, and the linear discriminant function. Prerequisite: PSYC 5406 and completion of computer science requirement or consent of instructor.

5310. MATHEMATICAL MODELS IN PSYCHOLOGY (3-0). Elementary probability theory, matrix algebra, and theory of linear difference equations applied to theoretical problems in learning, signal detection, decision processes, and social interactions.

5411. LEARNING (4-0). Survey of the basic theories and topics of learning.

5312. ANIMAL LEARNING (3-0). Survey of contemporary problems in animal learning.

5313. COGNITIVE PROCESSES (3-0). Application and extension of basic concepts of psychology to more complex behavior. Investigation of such behaviors as concept formation, problem solving, and creative thinking.

5314. PSYCHOLINGUISTICS (3-0). Investigation of language in terms of its function, content and structure, with an emphasis on learning, perception, and generation of linguistic units.

5315. OPERANT PSYCHOLOGY (3-0). Overview of operant theory with an emphasis upon contemporary problems. Basic concepts that are covered include: reinforcement and stimulus control, punishment, compound schedules, response topography, and chaining. Other topics include complex human operants, verbal behavior, behavior modification, and contingency management.

5316. HISTORY AND SYSTEMS (3-0). Consideration of the origins of psychology in the development of Western thought. Early conceptualization of problems and their modification with changes in evidence emphasized.

5317. PSYCHOPHYSIOLOGY (3-0). Introduction to human psychophysiological research and methodology.

5320. BEHAVIORAL PHARMACOLOGY (3-0). Survey of the basis of behavioral pharmacology including mechanisms and theories of drug actions, techniques and strategies of pharmacological research, common psychoactive drugs, and the uses of drugs in clinical practice.

5321. PERSONALITY AND BEHAVIOR DYNAMICS (3-0). Research in personality processes; particular topics include unconscious processes, anxiety, and conflict.

5422. ADVANCED SOCIAL PSYCHOLOGY (4-0). Problems in social psychology emphasizing integration of experimental design, research findings and theoretical formulations.

5323. ADVANCED DEVELOPMENTAL PSYCHOLOGY (3-0). Survey of development of behavior in both humans and sub-humans.

5325. THEORIES OF MOTIVATION (3-0). Surveys the current literature and theory on emotion and the neural and physiological basis for motivation. Material to be covered will include both biological drives, such as hunger and thirst, and interpretations of drives less immediately related to the underlying biological processes.

5431. PERCEPTUAL PROCESSES (4-0). Survey of methods and findings dealing with perception; emphasis will be upon behavioral rather than physiological considerations; particular topics include signal detection theory, form and pattern recognition, and attentional mechanisms.

5332. SENSORY PROCESSES (3-0). Structure, function, and neural processes in the various sense modalities. Emphasis is placed upon the current literature and theory on vision, audition, somathesis, taste, and smell and their relationship to perception and behavior.

5433. ADVANCED PHYSIOLOGICAL PSYCHOLOGY (4-0). Biological and physical processes underlying behavior. Emphasis on neurophysiological, biochemical and endocrinological mechanisms serving as a foundation for behavior. Other topics covered are the neural and chemical basis for conditioning and learning, intelligence and language, reflexes and motor performance, and abnormal behavior.

5335. ANIMAL BEHAVIOR (3-0). Phylogenetic approach to some basic problems in behavior, with special emphasis on unlearned behavior. Also offered as BIOL 5335; credit will be granted for only one of these courses.

5338. OBJECTIVE PSYCHOLOGICAL TESTING (3-0). Survey of major objective psychological tests. Prerequisites: PSYC 5344.

5339. PRACTICUM IN TESTING AND ASSESSMENT TECHNIQUES. Administration, scoring, research, and rationale of individual intelligence and selected personality tests. Process of clinical inference also scrutinized. Prerequisite: PSYC 5344.

5340. TEACHING UNDERGRADUATE PSYCHOLOGY (2-2). Survey of the approaches to teaching general psychology, course organizations, sources of knowledge, and keeping current with contemporary developments. Definition of objectives and evaluation of teaching effectiveness are also analyzed in their application. **$2 lab fee.**

5341. DECISION MAKING (3-0). Study of variables that influence choices.

5342. MATHEMATICAL LEARNING THEORY (3-0). Study of the variables that influence choices.

5343. SIGNAL DETECTION THEORY (3-0). Survey of signal detection theory considered both as a method and as a substantive approach to perception, memory and decision making in the social sciences. Prerequisite: PSYC 5405 or consent of instructor.

5344. PSYCHOMETRIC THEORY (3-0). Introduction to test construction. Topics include reliability theory, test validation, and item analysis.

5345. HUMAN LEARNING AND MEMORY (3-0). Survey of current approaches to the study of human learning and memory.

5346. SOCIAL BEHAVIOR OF ANIMALS (3-0). Survey of the research and theories related to nonhuman social behavior.

5347. ADVANCED ENVIRONMENTAL PSYCHOLOGY (3-0). Survey of the current literature on the impact of various features of the physical and social environment on human behavior. Designed to be of interest to graduate students in architecture, urban studies, engineering, geology, sociology, as well as those in psychology.

5151, 5251, 5351. READINGS IN PSYCHOLOGY. Independent readings under the supervision of an individual faculty member. Students wishing to conduct an experiment should sign up for PSYC 5191, 5291, or 5391. May be repeated for credit with consent of the Graduate Advisor. Graded P/F. Prerequisite: consent of the instructor.

5353. PSYCHOLOGY EDUCATION I (3-0). Survey of the content of contemporary psychology.

5354. PSYCHOLOGY EDUCATION II (3-0). Survey of the methods of contemporary psychology.

5360. APPLIED BEHAVIOR ANALYSIS (3-0). Overview of recent developments in the application of operant and respondent conditioning techniques to modify human problem behaviors with special emphasis on behavior modification in institutions and education, training, and rehabilitation settings.

5361. ANALYSIS OF ABNORMAL BEHAVIORS (3-0). Advanced study in the causes, incidence, prophylaxis, and treatment of human problem behaviors.

5362. EVALUATION OF SENSORY FUNCTION (3-0). Examination of theories and techniques relevant to the assessment of sensory functioning and sensory disorders.

5363. ETHICAL AND LEGAL ISSUES IN APPLIED BEHAVIOR ANALYSIS (3-0). Study of the ethical and legal restrictions which control the contingencies of the applied behavior analyst. Includes an overview of recent court decisions which constrain and set guidelines for the use of behavior modification in institutional and quasi-institutional settings.

5368. PRACTICUM IN BEHAVIORAL MODIFICATION. Intensive experience-based course in applied behavior analysis. Students, under the supervision of the instructor, develop and implement behavior training programs for individual retarded children in local school settings. The programs are designed to facilitate ongoing classroom instruction for the children in academic, verbal, and self-help skills. Prerequisite: PSYC 2310 or PSYC 3440 or PSYC 4318, or the equivalent. By consent only. May be repeated for credit with consent of the Graduate Advisor. Graded P/F.

5370. PROGRAM EVALUATION (3-0). Criterion analysis, application of quantitative techniques, and communication of results.

5389. CONTEMPORARY PROBLEMS IN PSYCHOLOGY (3-0). Topics vary; may be repeated for credit with consent of Graduate Advisor.

5390. SURVEY OF EXPERIMENTAL PSYCHOLOGY (3-0). Selected topics from recent research. Topics depend on interests of students and instructor. Prerequisite: consent of Graduate Advisor.

5191, 5291, 5391. RESEARCH IN PSYCHOLOGY. Independent research under the supervision of an individual faculty member; may be repeated for credit with consent of Graduate Advisor. Prerequisite: consent of the instructor.

5617. RESEARCH IN PSYCHOPHYSIOLOGY. Prerequisite: consent of the instructor.

5640. RESEARCH IN HUMAN PERFORMANCE AND PERCEPTION. Prerequisite: consent of the instructor.

5641. RESEARCH IN LEARNING OR MOTIVATION. Prerequisite: consent of the instructor.

5642. RESEARCH IN PHYSIOLOGICAL PSYCHOLOGY. Prerequisite: consent of the instructor.

5643. RESEARCH IN DEVELOPMENT. Prerequisite: consent of the instructor.

5644. RESEARCH IN MATHEMATICAL PSYCHOLOGY. Prerequisite: consent of the instructor.

5645. RESEARCH IN GROUP PROCESSES. Prerequisite: consent of the instructor.

5646. RESEARCH IN PERCEPTION. Prerequisite: consent of the instructor.

5647. RESEARCH IN COGNITIVE PSYCHOLOGY. Prerequisite: consent of the instructor.

5671. PRACTICUM IN PROGRAM EVALUATION. Supervised practice of evaluation in an applied or research setting. Prerequisite: consent of instructor.

5398, 5698; 5998. THESIS. Prerequisite: 12 hours of advanced psychology and consent of the Graduate Advisor.

6300. SEMINAR IN PSYCHOLOGY (3-0). Offered each semester. Topics vary. May be repeated for credit. Prerequisite: consent of instructor.

6399, 6699, 6999. DISSERTATION. Prerequisite: approved dissertation proposal. For students in the Ph.D. program in Mathematical Sciences, see Mathematical Sciences entry.

RADIOLOGICAL PHYSICS Program

See Interdepartmental and Intercampus Programs, p. 218.

Graduate School of SOCIAL WORK (SOCW)

Areas of Study	*Degrees*
Social Work	M.S.S.W.
Administration (See Interdepartmental and Intercampus Programs.)	Ph.D.

Master's Degree Plans: Thesis and Thesis Substitute

Dean: Paul H. Glasser 301 Social Work 273-3181

Graduate Advisor: Lila B. Hagins 301 Social Work 273-3181

Graduate Faculty:

Professors Callicutt, Duehn, Gaupp, Glasser, Lecca, Mayadas, Mindel, Saleebey, Sundel
Associate Professors Dangel, Granvold, Hagins, Hunter, Litrio, Maldonado, McNeil, Polster, Shannon, Watts, Wright
Assistant Professors Barrett, Collins Deschner, Kail, Kersey, King, Lobb, Mayers, Schoech
Adjunct Associate Professor Bernstein
Adjunct Assistant Professors Borland, Sanchez
Specialist Birmingham

OBJECTIVES

The program leading to the Master of Science in Social Work degree focuses on developing professional leaders in the areas of direct social work practice and community social work practice. The program of instruction includes an intensive academic component integrated with a practicum component allowing the student to learn and apply theory concurrently.

ACCREDITATION

The graduate program in social work is accredited by the Council on Social Work Education.

ADMISSION REQUIREMENTS

Admission to the Graduate School of Social Work requires: (1) a grade point average of 3.0 or above on upper-division undergraduate study *or* (2) if less than a 3.0 grade point average on upper-division undergraduate study, a Graduate Record Examination score which evidences graduate study aptitude; (3) leadership ability; (4) personal maturity; and (5) motivation for a human service profession. A personal interview may be required.

Applicants to the Graduate School of Social Work whose native language is not English must take, in addition to the Test of English as a Foreign Language, the Test of Spoken English.

Students admitted on Probationary Admission are encouraged to participate in an Academic

Skills Seminar conducted by the Graduate School of Social Work and are informed of particulars at the time of admission.

Neither probationary nor provisional admission will be granted to an applicant with less than a 3.0 GPA on upper division undergraduate study when the required credential lacking is a GRE score.

DEGREE REQUIREMENTS

The program leading to the degree of Master of Science in Social Work covers four semesters for full-time students and requires the completion of 64 semester hours of graduate work including class and field instruction and a thesis or thesis substitute.

ADVANCED STANDING

An applicant who has graduated from an accredited undergraduate program in social work may request admission to the graduate program with advanced standing. Such requests will be considered by the Committee on Graduate Studies on an individual basis, course by course, considering the applicant's demonstrated academic and practice competence.

DUAL DEGREE PROGRAM

In conjunction with the Institute of Urban Affairs, the Graduate School of Social Work participates in a dual degree program whereby a student can earn a Master of Arts in Urban Affairs and a Master of Science in Social Work. To participate in the program, a student must make separate applications to both the Institute and the Graduate School of Social Work. Admission to one program does not automatically ensure admission to the other program because of both selection criteria and spaces available. The dual program requires students to complete a total of 82 semester hours as follows: 46 hours of coursework in the Graduate School of Social Work, 24 hours in the Institute and 12 hours of joint coursework. The 12 hours of joint coursework are: 6 hours of research courses, and in addition students must complete either a six-hour research practicum or thesis in the Graduate School of Social Work or an internship report in the Institute. The thesis in the Graduate School of Social Work must span two semesters.

CONTINUATION

The Graduate School of Social Work, in fulfillment of its responsibility to graduate high quality professional social workers, has established certain policies and procedures. In addition to the requirements of the Graduate School listed elsewhere, each graduate student in the social work program must:

(1) Maintain at least a B (3.0) overall GPA in all course work and,

(2) Demonstrate suitability for professional social work practice.

At such time as a student fails to achieve (1) above, or questions are raised by faculty concerning (2) above, a formal review by the Committee on Graduate Studies resulting in favorable comment (recommendation) by the committee will be required for continuation in the program.

PART-TIME PROGRAM (MSSW)

The part-time program allows students to complete most, and in some instances, all, of the first year's course requirements on a part-time basis. Normally, second year requirements are completed in full-time status. The part-time program is designed to accommodate those persons who would find it more practical to attend on a part-time basis for two years.

Admission and degree requirements for part-time students are the same as those for full-time students. Likewise, part-time students must maintain the performance level required of full-time students.

REQUIREMENT FOR LIABILITY INSURANCE

All social work students enrolling in Field Instruction courses will be required to show evidence of professional liability insurance coverage of a minimum amount of $200,000 limit each

claim and $600,000 limit aggregate paid for the duration of the course as a prerequisite to enrollment. The effective date of the policy must be on or before the first regular class period of the Field Instruction course for which the student is enrolling.

Human Behavior and the Social Environment

5301. HUMAN BEHAVIOR AND THE SOCIAL ENVIRONMENT I (3-0). Examination and analysis of problems of human functioning, especially within urban environments, using stress and adaptation as a framework for analysis. Required of all first-year students.

5302. HUMAN BEHAVIOR AND THE SOCIAL ENVIRONMENT II (3-0). Continuation of SOCW 5301 with special emphasis on the problems and prospects of particular populations within the urban environment.

5308. INDIVIDUAL AND COMMUNITY PERSPECTIVES IN MENTAL HEALTH (3-0). Examination and analysis of theories of mental health and disorders, perspectives on the etiology and epidemiology of mental disorder and the institutional response to problems in mental health (e.g. "asylums", community mental health programs).

5309. CHILD DEVELOPMENT (3-0). Reviews and analyzes a number of theoretical and empirical approaches to understanding the development of the child through adolescence; implications for practice and policy.

5310. THEORIES OF THE FAMILY AND SOCIALIZATION PRACTICES (3-0). Reviews a variety of theoretical approaches useful in understanding the family and child and adult socialization procedures. Implications for practice at the policy, community, and interpersonal levels discussed.

5311. ADULT DEVELOPMENT (3-0). Explores selected issues and themes associated with middle and early adulthood; major contents and purposes of counseling for this population.

5312. AGING IN AMERICAN SOCIETY (3-0). Explores the elderly population in American society. Includes discussion of social gerontology, a description of the aged in the United States and across cultures. Changes among the elderly such as health, finances and social roles studied.

5313. PSYCHODYNAMICS (3-0). Major aspects of psychodynamics theory derived from Freud and the recent ego psychologists will be used in an analysis of the life cycle. Implications for social work practice will be drawn, particularly application of the theory for practice with special groups: minorities, including women, and lower socioeconomic groups.

5314. SOCIAL LIFE CYCLE OF WOMEN (3-0). Overview of the social life-cycle of women, including the cultural, structural, and psychological forces shaping choices and roles. Emphasis on the impact of social structure on women at each life-cycle stage and in a variety of contexts, including family and work.

6301. THEORIES OF PERSONALITY AND PSYCHOTHERAPY (3-0). Study of personality theories which focuses on the commonalities and critical differences between the theories and their status in terms of current empirical research into the area of personality dynamics. Prerequisite: permission of the instructor.

6303. ORGANIZATIONAL BEHAVIOR AND SOCIAL WORK PRACTICE (3-0). Analysis of the influences, external and internal, on human behavior in formal organization, as well as the forms that behavior takes within organizations. Of special concern is the interaction between personality attributes and organizational imperatives. Prerequisite: permission of the instructor.

6307. PRACTICE OF BEHAVIOR THERAPY (3-0). Introduction to the experimental bases and clinical applications of socio-behavioral approaches relevant to social work practice; attention given to different change methods and application made directly to the wide range of behaviors of concern to the social worker. Prerequisite: SOCW 5305 or equivalent and permission of instructor. (This course may substitute for a Direct Practice Course.)

6320. PERSONAL RELATIONSHIPS: PSYCHOLOGICAL UNDERSTANDINGS (3-0). Explores theoretical and empirical material on various processes and issues related to psychological intimacy to increase intellectual enlightenment of the beginnings through the endings of intimate relationships and to identify areas for intervention.

6325. FACTORS IN ALCOHOLISM (3-0). Focuses on the alcohol abuser; physiological, psychological, and social factors in the causation of and effects of alcohol abuse. Study of several very different approaches to treatment. Prerequisite: permission of instructor.

6326. SOCIAL WORK AND SELECTED SOCIOLOGICAL PERSPECTIVES (3-0). Overview of selected sociological theories, concepts and models, with particular emphasis upon their relevance to the development of social work theory and research. May include the sociology of knowledge, social values, role theory, social structure, community power, ecology and demography, social stratification, social change, and others. Prerequisite: permission of instructor.

6327. APPLICATION OF PSYCHOLOGICAL KNOWLEDGE TO PRACTICE RESEARCH AND THEORY (3-0). Examination of selected bodies of knowledge from psychology, and evaluation of their applicability to problems of social work. Focus on evolution of conceptual and research strategies for utilizing psychological findings in the development of social work knowledge. Prerequisite: permission of instructor.

6332. SOCIAL WORK AND SELECTED PERSPECTIVES FROM POLITICAL SCIENCE (3-0). Special problems considered in the strategies of applying political science research and knowledge in social work. Prerequisite: permission of instructor.

6333. APPLICATION OF ECONOMIC THEORY TO SOCIAL WORK PRACTICE (3-0). Examination of problems arising from characteristics and interactions of social welfare systems and the field of economics, including conceptual issues of research and application. Special attention given to existing and potential strategies for promoting collaboration. Prerequisite: permission of instructor.

6342. STRESSFUL LIFE EVENTS (3-0). Selection of stressful events examined such as: residential relocation (e.g., slum clearance); disasters (e.g., tornadoes); life transitions (e.g., high school to college, menopause); loss of primary relationships; hospitalization; long-term disabilities. Major objective will be formulation of strategies of coping and adaptation.

Social Welfare Policy and Services

5303. FOUNDATIONS OF SOCIAL WELFARE POLICY AND SERVICES (3-0). Examines how social goals are met by social welfare institutions. Conceptual schemes developed for analyzing the structure of social welfare institutions and evaluating social welfare sub-systems. Social work profession also examined in the context of the evolution and function of the contemporary American social welfare system. Required of all first-year students.

5320. HEALTH POLICY (3-0). Historical, current, and projected national and local health policies and roles of providers and consumers of health care examined; service demands, economic, access, and regulatory issues analyzed; relationships between governmental, voluntary, and commercial sectors studied; analytic frameworks for the understanding and development of policies developed. Prerequisite: SOCW 5303.

6304. ISSUES IN CHILD WELFARE (3-0). Examination of current policies, programs, and practices which have been established to deal with the problem population. Attention given to new perspectives on the delivery system and staffing in Child Welfare. Through analysis and research students provided knowledge for more effective practive in the field of Child Welfare. Prerequisite: SOCW 5303 and permission of the instructor.

6305. SOCIAL WELFARE POLICY AND SERVICES INTEGRATING SEMINAR (3-0). Focuses on issues and problems of broad concern to the profession of social work. Members of the faculty may serve as consultants and resource persons to seminar members who are required to make analyses and presentations on issues that predict as well as apprehend the urgent concerns of the social work profession. Prerequisite: SOCW 5303 or permission of the instructor.

6319. ISSUES IN COMMUNITY MENTAL HEALTH (3-0). Examines significant policy issues in mental health through the application of an analytic model. Issues include problem definition, client identification and analysis, manpower, organization and delivery of services, and economic issues. Substantive knowledge developed through discussion and analysis of these interrelated issues. Prerequisite: SOCW 5303 and permission of the instructor.

6321. ISSUES IN ALCOHOL ABUSE AND ALCOHOLISM (3-0). Examines significant policy issues in area of alcohol abuse and alcoholism through the application of an analytic model. Issues include problem definition, client identification and analysis, manpower, organization and delivery of services, and economic issues. Substantive knowledge developed through discussion and analysis of these interrelated issues. Prerequisite: SOCW 5303 and permission of the instructor.

6328. SOCIAL POLICY RESEARCH AND ANALYSIS (3-0). Seminar on methods of analyzing social welfare policies and the programs through which they are implemented and policy objectives achieved. Inquiries and investigations regarding control or management of policy considered, as well as more formal research designed to add to professional knowledge concerning intervention in macro-systems. Prerequisite: SOCW 6322 and SOCW 6324 or equivalents and permission of instructor. Required of all doctoral students concentrating in human services administration.

6331. PROFESSIONAL AND INSTITUTIONAL HISTORY AND PHILOSOPHY OF SOCIAL WELFARE (3-0). Historical and philosophical perspective on social welfare and social work concepts, issues, and trends. Prerequisite: permission of instructor. Required of doctoral students concentrating in human services administration.

6337. POVERTY POLICY (3-0). An examination of American poverty and the social welfare

interventions which aim at its amelioration. Major topics include the scope of poverty, theories and definitions of poverty, and the description and evaluation of poverty programs. Prerequisites: SOCW 5303 and permission of the instructor.

6338. SOCIAL SERVICES AND SOCIAL WELFARE POLICY (3-0). Broad acquaintance with, and analysis of, the social services and their role within social welfare policy. A variety of social services examined as well as modes and methods of providing these services, degree of effectiveness of various services in adequately serving clients, service gaps or duplication, and related areas. Prerequisites: SOCW 5303 and permission of the instructor.

6349. SOCIAL WELFARE POLICY AND THE AGED (3-0). Social welfare policies and programs serving the aged are examined, past and present, in terms of their overall impact on the aged and on society at large. Needs and gaps in services to the aged are evaluated, especially concerning minority and low-income aged. Current issues in aging policy are examined. Prerequisites: SOCW 5303 and permission of the instructor.

6354. DEVIANCE AND SOCIAL POLICY (3-0). Examines past and present policies relating to deviant groups such as the physically and mentally handicapped, drug users, homosexuals, and juvenile delinquents. Theoretical and ideological bases of social reaction to these "problematic" individuals considered. Attention given to the influence of class, ethnicity, and gender on society's tolerance of deviant behavior. Prerequisites: SOCW 5303 and permission of the instructor.

Direct Practice

5304. DIRECT SOCIAL WORK PRACTICE I (3-0). Introduction to basic direct service methodologies of social work intervention at the individual, family, and group levels. Common elements of direct service methodologyOcriteria for problem identification, goal determination, and selection of intervention techniques and treatment strategies explored. Required of all first-year students.

5305. DIRECT SOCIAL WORK PRACTICE II (3-0). Further attention given to change theories, intervention strategies and therapeutic techniques employed at the individual, family, and group levels. Emphasis placed on developing criteria for selection among alternative approaches, intervention activities appropriate to the specific goal of intervention and the specific practice context. Prerequisite: SOCW 5304 or equivalent. Required of all direct practice majors.

6307. PRACTICE OF BEHAVIOR THERAPY (3-0). Introduction to the experimental bases and clinical applications of socio-behavioral approaches relevant to social work practice. Attention given to different change methods and application is made directly to the wide range of behaviors of concern to the social worker. Prerequisite: SOCW 5305 or equivalent and permission of instructor. (This course may substitute for a Human Behavior and the Social Environment Course.)

6308. ADVANCED SEMINAR IN DIRECT SOCIAL WORK PRACTICE III (3-0). Focuses on integration of theoretical knowledge and practice principles in direct practice. Emphasis placed on recent research and theoretical developments in the social and behavioral sciences as well as current practice trends. Prerequisite: permission of instructor.

6309. SUPERVISION AND CONSULTATION FOR DIRECT PRACTICE (3-0). Introduction to the philosophy, objectives, and methods of the supervisory and consultative processes. Application of relevant social and behavioral science concepts and social work theory to principles of administration, teaching, and learning. Prerequisite: SOCW 5305 or equivalent and permission of instructor.

6310. SEMINAR IN TREATMENT MODALITIES (3-0). Critical examination of a broad spectrum of intervention methodologies employed by a variety of allied helping professions. Attention given to problems of their efficacy, the status of empirical validation, and the adequacy of their explanations of human behavior for given practice situations. Prerequisite: SOCW 5305 or equivalent and permission of instructor.

6311. SEMINAR IN DIRECT METHODS IN MARITAL COUNSELING (3-0). Examination of various psychological, social and behavioral treatment approaches to the treatment of problems in marital adjustment. Emphasis placed on developing criteria for assessing the sources and patterns of imbalance and conflict, the selection and ordering of treatment strategies, and intervention techniques consistent with determined goals. Prerequisite: SOCW 5305 or equivalent and permission of instructor.

6312. GROUP DYNAMICS I AND SOCIAL WORK PRACTICE (3-0). Examines contemporary social-psychological concepts and small group research, with a view to testing their applicability to practice propositions and operational principles, in work with both task and personality satisfaction groups. Prerequisite: SOCW 5305 and permission of instructor.

6313. GROUP METHODS IN COUNSELING II AND SOCIAL WORK PRACTICE (3-0). Critical investigation of the therapeutic processes which are directed toward behavior change in persons through the structured medium of group interaction, and planful management, by the

therapist, of group processes which emerge through interactional patterns between group members. Prerequisite: SOCW 6312 or permission of instructor.

6323. INTERPERSONAL COMPETENCE IN SOCIAL WORK PRACTICE (3-0). Course content draws upon existing studies and theories in the areas of (1) self-concept, (2) levels of performance in interventive encounters, and (3) worker behaviors allegedly related to client change within the contexts of interpersonal helping.

6344. TREATMENT OF CHILDREN AND ADOLESCENTS (3-0). Overview of the literature which describes physical, psychological, and cultural characteristics unique to childhood and adolescence. Attention then turned to treatment principles, and the specification of procedures for the amelioration of problems common to children and adolescents. Prerequisite: SOCW 5305 or SOCW 5307, or equivalent.

6348. SUPERVISION IN DIRECT SERVICES WITH CHILDREN AND FAMILIES (3-0). Current assessment and treatment methodologies as they apply to the problems of children and families; focus on the effectiveness of methodological tools and on the situational context of each phase of the decision making process to improve and make effective supervision and management of direct service personnel.

6350. SEMINAR IN COGNITIVE INTERVENTION STRATEGIES (3-0). Explores various covert conditioning, cognitive restructuring, and self-instruction therapies. Recent theoretical formulations and relevant research will be investigated as they pertain to the efficacy of cognitive intervention strategies with various clinical problems. Prerequisite: SOCW 5305 or equivalent and permission of the instructor.

6352. SELF-REGULATION METHODS: RELAXATION, BIOFEEDBACK, AND HYPNOSIS (3-0). Examines the clinical application of relaxation, biofeedback, and hypnosis for self-regulation of both internal and external behavior for personal growth and clinical treatment. Students will learn how to use specific instruments and techniques of self-regulation.

6353. SEMINAR IN FAMILY THERAPY (3-0). Comparision of various approaches to working with the family as a total system; enhancement of cognitive understanding of similarities and differences in theory and goals of family treatment in many fields of practice; integration of strategies and techniques of each method into an individual style of therapy. Prerequisite: SOCW 5305 or permission of instructor.

6355. COMPUTER USE IN HUMAN SERVICES (3-0). Basic terminology, knowledge, and skills to make maximum use of a computer in practice. Explores computer hardware and software and its present and future use in information systems, decision-support systems, office automation, and direct practice applications. Examines the processes of decision making, systems analysis, and computer system development and implementation.

6369. INTRODUCTION TO HUMAN SEXUALITY AND SOCIAL WORK PRACTICE (3-0). Overview of human sexuality as it relates to social work practice. Human sexuality considered from a bio-psychosocial perspective. Emphasis on viewing human sexuality as an interactive process of the total personality. Attention given to various psychological, social and behavioral educational/treatment approaches. Prerequisite: SOCW 5305 or permission of instructor.

Human Services Administration and Planning

5306. INTRODUCTION TO HUMAN SERVICES ADMINISTRATION AND PLANNING (3-0). Survey of human services administration and planning with emphasis on common areas of knowledge and practice skills. Focuses also on the development of analytical approaches to the understanding of community and organizational phenomena. Required of all first-year students.

5307. HUMAN SERVICES ADMINISTRATION AND PLANNING METHODS (3-0). Seminar to examine and apply methodologies in human services administration and planning. Builds and expands on knowledge gained in SOCW 5306. Roles of professional planners and administrators examined. Prerequisite: SOCW 5306. Required of students concentrating in Administration/Planning.

6314. THEORY AND PRACTICE OF ADMINISTRATION (3-0). Significant organizational variables identified to help the student identify implications for the practice of human services administration. Prerequisite: SOCW 5307. Required of students concentrating in Administration/Planning.

6315. PRINCIPLES OF PLANNING (3-0). Describes and analyzes theoretical and conceptual underpinnings of planning which are integrated with cognitive skills necessary for undertaking independent planning projects. Particular attention devoted to social problems and needs and developing plans. Prerequisite: SOCW 5307 or permission of instructor. Required of Administration/Planning students.

6316. ADVANCED ADMINISTRATION (3-0). Explores selected organizational and administration issues and focuses on skills and methodologies useful to the administrator in dealing

with such issues. Student leadership and responsibility for class presentations planned for the latter part of the course.

6317. ISSUES IN PLANNING AND IMPLEMENTATION (3-0). Provides future planners/administrators with explanatory models for examining human services implementation. Local and state levels of implementation described and analyzed through political and organizational conceptualizations. Students introduced to recent trends influencing implementation and present in carrying out major national and state policy/planning efforts.

6318. LEADERSHIP (3-0). Leadership styles and variables examined on a historical and theoretical basis and the value base inherent in the leadership process explored. Attention given to unique qualities required of leaders in social welfare settings and a conceptual method to assist students in developing the qualities.

6335. ADVANCED SEMINAR IN THE THEORY AND PRACTICE OF SOCIAL WORK ADMINISTRATION (3-0). Critical evaluation of social work administration practice conceptualizations and instances of current practice, focusing on adequacy of theoretical formulations and their fit to the requisites of practice. Prerequisite: SOCW 6316 and permission of instructor. Required of all doctoral students concentrating in human services administration.

6339. PROGRAM EVALUATION (3-0). Presumes basic research competence on part of student. Focus on socio-political aspects of program evaluation as a specialized use of scientific methods and community practice skills. Relationships between program evaluation and program planning or administration stressed.

6340. STRATEGIES FOR SOCIAL CHANGE (3-0). Examines two models of community organization, social action and community development. Each model analyzed in terms of its utilities and limitations. Strategic choices available to the professional organizer investigated, using theoretical literature, and empirical evidence. Racial, cultural, and economic influences are considered in light of professional strategies.

6341. THE MINORITY EXPERIENCE AND HUMAN SERVICE AGENCIES (3-0). Socio-historical experiences of racial and ethnic minority groups and their relationships in the human service agencies as clients, staff and policy makers.

6345. ADMINISTRATIVE LAW AND REGULATORY CONCEPTS IN CHILD WELFARE (3-0). Examination of the regulatory aspect of child welfare services including examination of the function of the regulatory process in regard to child welfare organizations and its effect upon the treatment process for the involuntary client. Prerequisite: SOCW 6329 or permission of the instructor.

6346. DECISION MODELING IN CHILD WELFARE (3-0). Examination of the factors which must be considered in reaching decisions in: termination of parental rights, foster placement and changes in foster placement, suitability for adoption, and continuation of resource utilizations. Attention given to the feasibility of applying the techniques of computer simulation and linear programming to the child welfare decision making process. Prerequisites: SOCW 6329 and permission of the instructor.

6347. WOMEN AND LEADERSHIP (3-0). Focuses on the professional development of women. An examination of attitudinal, behavioral, and structural factors which impede or enhance professional growth with an emphasis on intervention strategies to realize feminine potential. Interventions include handling role conflict, success, assertiveness as well as strategies to work with other people or structures which impact leadership performance.

6601. LABORATORY IN TRAINING METHODOLOGY (0-18). Assistance in the development of the skills necessary to become an effective trainer; including discerning training needs, assessment of pupils groups, development of learning objectives, measuring attainment of learning objectives, preparation of course outlines and lesson plans, and technology of instruction. Prerequisite: SOCW 5307 or permission of the instructor.

6363. BUDGETING AND FINANCIAL MANAGEMENT (3-0). A basic overview of financial management applied specifically to human service agencies; emphases on basic concepts and skill building in budgeting, grant writing, and fund raising; accounting principles, financial statements, and computerized financial information systems also covered.

6364. SOCIAL WORK IN HEALTH CARE SETTINGS (3-0). An introductory course for those students interested in medical social work practice; health settings examined from organizational, administrative, and clinical perspectives to provide an understanding of the intra/inter-disciplinary practice in the health care system.

Research and Evaluation

6322. RESEARCH AND EVALUATION METHODS IN SOCIAL WORK I (3-0). Introduction to the methods of scientific inquiry and their relevance to social work. Topics include problem formulation, single subject and group research design, elementary statistics such as chi squares, correlations, analyses of variance, and report writing. Required of all students.

6324. RESEARCH AND EVALUATION METHODS IN SOCIAL WORK II (3-0). Advanced course in the application of research priniciples and techniques. Topics include regression and statistical control, analysis of variance, questionnaire construction, evaluation research, and computerized tabulation and analysis of data. Mini-projects require the student to apply these techniques in the context of social work practice. Prerequisite: SOCW 6322. Required of all students.

6336. SEMINAR IN LARGE SCALE ORGANIZATIONAL AND EVALUATIVE RESEARCH (3-0). Examination of the problems and issues in evaluating the effectiveness of service outcome in large social service delivery systems. A variety of research designs and exemplars of evaluative research examined. Attention devoted to accreditation and accountability of human service practice. Prerequisite: SOCW 6322 and SOCW 6324 or equivalents and permission of instructor.

6395, 6695. RESEARCH PRACTICUM. Individual or small group research project in the student's major area of specialization with emphasis on applying research principles and procedures. A substantial research report expected at the conclusion of the course.

6398, 6698. THESIS. Requires an individual research project in the individual's area of specialization, with a minimum of 6 semester hours total needed for the project. Satisfactory completion requires approval of the instructor in charge, a supervising committee appointed by the Dean of the Graduate School, and the Dean of the Graduate School. Defense in a final oral examination is required. Prerequisite: permission of the Graduate Advisor and the instructor in charge.

General

6201. RACISM AND ETHNICITY: IMPLICATIONS FOR SOCIAL WELFARE SERVICES (2-0). Examination of the manner in which economic, political and social systems differentially impact ethnic minorities (due to cultural diversity) and women; major attention devoted to the extent to which Social Welfare Policies/Services facilitate access to resources for these groups.

6329. SOCIAL WORK, LAW, AND THE FAMILY CODE (3-0). Overview of legal principles and procedures as they apply to social workers and their interaction with clients. Particular attention given to the broad area of Family Law. Areas of Mental Health Law, Children's Rights, Consumerism, Malpractice, Courtroom testimony, Criminal Law, Estates, and Community Legal Services covered.

Field Instruction

Field Instruction is a directed educational experience in social work practice with instruction offered by agency or campus-based faculty members. Offered concurrently or subsequent to classroom instruction, the field courses offer an opportunity for a student to integrate and utilize classroom content in the context of practice. Field instruction must be taken in the student's concentration. Courses may be repeated for credit. Graded P/F only.

All social work students enrolling in Field Instruction courses will be required to show evidence of professional liability insurance coverage of a minimum amount of $200,000 limit each claim and $600,000 limit aggregate paid for the duration of the course as a prerequisite to enrollment. The effective date of the policy must be on or before the first regular class period of the Field Instruction course for which the student is enrolling.

5351, 5451, 5551, 5651, 5751, 5851. APPLIED SOCIAL WORK PRACTICE I.

6151, 6251, 6351, 6451, 6551, 6651, 6751, 6851, 6951. APPLIED SOCIAL WORK PRACTICE II.

Doctoral Program in Administration: Advanced Curriculum

6356. ADVANCED SEMINAR IN CONTEMPORARY POLICY ISSUES (3-0). Critical examination of current economic and social policies; historical antecedents of the policies, their rationales and their impacts on various segments of society; review of the issues raised by the implementation of these policies with the goals of developing viable alternatives.

6357. PRINCIPLES OF ADMINISTRATION: A DOCTORAL SEMINAR (3-0). Nature of formal organizations and their management with application to the human service area.

6358. STRESS MANAGEMENT IN HUMAN SERVICE ORGANIZATIONS (3-0). Theories of adult socialization and career development, complex organizations, social systems, social learning, small groups, power and stress; utilization of these theories to analyze organizational, interpersonal and individual stressors in human service organizations.

6359. THEORIES OF PLANNING (3-0). Examination of planning theory in physical, social, economic, and policy aspects; differences in theoretical perspectives, methods, and processes; examination and evaluation in each aspect of the state-of-the-art and future directions.

6360. ADVANCED RESEARCH METHODS IN HUMAN SERVICES (3-0). Advanced course in application of research methods to human services; research design, including experimental and survey methods, measurement, introduction to computer applications, sampling, and review of basic statistical applications. Prerequisites: SOCW 6322 and 6324 or equivalent.

6361. ADVANCED STATISTICAL SERVICES IN HUMAN SERVICES (3-0). Advanced course in statistical applications in human services; multiple regression, analysis of variance and covariance, factor analysis, discriminant analysis, path analysis, and canonical analysis. Prerequisites: SOCW 6322 and 6324 or equivalent.

6362. SEMINAR IN HUMAN SERVICES PLANNING METHODS (3-0). Review of the history of human services planning and comparison of major methodologies; planning methods and their futures; differentiation between analytic and action orientations; examination and evaluation of major practice principles and standards.

Tutorials

6190, 6290, 6390. TUTORIAL. Arrangements may be made for a directed and supervised tutorial in a select area of special interest to the student. Prerequisite: permission of Graduate Advisor. May be repeated for credit.

Special Seminars

6192, 6292, 6392. SELECTED TOPICS IN SOCIAL WELFARE. Topics vary from semester to semester depending on the needs and interest of the students. Prerequisite: permission of Graduate Advisor. May be repeated for credit.

Affiliated Field Agencies
Metroplex and Surrounding Area

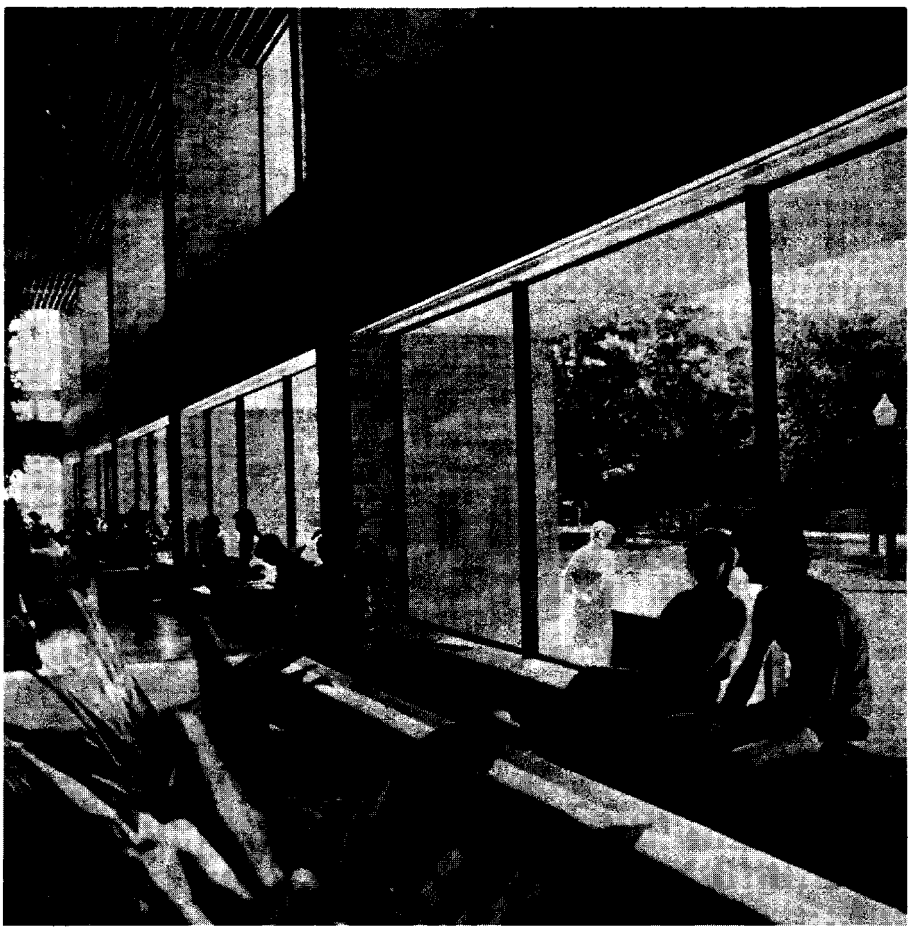
ACTION, Dallas
ADMINISTRATION ON AGING, Dallas
ALPHA & OMEGA FAMILY CENTER, INC., Fort Worth
AMERICAN RED CROSS-DALLAS
ARLINGTON GIRLS CLUB
ARLINGTON HOUSING AUTHORITY
ARLINGTON INDEPENDENT SCHOOL DISTRICT
ARLINGTON MEMORIAL HOSPITAL, Arlington
ARLINGTON WOMEN'S SHELTER, Arlington
BAYLOR MEDICAL CENTER, Dallas
BI COUNTY INFORMATION AND REFERRAL
MENTAL RETARDATION OFFICE, Arlington
BIG BROTHERS AND SISTERS, Dallas
B'NAI B'RITH YOUTH ORGANIZATION, Dallas
BRIDGE ASSOCIATION, Fort Worth
CAPITOL AREA REHABILITATION CENTER, Austin
CARPENTER AND ASSOCIATES, Arlington
CARROLLTON YOUTH AND FAMILY SERVICES
CATHOLIC SOCIAL SERVICES, Fort Worth
CENTER FOR COMMUNITY SERVICES PLANNING,
Arlington
CENTER FOR PASTORAL CARE AND FAMILY
COUNSELING, Dallas
CENTRAL TEXAS MENTAL HEALTH MENTAL
RETARDATION, Brownwood
CHILD CARE, Dallas
CHILD GUIDANCE CLINIC, Dallas
CHILD STUDY CENTER, Fort Worth
CHILDREN'S MEDICAL CENTER, Dallas
CHRISTIAN SERVICES OF THE SOUTHWEST, Dallas
CITY OF DALLAS DEPARTMENT OF HUMAN SERVICES
COMMUNITY COUNCIL OF GREATER DALLAS
COMMUNITY PSYCHOTHERAPY CENTER, Dallas
COMMUNITY SERVICE ADMINISTRATION, Dallas
COMMUNITY SERVICE CLINIC, Arlington
COUNSELING ASSOCIATES, Cleburne
DALLAS COUNTY MHMR
DALLAS REHABILITATION INSTITUTE
DENTAL HEALTH PROGRAMS, INC., Dallas
DENTON STATE SCHOOL
DENTON COUNTY FRIENDS OF FAMILY
EAST DALLAS SENIOR CITIZENS NETWORK, Dallas
ECUMENICAL CENTER FOR PASTORAL COUNSELING,
Arlington
ELLIS COUNTY OUTREACH CENTER, Waxahachie
FAMILY COUNSELING AND CHILD SERVICES, Amarillo
FAMILY AND INDIVIDUAL SERVICES, Fort Worth
FAMILY GUIDANCE CENTER, Dallas
FAMILY RESOURCE INC., Dallas
FEDERAL CORRECTIONAL INSTITUTE, Fort Worth
FORT WORTH INDEPENDENT SCHOOL DISTRICT
FORT WORTH STATE SCHOOL
GENETICS SCREENING AND COUNSELING SERVICE,
TDMHMR, Denton
GIRLS CLUB OF DALLAS
EDNA GLADNEY HOME, Fort Worth
GOLDEN ACRES, Dallas
GOOD SHEPHERD COMMUNITY CENTER, Dallas
GRAYSON COUNTY JUVENILE ALTERNATIVES
HARRIS HOSPITAL, Fort Worth
HESLEY AND HESLEY, Arlington
HOPE COTTAGE CHILDREN'S BUREAU, Dallas
HOUSING AUTHORITY OF THE CITY OF FORT WORTH
INSTITUTE FOR SOCIAL JUSTICE, Fort Worth
JEWISH COMMUNITY CENTER OF DALLAS
JEWISH FEDERATION, Dallas
JEWISH SOCIAL SERVICE AGENCY, Fort Worth
JULIETT FOWLER HOME, Dallas
KILGORE CHILDREN'S PSYCHIATRIC HOSPITAL,
Amarillo
LA HACIENDA, Hunt
LOS BARRIOS UNIDOS COMMUNITY CLINIC, Dallas
LUTHERAN MEDICAL SYSTEM, Dallas
LUTHERAN SOCIAL SERVICES, Dallas
LUTHERAN SOCIAL SERVICES, Austin
MARILLAC SOCIAL CENTER, Dallas
MARTIN LUTHER KING, JR. CENTER, Dallas
MENTAL HEALTH ASSOCIATION OF DALLAS COUNTY
MENTAL HEALTH ASSOCIATION OF TARRANT
COUNTY, Fort Worth
METHODIST HOME CHILD GUIDANCE CENTER
OUTPATIENT SERVICES, Waco
METHODIST HOSPITALS OF DALLAS
METROPOLITAN BOARD OF MISSIONS, Fort Worth
MEXIA STATE SCHOOL, Mexia
NATIONAL ASSOCIATION FOR RETARDED CITIZENS,
Arlington
NORTH CENTRAL TEXAS COUNCIL OF
GOVERNMENTS, Arlington
OUTSIDER PROGRAM, Dallas
PARENTING GUIDANCE CENTER, Fort Worth
PARKLAND MEMORIAL HOSPITAL, Dallas
PASTORAL COUNSELING CENTER, Dallas
PLANO INDEPENDENT SCHOOL DISTRICT, Plano
PRESBYTERIAN VILLAGE, Dallas
RETIRED SENIOR VOLUNTEER PROGRAM, Fort Worth
SALESMANSHIP CLUB, Dallas
SALVATION ARMY SOCIAL SERVICES CENTER, Dallas
SENIOR CITIZENS OF GREATER DALLAS
SCAN, Dallas
SOUTHWEST FAMILY INSTITUTE, Dallas
ST. JOSEPH YOUTH CENTER, Dallas
ST. JOSEPH HOSPITAL, Fort Worth
SUNRISE HOSPITAL, Arlington
TARRANT COUNCIL ON ALCOHOLISM AND DRUG
ABUSE, Fort Worth
TARRANT COUNTY ADULT PROBATION, Fort Worth
TARRANT COUNTY JUVENILE PROBATION DEPT.,
Fort Worth
TARRANT COUNTY MHMR, Fort Worth
TARRANT COUNTY TENANTS UNION, Fort Worth
TERRELL STATE HOSPITAL
TEXAS COALITION FOR JUVENILE JUSTICE, Dallas
TEXAS DEPARTMENT OF HUMAN RESOURCES, Fort
Worth, Arlington, Dallas, Cleburne, Denton, Longview,
Texarkana, McKinney
TEXAS YOUTH COUNCIL, Dallas
UNITED COMMUNITY CENTERS, Fort Worth
UNITED CEREBRAL PALSY, Dallas
UNITED WAY OF METROPOLITAN TARRANT COUNTY,
Fort Worth
UNIVERSITY AFFILIATED AGENCY, Dallas
VETERANS ADMINISTRATION HOSPITAL, Dallas
VETERANS ADMINISTRATION, Waco
VETERANS ADMINISTRATION, Temple
VISITING NURSES ASSOCIATION, Dallas
VOLUNTEERS OF AMERICA, Fort Worth
WESLEY RANKIN COMMUNITY CENTER, Dallas
WEST DALLAS COMMUNITY CENTERS
WOMEN'S CENTER OF DALLAS
WOMEN'S CENTER OF TARRANT COUNTY, Fort Worth
WOMEN'S HAVEN, Fort Worth

Affiliated Field Agencies
East Texas

DEEP EAST TEXAS REGIONAL MHMR SERVICES, Lufkin
GOOD SHEPHARD MEDICAL CENTER, Longview
MEDICAL CENTER HOSPITAL, Tyler
MHMR REG. CENTER OF EAST TEXAS, Tyler
MOTHER FRANCES HOSPITAL, Tyler
NORTH EAST TEXAS MHMR, Texarkana
RUSK STATE HOSPITAL
SABINE VALLEY MHMR CENTER, Longview
SABINE VALLEY MHMR, Henderson
ST. JOSEPH'S HOSPITAL, INC., Paris
TEXAS DEPARTMENT OF HUMAN RESOURCES, Lufkin, Nacogdoches, Paris, Quitman, Tyler, Sherman
TEXOMA REGIONAL MHMR CENTER, Sherman

Affiliated Field Agencies
West Texas

AREA AGENCY ON AGING, El Paso
BEAUMONT ARMY HOSPITAL, El Paso
CATHOLIC FAMILY SERVICE, Amarillo
CHILDREN'S HOME OF LUBBOCK
COMMISSION FOR THE BLIND DISTRICT OFFICE, Amarillo
EL PASO CENTER FOR MHMR, El Paso
FAMILY SERVICES OF AMARILLO
TEXAS DEPARTMENT OF HUMAN RESOURCES, Amarillo and El Paso
VA Amarillo
VETERANS ADMINISTRATION MEDICAL CENTER, Amarillo
VETERANS ADMINISTRATION, Lubbock
WOMENS PROTECTIVE SERVICES, Lubbock



Department of SOCIOLOGY, ANTHROPOLOGY, AND SOCIAL WORK (SOCI)

Areas of Study	*Degrees*
Sociology,	M.A.
Humanities (See Interdepartmental and Intercampus Programs.)	MA., Ph.D.

Master's Degree Plan: Thesis only

Chairman: F. S. Vidal — 205 University Hall — 273-3203

Graduate Advisor: Bruce Anderson — 424 University Hall — 273-3758

Graduate Faculty:

Professors Ramsey, Taylor, Vidal
Associate Professors Anderson, Bastien, Eve, Shupe, Stacey, Watkins, Weed
Assistant Professors Greenstein, Harrold, Robbins

OBJECTIVE

The master's degree program in sociology gives students the opportunity to enhance their skills in understanding interpersonal relationships and the institutions within which they occur. The program is designed to meet the needs of:

1. Students desiring to emphasize applied skills in the areas of research and evaluation, population studies, occupational and organizational analysis, and computer application to behavioral problems. Students in this program will learn to conduct competent social science research.
2. Working professionals who want to enhance their knowledge by learning about problems associated with the basic social institutions of their community (such as family, institutions of education and health, politics, and religion).

The master's degree program provides students with a professional understanding of sociology and related disciplines while giving them the opportunity to develop applicable skills. Additionally the program is designed to prepare those wishing to pursue a doctorate in sociology or related fields.

ADMISSION AND DEGREE REQUIREMENTS

The admission requirements of the graduate program in sociology conform with the general Graduate School requirements. Early consultation with the graduate advisor is essential for planning an individual program of study.

5301. SOCIOLOGICAL THEORY (3-0). Development of sociological theory from 1800 to the present.

5302. THEORY CONSTRUCTION (3-0). Study of modern writers as they deal with the logic of theory construction and address questions concerning the philosophy of science. Students individually utilize formal terms such as models, hypotheses, and derivation in developing various mathematical, schematic, and verbal modes of theorizing.

5303. RESEARCH DESIGN (2-2). Seminar on the design, plan, structure, and strategies currently used in sociological research. The interrelatedness between theory, methods, and statistics. Includes the limitations of theory, problems of measurement error, sampling techniques, and the application of mathematical models, and the presentation of statistical data.

5304. SOCIAL STATISTICS I (3-0). Descriptive statistics for survey research and selected non-parametric and parametric models utilizing computer data processing.

5305. SOCIAL STATISTICS II (2-2). Testing of scientific hypotheses; analysis of variance, regression analysis, pearsonian or zero-order correlation, multiple and partial techniques considered.

5310. SOCIAL ORGANIZATION (3-0). Undertakes the scientific study of phenomena arising from group relationships of human beings. General explanatory principles and processes are the focus. The organization of society into communities, institutions, and subgroups examined.

5311. STRATIFICATION (3-0). Directs attention to the origin, substance, and function of social stratification and social mobility in contemporary American society. Primary focus on the individual, group, and societal consequences of class, status, and power differentials. Attention given to current literature and methodologies in stratification study.

5312. OCCUPATIONS AND PROFESSIONS ANALYSIS (3-0). An indepth examination of selected occupations at major blue collar, white collar, and professional levels for both theoretical and methodological points of view.

5313. POPULATION AND URBAN ECOLOGY (2-2). Population theory and research into population trends, composition, and migration. Includes review and evaluation of census data, vital statistics, demographic surveys and their uses with emphasis on measurement methods and analytical techniques. Special emphasis on ecumenopolis trends.

5314. FORMAL ORGANIZATION (3-0). Analyzes the development, structure, and operation of formal organizations in society. Emphasizes internal social processes, the effects of technology, and variations in the institutional setting.

5315. POLITICAL SOCIOLOGY (3-0). Examines the structure and functioning of the community political institution in urban society. Topics considered: historical trends in community power structure, factors influencing power structure configurations, decision and policy-making, community extralocal political relationships, and minority politics.

5316. SOCIOLOGY OF LAW (3-0). Variety of topics which focus on law as a social product and process, including: the creation of law; the relationship between law and justice; the functioning of enforcement agencies such as police forces, courts, and the legal profession; law as an instrument for social change; the relationship between politics and law; and the operation of law with respect to minority groups.

5317. COMPARATIVE SOCIAL CHANGE (3-0). Selected aspects of social change. The units of analysis will be large scale; societies, their value systems and institutions. Attention given to the various theories and attempts at measurement of social change.

5318. SOCIOLOGY OF THE FAMILY (3-0). Contemporary sociological theory and research on marriage and the family as social institutions; attention given to conflict, stability, and change in different types of family structures.

5319. SPECIAL TOPICS IN SOCIAL ORGANIZATION (3-0). May be repeated for credit as the topic changes.

5320. SOCIAL PSYCHOLOGY (3-0). Analyzes the relationship between the individual and the group at various levels of abstraction, emphasizing integration of sociological and psychological approaches. Major areas of concern include: operant behaviorism, symbolic interactionism, causal attribution theory, attitude-behavior relations, and other contemporary trends in social psychology.

5321. COLLECTIVE BEHAVIOR (3-0). Examines various forms of collective behavior. Processes which will be examined include emergent norms, contagion, convergence, and rumor. Attention also to the creation of leadership, conformity and structure within episodes of collective behavior.

5322. SMALL GROUPS (3-0). Examination of special topics in the areas of exchange theory, bargaining theory, and small group dynamics. Consideration given to topics of autonomy, interdependence, dominance and conformity, cost/reward and distributive justice in small groups.

5323. SOCIOLOGY OF LANGUAGE (3-0). Interrelations between language behavior and other aspects of social behavior explored in such topics as: the sociology of bilingualism, language and social stratification, socialization and language acquisition, language problems in cross-cultural research, and the ecology of language. Topic emphasis may vary with student interest.

5324. TOPICS IN DEVIANCE (3-0). May be repeated as topic changes.

5325. SOCIALIZATION AND SOCIAL CONTROL (3-0). Seminar review of major theories of the relationship between social structure and social character. Covers equally classical and contemporary theories of child socialization and of adult socialization. Special emphasis on the adequacy of socialization and socialization to deviant behavior.

5326. SOCIOLOGY OF EDUCATION (3-0). Social relations between the community and the school administration, the school administration and teachers, teachers and students, and be-

tween teachers and parents; relationship between characteristics of the young, the organization of the school and the class room, and learning.

5327. SOCIOLOGY OF HEALTH (3-0). Organization of health delivery systems, including structure of the hospital and distribution of services; etiology of disease as found in culture and society; health related careers.

5328. SOCIOLOGY OF AGING (3-0). Characteristics of aging persons, critical stages in aging, lifestyles of mature persons, organizations for and of the aged, and social factors affecting the welfare of older persons.

5330. SOCIAL ISSUES (3-0). Social issues employed as a means of analyzing socio-political structure and social policy. Ethical considerations in doing applied research, non-scientific factors in the political use of research, and research design/grant formulation among topics examined.

5331. SOCIOLOGY OF RELIGION (3-0). Consideration of religion and specific religious groups (cults, sects, churches, denominations), their functions and conflicts, development and activities in American society.

5332. ADVANCED RESEARCH PRACTICUM (3-0). Through collaboration with faculty on research projects and seminar discussions, advanced research skills stressed. Participants prepare a research proposal for submission to a funding agency and/or a report for professional dissemination. Not to be counted toward the degree requirement of thirty hours course work.

5333. METHODS OF DEMOGRAPHIC RESEARCH (3-0). Covers the review and evaluation of censuses, vital statistics, and demographic surveys and their uses, with emphasis on measurement, methods, and analytical techniques.

5334. CRIMINOLOGY (3-0). Covers different topics each semester in the fields of criminology, penology, and corrections. May be repeated for credit as the topic changes.

5335. URBAN SOCIOLOGY AND PLANNING (2-2). Descriptive study of the form and development of the urban community with respect to its demographic structure, spacial and temporal pattern, and functional organization. The sociological aspects of planned change studied.

5336. TEACHING UNDERGRADUATE SOCIOLOGY I (3-0). In order to learn strategies of coping with practical problems of teaching undergraduate sociology, students assist one or more professors in order to have experience in lecture preparation, grading procedures, and examination construction. Not to be counted toward the degree requirement of thirty hours course work.

5337. TEACHING UNDERGRADUATE SOCIOLOGY II (0-3). Same as 5336, except that students are assigned to different professors teaching in areas different from the previous semester. May not be taken as credit toward the 30 hours of course work needed for the MA degree.

5338. EVALUATIONS RESEARCH AND NEEDS ASSESSMENT (3-0). Methodological issues in needs assessment and evaluating public or private programs; identification of variables, construction of indices, and developing predictive models.

5339. SPECIAL TOPICS IN SOCIOLOGY (3-0). May be repeated for credit as the topic changes.

5342. ADVANCED ETHNOLOGY (2-2). Seminar based on student reports and critiques of assigned readings. Major emphasis on the areas of ethnology and social anthropology.

5349. SPECIAL TOPICS IN ANTHROPOLOGY (3-0). May be repeated for credit as the topic changes.

5350. FOLK AND PEASANT SOCIETIES (3-0). Seminar on the development and patterning of folk and peasant societies in various parts of the world. Data are drawn from archaeological and historical records as well as contemporary ethnographic studies. May be repeated for credit when the content varies.

5351. EMERGENCE OF MANKIND (3-0). An intensive review of the evidence for, and main outlines of human biological and cultural evolution up to the emergence of civilization.

5352. URBAN ANTHROPOLOGY (3-0). Development and differentiation of cities with emphasis on the contribution of cross-cultural anthropological perspectives to the understanding of urban life in the United States. Readings and student papers will cover current literature in this subfield.

5353. MEDICAL ANTHROPOLOGY (3-0). An examination of anthropological concepts for understanding curing practices and attitudes toward health programs in various cultures.

5368. ANTHROPOLOGY OF RELIGION (3-0). Seminar review of theoretical treatments of religious symbolism, revitalization movements, magic, witchcraft beliefs and accusations, sacrifice, taboo, and the origin of religion. Emphasis on ritual and belief in preindustrial societies.

5369. FOLKLORE AND MYTHOLOGY (3-0). Function, forms, and interpretation of folklore and myth in traditional societies; examination of oral literature as an expression of continuity and change; emphasis on a structural analysis of myth.

5370. APPLIED ANTHROPOLOGY (3-0). Explores the principles of cultural dynamics and the sources of cultural change in innovation and diffusion. Focuses particularly on the anthropological theories, methods, and findings relevant to problems of directed culture change, especially as illustrated by non-literate and peasant groups in contact with western civilization.

5391, 5691. INTERNSHIP AND THESIS. Professionally oriented graduate students in sociology are encouraged to participate in an internship program and out of that experience a thesis is to be written. The internship will be an internal part of the graduate offering. Placement and work will be under close supervision of the student's major professor.

5392. CONFERENCE COURSE IN SOCIOLOGY I.

5393. CONFERENCE COURSE IN SOCIOLOGY II.

5398, 5698. THESIS.

Department of SYSTEMS ANALYSIS (SYAN)

Areas of Study	*Degrees*
Business Administration (See Interdepartmental and Intercampus Programs.)	M.B.A.
Administration (See Interdepartmental and Intercampus Programs.)	Ph.D.
Mathematical Sciences (See Interdepartmental and Intercampus Programs.)	Ph.D.

Chairman: L. Schkade 132 Business 273-3502

Graduate Faculty:

Professor Schkade
Associate Professors Baker, Brobst, Pinney, Rajaraman, Sircar
Assistant Professors Eakin, Hanna, Slinkman

OBJECTIVE

The Systems Analysis curriculum is multidisciplinary and provides students with an opportunity to study Information Systems and Management Science as they relate to the business environment.

Information Systems emphasizes the preparation required for developing and managing computer-based information systems. The comprehensive curriculum includes the study of applicable computer hardware, software, and database technology; the design of information systems; and management and control of information processing.

Management Science emphasizes the development of quantitatively-based decision-making, including problem recognition and definition, system modeling capabilities, and the determination of optimal courses of action from various decision alternatives. Management Science exposes the student to a variety of decision-making frameworks and an extensive array of quantitative modeling tools.

MANAGEMENT SCIENCE (MASI)

5311. DECISION MODELS AND INFORMATION SYSTEMS (3-0). System concepts, analysis of systems operations, and the formulation of system models considering the acquisition of data, the processing of information, and the utilization of algorithms and decision models in information systems for the administration of operations. Prerequisite: BUSA 5302 or equivalent or concurrent enrollment.

5321. INTRODUCTION TO MANAGEMENT SCIENCES (3-0). Introduction to the scientific approach to management problems. Special topics with applications taken from the areas of probability theory, linear programming, game theory, simulation, queuing theory, inventory theory,

Markov chains, network analysis and other areas of management sciences and operations research. Prerequisite: BUSA 5301 and 5302 or equivalents.

5323. APPLIED DECISION THEORY (3-0). Investigation of the analysis of decisions under risk and uncertainty. Concepts of both classical and Bayesian statistics will be integrated and applied to the decision-making process. Includes a treatment of subjective probability, utility theory, risk analysis, and the value of information. Prerequisite: BUSA 5301 and 5302, or equivalents.

5326. SIMULATION AND BUSINESS MODELS (3-0). Theory and practices in the simulation of stochastic and mathematical models of business and industrial processes. Application of mathematical models to problems of resource allocation, economic analysis, inventory systems, management planning models, queuing systems. Emphasis on the formulation, construction and simulation of realistic business problems. Prerequisite: MASI 5321.

5327. APPLIED MATHEMATICAL PROGRAMMING (3-0). Optimization techniques including linear, quadratic, non-linear, dynamic integer, and geometric programming. Emphasis on problem identification, technique association, and solution formulation. Investigates applications of game theory. Prerequisite: MASI 5321.

5330. NONPARAMETRIC STATISTICS (3-0). A survey of statistical techniques which may be used when the normal assumptions of parametric statistics cannot be made; inclusion of procedures for cross-classified data, methods involving ranks, and Kolmogorov-Smirnov type techniques. Prerequisite: BUSA 5301 or equivalent.

5182, 5282, 5382. INDEPENDENT STUDIES IN MANAGEMENT SCIENCE. Extensive analysis of a management science topic. Prerequisite: consent of faculty member and department chairman.

5192, 5292, 5392. SELECTED TOPICS IN MANAGEMENT SCIENCE. In depth study of selected topics in management science. May be repeated when topics vary. Prerequisite: consent of instructor and Graduate Advisor.

6301. APPLIED GENERAL SYSTEMS THEORY (3-0). General concepts of systems, including contributions to system theory from a wide variety of disciplines, applied to the analysis, design, and control of systems in industry and the public sector. Prerequisite: consent of instructor.

6302. DATA ANALYSIS USING REGRESSION (3-0). A data analytic approach to building linear models stressing the steps of model identification, parameter estimation, diagnostic checking, and model validation; alternatives to least squares estimation such as ridge and robust regression presented; introduction to analysis of variance for the more common experimental designs. Prerequisite: BUSA 5325 or equivalent.

DISSERTATION—See Mathematical Sciences entry for students in the Ph.D. Program in Mathematical Sciences; see Administration entry for students in the Ph.D. Program in Administration.

INFORMATION SYSTEMS (INSY)

5340. INTRODUCTION TO INFORMATION SYSTEMS (3-0). An overview of Information Systems, their conceptual foundations, structure and development. Includes hardware and software technology, computer-based applications, management of corporate information systems, and current trends. Prerequisite: MASI 5311 or equivalent.

5341. INFORMATION SYSTEMS ANALYSIS (3-0). Definition, analysis and documentation of information systems. Consists of contemporary tools and techniques used to develop the functional specifications of systems. Includes user liaison, system specification, feasibility and cost-benefit analysis, and project planning and control. Prerequisite: INSY 5340.

5342. INFORMATION SYSTEMS DESIGN (3-0). Design and development of computer-based information systems, beginning with system specification, and comprising program design, coding, testing, documentation and implementation. Includes concepts in structured design and programming. Prerequisite: INSY 5341 and COBOL.

5343. DISTRIBUTED INFORMATION SYSTEMS AND DATA COMMUNICATIONS (3-0). Characteristics, feasibility, configuration and design of distributed processing systems. Various business applications of distributed processing discussed. Computer programming in an interactive computer language. Prerequisite: INSY 5340.

5344. DATA BASE MANAGEMENT (3-0). Concepts and methods in the management of data bases. Includes: objectives, data structures, data base design, interrogation languages, selection of data base management systems, data integrity, security and privacy. Prerequisite: INSY 5340.

5345. MANAGEMENT OF INFORMATION SYSTEMS (3-0). Issues related to the administration of computer-based systems including planning and development; control and evaluation; organization and personnel. Societal and technological issues are also addressed from a managerial viewpoint. Prerequisite: INSY 5340.

5182, 5282, 5382. INDEPENDENT STUDIES IN INFORMATION SYSTEMS. Extensive analy-

sis of an information systems topic. Prerequisite: consent of faculty member and department chairman.

5192, 5292, 5392. SELECTED TOPICS IN INFORMATION SYSTEMS. In depth study of selected topics in information systems. May be repeated when topics vary. Prerequisite: consent of instructor and Graduate Advisor.

6301. APPLIED GENERAL SYSTEMS THEORY (3-0). General concepts of systems, including contributions to system theory from a wide variety of disciplines, applied to the analysis, design, and control of systems in industry and the public sector. Prerequisite: consent of instructor.

6302. CONCEPTUAL ISSUES IN INFORMATION SYSTEMS (3-0). Issues involved in the development of computer-based information systems including complexity and information, alternative approaches to system design, human information processing and decision support systems, system adaption, and research in systems development. Prerequisite: INSY 5340.

DISSERTATION—See Mathematical Science entry for students in the Ph.D. Program in Mathematical Sciences; see Administration entry for students in the Ph.D. Program in Administration.

URBAN AND REGIONAL AFFAIRS Programs Division (URBA)

Areas of Study	*Degrees*
Urban Affairs	M.A.
Administration (See Interdepartmental and Intercampus Programs.)	Ph.D.

Master's Degree Plans: Thesis and Thesis Substitute

Division Director: Mark S. Rosentraub 530 University Hall 273-3071

Graduate Advisor: Sherman Wyman 512 University Hall 273-3071

Graduate Faculty:

Professors Cole, Cornehls, Geisel, Taebel
Associate Professors Rosentraub, Seidel, Wyman

OBJECTIVES

The Master of Arts degree in urban affairs is organized around a subject matter area, city or urban phenomena, rather than one of the traditional disciplines. Emphasis is placed on issues, problems, and public policy questions related to life in urban communities. Urban problems are viewed as complex which require the understanding and skills of many disciplines. Therefore, the program is interdisciplinary in character, curriculum content, teaching staff, and enrollment of students.

Broad and intensive graduate education in urban affairs can introduce graduates to a variety of rewarding and profitable careers and positions. With the increased urbanization of Texas and the nation, new career opportunities, many of them recent in origin, are becoming available.

By educating young men and women for urban affairs careers, the program seeks to help provide society with the "brain power" needed to deal with increasingly complex and urgent city problems.

DUAL DEGREE PROGRAM

In conjunction with the Graduate School of Social Work, the Institute participates in a dual degree program whereby a student can earn a Master of Arts in Urban Affairs and a Master of Science in Social Work. To participate in the program, a student must make separate applications to both the Institute and the Graduate School of Social Work. Admission to one program does not automatically ensure admission to the other program because of both selection crite-

ria and spaces available. The dual program requires students to complete a total of 82 semester hours as follows: 46 hours of coursework in the Graduate School of Social Work, 24 hours in the Institute and 12 hours of joint coursework. The 12 hours of joint courses are composed of six hours of classroom research courses and either a six-hour research practicum or thesis in the Graduate School of Social Work or a thesis in the Institute.

DEGREE REQUIREMENTS

The Master of Arts degree in urban affairs seeks to provide students with an understanding of cities in five general and interrelated areas of knowledge:

1. Introduction to Urban Affairs and Urban Institutions (9-12 hours)
2. Urban Policy Problems (6 hours)
3. Professional Development (6-9 hours)
4. Research and Analysis (12 hours)
5. Self-development (3 or more hours)

A total of 36 to 42 hours is required for completion of the program, depending on the prior academic degree of the student, prior professional experience and the specialization within the Professional Development field. In general all new students will take URBA 5300, Introduction to Urban Affairs, as their first course in the program.

In the Professional Development field, students can specialize in urban management, urban and social planning, or policy research. As an alternative, they can petition to substitute another professional field, such as criminal justice, journalism, social work, engineering, or business administration.

In the Research and Analysis field, all students are required to take URBA 5360, Methods of Social Research and Analysis, URBA 5363, Applied Urban Analysis. Students then have the option of taking one or the other of the sequences listed below:

a. URBA 5361, Professional Report Writing, and URBA 5396, Project Report;
b. URBA 5362, Advanced Statistics, and URBA 5397, Research Report.

A student may select URBA 5698, Thesis, in lieu of either URBA 5396, Project Report, or URBA 5397, Research Report.

INTRODUCTION TO URBAN AFFAIRS AND URBAN INSTITUTIONS

5300. INTRODUCTION TO URBAN AFFAIRS (3-0).Urban history; social, economic and political institutions; urban policy, such as transportation, housing and crime; professional roles in urban communities. Pass/Fail only.

5301. THE URBAN POLITICAL SYSTEM (3-0). Examination of the city as a political system, including the impact of urbanization and fragmentation on policies; input dimensions, including voting patterns and interest group development; decision-making structures, especially types of community power structures and the impact of the reform movement on structural processes. Also offered as POLS 5331; credit will be granted only once.

5302. THEORIES OF URBAN SOCIETY (3-0). Several theoretical perspectives of the community and community organization examined. Special emphasis given to theories from human ecology, organization and stratification, and social welfare.

5303. THE URBAN ECONOMY (3-0). Internal dynamics of the growth and development of the urban system and its relation to the national economy. National and urban economic policy, urban growth and land use, market imperfections, urban financial issues, and the environmental implications of urban growth studied through lecture, game simulation and policy debates.

5304. URBAN GEOGRAPHY (3-0). Emphasizes areal aspects associated with urban physical environments and social, behavioral and financial processes that shape these environments.

5305. URBAN HISTORY (3-0). Extensive reading primarily in the history of urbanization and metropolitanization of the people of the United States. Historical method as exemplified in the works of leading historians analyzed; examples of the scholarship of selected historians and treatises on selected cities, regions, and urban institutions studied. Also offered as HIST 5303; credit will be granted only once.

5306. COMPARATIVE URBAN SYSTEMS (3-0). Urbanization and the institutional processes of cities on an intracultural or intercultural basis; cities from a functional perspective, emphasizing such areas as housing, health care and transportation in a comparative framework.

5390. SPECIAL TOPICS IN URBAN THEORY. Different topics explored on an intensive basis, especially recent theoretical approaches. May be repeated for credit as topic changes.

URBAN AND REGIONAL AFFAIRS

URBAN POLICY

5310. URBAN POLICY AND INTERGOVERNMENTAL RELATIONS (3-0). Critical analysis of federal government and selected state and local government policies and programs designed to influence the course of change and the future development of cities and urban areas. The role of "private" governments in affecting policy explored.

5311. SOCIAL POLICY FORMATION (3-0). Utilization of a sociological approach in the study of policy formation in such areas as aging, social planning, and community problem solving.

5312. ECONOMIC POLICY (3-0). Examines the structure of the U.S. economic system and its impact on the welfare of consumers, workers and industry; public policy efforts to provide for management of critical economic variables are evaluated for their effectiveness and equity as they impact different interest groups.

5313. COMMUNITY DEVELOPMENT (3-0). Focuses on problems of neighborhood development and revitalization. Decline of economic opportunity in central cities and deterioration of housing and neighborhoods analyzed. Federal, state and local policies, with grass roots initiatives evaluated for effectiveness in promoting community stability.

5314. URBAN TRANSPORTATION (3-0). Analysis of development of transportation systems in cities, including mass transportation; review of governmental policy and fiscal strategies; impact on design of cities and other social problems.

5315. URBAN EDUCATION (3-0). Public schools in cities: financing, governance, management, enrollment, staffing, curriculum demands. Issues such as race, low income, special service needs, interaction with agencies and government entities.

5316. HUMAN SERVICES (3-0). Social welfare institutions—private and public; needs assessment, resource allocation, procedures, city/state/federal/private policy review; highlights of current system demands and changes.

5317. URBAN ENVIRONMENTAL MANAGEMENT AND POLICY (3-0). Focuses on the physical-environmental dimensions of urbanization including such factors as pollution, waste disposal, and land use; stresses the role of economics, social, and political institutions as these affect environmental quality of the city. Management and policy alternatives for dealing with urban environmental problems will be studied.

5391. SPECIAL TOPICS IN URBAN POLICY (3-0). Different topics and approaches in analysis of urban problems. May be repeated for credit as topic changes.

PROFESSIONAL DEVELOPMENT

Urban Management

5320. ORGANIZATION THEORY AND DEVELOPMENT (3-0). Historical evolution of administrative theory including classical, sociological and social-psychological dimensions; decision-making theory; implications of public interest theory for public management; basic concepts of organization development and impact on public administration paradigms; new public administration; and future of public urban organization. Also offered as CRJU 5309 and POLS 5303; credit will be granted only once.

5321. URBAN MANAGEMENT (3-0). Focuses through lectures, readings, and exercises on major administrative process: budgeting, personnel and policy development and analysis; management styles and key contemporary management problems explored through presentations by prominent local practitioners.

5322. URBAN BUREAUCRACY AND THE POLICY PROCESS (3-0). Development of theory of bureaucracy; bureaucracy as social issue; ethics and morality in public bureaucracy; mobilization of special interest support; power differentials in urban agencies; policy process in bureaucracy; new bureaucratic structuresand processes for urban policy making.

5323. PUBLIC ORGANIZATIONAL CHANGE (3-0). Current theories and concepts of public organizational change with particular emphasis on organization development and action research; theoretical roots of contemporary change literature traced through readings and discussion of classical organization theory, public administration including New Public Administration decision making, public interest, phenomenology, learning theory and general systems. Prerequisite: basic organization theory course or permission of instructor.

5324. URBAN PUBLIC FINANCE (3-0). Tax, revenue, and fiscal problems of cities and local governments in metropolitan areas; problems of matching costs and benefits in providing public services among different local governments; increasingly complex dimensions of intergovernmental fiscal relations and public budgeting systems. Also offered as POLS 5322; credit will be granted only once.

5325. URBAN AND ADMINISTRATIVE LAW (3-0). Examines scope and role of administrative regulation of and by governmental agencies; explores constitutional principles which limit

administrative power and administrative law which governs classical areas of conflict between administrative agencies and their constituencies; rule-making, judicial review and informed regulatory processes of importance to public officials.

5392. SPECIAL TOPICS IN URBAN MANAGEMENT (3-0). Selected topics on current management problems including small city management, community-neighborhood relations, citizen involvement programs and techniques, personal and professional effectiveness as a total person, intergovernmental strategies and styles, public-private sector collaboration and co-planning, privatization, and other alternatives to economic service delivery. May be repeated as topic changes.

Urban and Social Planning

5330. URBAN AND REGIONAL PLANNING (3-0). Nature of the planning process in cities and urban regions and with concepts and techniques used by professional planners and planning organizations. Emphasis on understanding the role, limitations, and political aspects of urban planning.

5331. URBAN DESIGN (3-0). Seeks to provide understanding and appreciation of the concepts and skills of architects and physical design specialists; importance of design, form, and visual or aesthetic factors studied. The interdependence of physical design and aesthetic and governmental policies and social problems in urban areas emphasized.

5332. COMMUNITY AND NEIGHBORHOOD ORGANIZATION (3-0). Structures and processes in the analysis and development of community and neighborhood organizations; special emphasis given to poverty and minority communities and neighborhoods.

5333. HUMAN SERVICE PLANNING (3-0). Needs assessment, funding, agency management, priority setting, service providers, long range planning, federal, state, local, private, public, volunteer roles.

5334. LAND USE PLANNING AND THE LAW (3-0). Examines the relationship between land use in urban areas and the legal system; covers traditional land use planning tools of zoning, sub-division regulation, and the special permit system; assessment of some of the more exotic, modern tools for managing urban growth for their legality and scope as interpreted by the judicial system.

5393. SPECIAL TOPICS IN URBAN PLANNING (3-0). Focuses on selected areas in urban and social planning. May be repeated for credit as topic changes.

Policy Research

5340. EVALUATIONS RESEARCH (3-0). Methodological issues in evaluating public programs; identification of variables, indicators and analyses formats presented.

5341. ADVANCED DATA ANALYSIS (3-0). Multivariate approaches to data analysis.

5342. DEMOGRAPHIC METHODS (3-0). Examination of sources of data-census, vital statistics, special surveys, reports, special studies; techniques of analysis with particular emphasis on growth and projection models, interpretation of findings as a major policy area in urban analysis.

5343. COST BENEFIT ANALYSIS (3-0). Reviews theory of cost-benefit and cost-effective analyses; explores the research, measurement and methodological requirements for the assessments of costs and benefits. It is recommended that students have completed at least one graduate course in research and one graduate class in public finance.

5394. SPECIAL TOPICS IN URBAN RESEARCH (3-0). Different topics each semester concentrate on a variety of methodological techniques and research strategies, such as demographic research and survey techniques. May be repeated for credit as topic changes.

Professional Field Experience

5350. URBAN MANAGEMENT/PLANNING INTERNSHIP (3-0). Designed to integrate work experience and course work through a series of brief work-related assignments; presentations by local planning and management practitioners and class discussions and exercises. Enrollment is open to both pre-entry and in-career students. Formal internship placements with agency mentors will be arranged. Pass/Fail only.

RESEARCH AND ANALYSIS

5360. METHODS OF SOCIAL RESEARCH AND ANALYSIS (3-0). Research methodology and statistical techniques useful in analysis of urban trends and problems; newer concepts and procedures for use of computers in social research studied. Special problems and methods of evaluative research related to programs and policies for coping with urban problems explored.

5361. PROFESSIONAL REPORT WRITING (3-0). Provides students entering public sector

employment with writing, management information, data retrieval skills to communicate ideas and information within and outside an agency; basic writing skills reviewed, including organization of reports and grammatical construction; assignments based on actual internship position of students in public agencies.

5362. STRATEGIES FOR URBAN RESEARCH (3-0). Conceptual and methodological approaches for the analysis of urban processes and the design of selected urban systems.

5363. APPLIED URBAN ANALYSIS (3-0). Group and individual projects to develop research studies or strategies, data reports for local government, agency or citizen group; techniques appropriate to task utilized. Pass/Fail only.

5395. CONFERENCE COURSE IN URBAN AFFAIRS (3-0). Reading and research in a specialized area of urban affairs under the direction of a member of the graduate faculty.

5396. PROJECT REPORT (3-0). Student prepares report focusing on specific policy or professional issue, utilizing appropriate research techniques; subject area and design of project report with consent of instructor. Pass/Fail only. Prerequisite: URBA 5361.

5397. RESEARCH REPORT (3-0). Student prepares report comparable to a journal article focusing on research issue, utilizing appropriate theory and research techniques; subject area and design of research report with consent of instructor. Pass/Fail only. Prerequisite: URBA 5362.

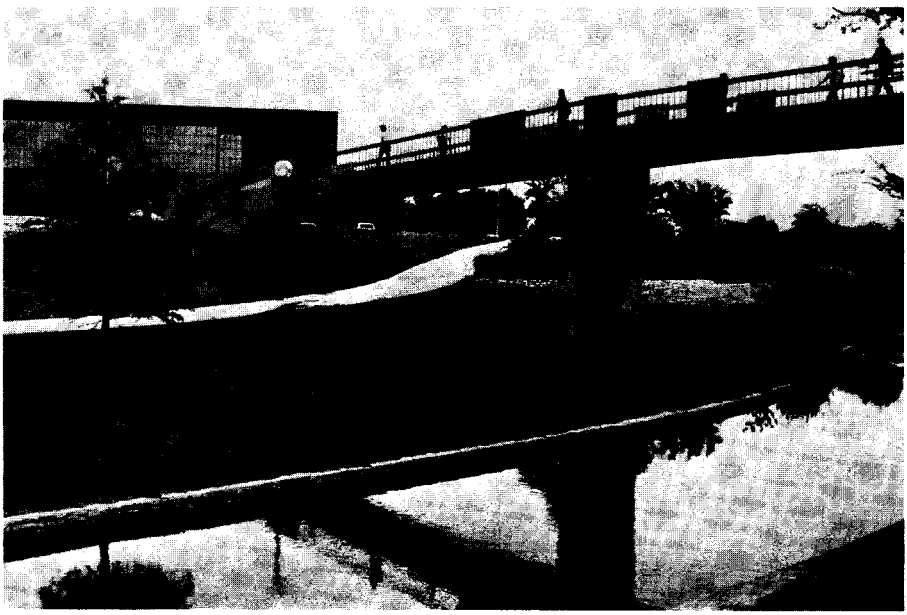
5698. THESIS. A thesis conforming to university and departmental requirements may be prepared by graduate students in urban affairs.

ADMINISTRATION (PhD Level Courses)

6310. MONETARY AND FISCAL POLICY: THE FEDERAL ROLE (3-0). Examination of the role of the federal government in maintaining economic stability, ensuring full employment and controlling inflation; exploration of liberal interventionist, conservative and radical theories of state economic management to assess the various policy alternatives and the importance of interest groups.

6320. STRATEGIC DECISION MAKING (3-0). Examination of the available models of policy setting in large complex social systems; critique of the shortcomings of the "goal-oriented" policy development models; adaptation of these models to formal and informal organizational decision-making.

6340. RESEARCH DESIGN (3-0). Advanced course especially for Ph.D. students; covers logic of research design and problems of structure. Emphasis on empirical and quantitative studies.



INTERDEPARTMENTAL and INTERCAMPUS PROGRAMS

The University reserves the right to withdraw courses at any time, change fees, rules, calendar, curriculum, degree programs, degree requirements, graduation procedures, and any other requirements affecting students. Changes will become effective whenever the proper authorities so determine and will apply to both prospective students and those already enrolled. The provisions of this catalog do not constitute a contract, express or implied, between any applicant, student, or faculty member and The University of Texas at Arlington Graduate School or The University of Texas System.

ADMINISTRATION Program (ADMN)

Areas of Study	*Degrees*
Business Administration	Ph.D.
Social Work	Ph.D.
Urban Affairs	Ph.D.

Graduate Advisors:

Business Administration		
Paul J. Solomon	434 Business	273-3004
Social Work		
Roosevelt Wright, Jr.	201 Social Work	273-2707
Urban Affairs		
Delbert A. Taebel	528 University Hall	273-3358

Graduate Faculty:

Professors Apilado, Callicutt, Carney, Cole, Cornehls, Courtney, Dickinson, Garland, Gates, Geisel, Hayashi, Holland, Imke, Lecca, McCrea, McDaniel, Mindel, Mullendore, Nelson, Ross, Saleebey, Schkade, Snavely, Solomon, Stanley, Stevens, Sundel, Taebel, Trapani, Wofford, Ziegler

Associate Professors Baker, Brobst, Dierks, Edgar, French, Gerloff, Gray, Hall, Herbst, Hitt, Isakson, McInish, Ordway, Price, Quick, Rosentraub, Seidel, Solomon, Tsay, Walther, Wheeler, Wright

OBJECTIVE

The Doctor of Philosophy in Administration program is a unique approach to the preparation of students for a variety of administrative positions. Students study in interdisciplinary fields broadly related to general administration and specialize at the dissertation stage by means of a substantive research project.

A student's program consists of course work, independent study, research, and a dissertation in an administrative area. Candidates for the degree select five areas to study from among the following: accounting, administration and planning, economics, finance, information systems, management, management science, marketing, policy processes, research in administration, urban systems and administration, and urban affairs. Upon special request and approval, a student may include an appropriate external area as one of the five fields. At some time during the program, the students must demonstrate competence in an administration core consisting of analysis, organization, and policy. Proficiency in research is required of all students.

ADMISSION REQUIREMENTS

Students planning to concentrate in social work should hold a master's degree in social work or in a related academic field. There is no specific background requirement for students planning to concentrate in business administration or urban affairs.

DEGREE REQUIREMENTS

Residence and Course Requirement—A student in the program must successfully complete a minimum of 15 semester hours in one 12 month period during his doctoral program. The doctoral program must include at least 24 semester hours of course work in addition to credit received for dissertation courses.

ADMINISTRATION

Foreign Language—Knowledge of a foreign language is required only when that knowledge is appropriate for the dissertation research. The requirement will be set in individual cases by the student's doctoral committee.

Diagnostic Evaluation—The diagnostic evaluation, to be administered according to the Graduate School regulations, will cover the administrative core of analysis, organization, and policy.

Time Limit—All coursework and the comprehensive examination must be completed within five calendar years after entry (registration date for first course or courses) into the program. All remaining degree requirements must be completed within four calendar years from the date of successful completion of the comprehensive examination.

ADMINISTRATION (ADMN)

6301. SEMINAR IN ADMINISTRATIVE ACCOUNTING (3-0). A study of contemporary accounting theory and its application to administration of the organization and to external reporting.

6302. SEMINAR ON ADMINISTRATIVE APPLICATIONS OF ECONOMICS (3-0). The application of economic theory to problems in administration; a critical examination of significant literature and emphasis on the use of quantitative research techniques for solving of administrative problems.

6303. ADVANCED SEMINAR IN FINANCIAL MANAGEMENT (3-0). In-depth analysis of the theory of finance, incorporating the basic tenets of the corporate investment and financing decision; analysis structured around the three traditional areas of corporate finance, investments, and financial markets.

6305. SEMINAR IN URBAN POLICY PROCESSES (3-0). Final course for students with a primary or major field in urban affairs; may be used for the purpose of completing the comprehensive examination; focus on the political, economic, and sociological institutions in the policy process, including various theoretical approaches, and application of these multi-disciplinary perspectives in the analysis of specific policy issues.

6306. SEMINAR IN MARKETING (3-0). Study of the history of marketing thought, evolution of marketing theory, and latest theoretical developments.

6307. SEMINAR IN SOCIAL SYSTEMS (3-0). The study of the concepts and models of social systems theory; examination of the origins, elements, applicability, and shortcomings of the social systems approach to problem solving and organizational change. Prerequisite: SOCW 6315 and 6316 and permission of instructor.

6308. SEMINAR IN CONTEMPORARY MANAGEMENT THEORY AND RESEARCH (3-0). Advanced study of management history, contemporary theory and research as found in management literature.

6309. SEMINAR IN MANAGEMENT SCIENCES (3-0). Comprehensive and integrative study of management sciences, including epistemology, theoretical structures and considerations for application of models and methods of analysis.

6310. SEMINAR IN URBAN ADMINISTRATION (3-0). Urban administration and organization theories from sociological, political, economic, and planning perspectives.

6311. SEMINAR IN INFORMATION SYSTEMS (3-0). Comprehensive study of theory, research and advanced applications in the field of information systems.

6390. SEMINAR IN SPECIAL TOPICS IN ADMINISTRATION (3-0). Advanced doctoral level work in the areas of policy, administration, and research. May be repeated for credit when topic changes.

6392. INDEPENDENT STUDY IN ADMINISTRATION (3-0).

6399, 6699, 6999. DISSERTATION.

ACCOUNTING (ACCT) *See Department of Accounting for course descriptions.*

5301. ACCOUNTING ANALYSIS I—Foundation Course

5302. ACCOUNTING ANALYSIS II—Foundation Course

Advanced Elective Credit may be received from the following courses:

5310. INTRODUCTION TO BUSINESS TAXATION

5311. FINANCIAL ACCOUNTING I

5312. FINANCIAL ACCOUNTING II

5313. ACCOUNTING THEORY

5314. STUDY OF FEDERAL INCOME TAX LAW
5316. AUDITING CONCEPTS AND PRACTICES
5317. COST ACCOUNTING
5318. STUDIES IN AUDITING
5319. FINANCIAL ACCOUNTING III
5320. GOVERNMENTAL AND NONPROFIT ACCOUNTING
5321. CASES IN FINANCIAL ACCOUNTING
5322. ACCOUNTING FOR MANAGEMENT PLANNING AND CONTROL
5323. CORPORATE MODELING
5324. ADVANCED STUDIES IN PLANNING AND CONTROL
5327. CONTEMPORARY ISSUES IN ACCOUNTING THEORY
5329. INFORMATION SYSTEM ANALYSIS
5330. INTERNATIONAL ACCOUNTING AND FINANCIAL REPORTING
5340. STUDY OF FEDERAL INCOME TAX FOR ENTITIES OTHER THAN INDIVIDUALS
5341. TAX PROBLEMS OF PARTNERSHIPS AND PARTNERS
5342. TAX PROBLEMS OF CORPORATE REORGANIZATIONS AND LIQUIDATIONS
5343. TAX PROBLEMS OF TRANSACTIONS IN REAL ESTATE
5344. TAX PROBLEMS OF THE EXTRACTIVE INDUSTRIES
5345. CONTEMPORARY ISSUES IN FEDERAL TAXATION
5346. SEMINAR IN FEDERAL TAXATION
5347. FEDERAL TAXATION OF GIFTS AND ESTATES
5348. TAX PLANNING AND RESEARCH
5349. ADVANCED TAX PLANNING
5392. SELECTED TOPICS IN ACCOUNTING

ADMINISTRATION AND PLANNING (SOCW) *See Graduate School of Social Work for course descriptions.*

6316. ADVANCED ADMINISTRATION
6334. SOCIAL WORK AND THE POLITICAL PROCESS
6335. ADVANCED SEMINAR IN THE THEORY AND PRACTICE OF SOCIAL WORK ADMINISTRATION
6392. SELECTED TOPICS IN SOCIAL WELFARE: LEADERSHIP SKILLS TRAINING FOR HUMAN SERVICE ADMINISTRATORS
6392. SELECTED TOPICS IN SOCIAL WELFARE: ORGANIZATIONAL COMMUNICATIONS
6359. THEORIES OF PLANNING
6357. PRINCIPLES OF ADMINISTRATION: A DOCTORAL SEMINAR
6362. SEMINAR IN HUMAN SERVICES PLANNING METHODS
6358. STRESS MANAGEMENT IN THE HUMAN SERVICES

ECONOMICS (ECON) *See Department of Economics for course descriptions.*

5301. ECONOMIC DEVELOPMENT
5304. ADVANCED PUBLIC FINANCE
5308. ECONOMIC HISTORY OF THE UNITED STATES
5310. MICROECONOMIC THEORY
5312. MACROECONOMIC THEORY
5313. MANAGERIAL ECONOMICS
5314. INDUSTRIAL ORGANIZATION
5316. MATHEMATICAL ECONOMICS I
5317. MATHEMATICAL ECONOMICS II
5321. INTERNATIONAL ECONOMICS
5324. MONETARY AND FISCAL ECONOMICS

ADMINISTRATION

5326. HISTORY OF ECONOMIC THOUGHT
5327. INTERNATIONAL FINANCE
5328. INSTITUTIONAL ORGANIZATION AND ECONOMIC BEHAVIOR
5329. RESEARCH METHODS IN APPLIED ECONOMICS
5330. ADVANCED LABOR ECONOMICS
5331. URBAN ECONOMICS
6310. APPLIED MICROECONOMIC THEORY
6312. APPLIED MACROECONOMIC THEORY
6336. ECONOMETRICS II
6392. RESEARCH IN ECONOMICS
5332. TRANSPORTATION ADMINISTRATION
5333. ECONOMICS OF HEALTH
5335. GOVERNMENT REGULATION OF BUSINESS
5337. BUSINESS AND ECONOMIC FORECASTING
5338. SEMINAR
5340. ADVANCED MANPOWER ECONOMICS
5182, 5282, 5382. INDEPENDENT STUDIES IN ECONOMICS
5191, 5292, 5392.. RESEARCH AND SPECIAL TOPICS IN ECONOMICS

FINANCE (FINA) *See Department of Finance and Real Estate for course descriptions.*

5311. BUSINESS FINANCIAL MANAGEMENT—Foundation Course
5320. SEMINAR IN CENTRAL BANKING
5322. ADVANCED BUSINESS FINANCIAL PROBLEMS
5323. INVESTMENT MANAGEMENT PROBLEMS
5324. SEMINAR IN FINANCIAL THEORIES
5325. MANAGEMENT OF FINANCIAL INSTITUTIONS
5326. COMMERCIAL BANKING
5327. RISK MANAGEMENT
5331. MULTINATIONAL FINANCIAL MANAGEMENT
5182, 5282, 5382. INDEPENDENT STUDIES IN INFORMATION SYSTEMS
5192, 5292, 5392. SELECTED TOPICS IN INFORMATION SYSTEMS
5192, 5292, 5392. SELECTED TOPICS IN FINANCE

INFORMATION SYSTEMS (INSY) *See Department of Systems Analysis for course descriptions.*

5340. INTRODUCTION TO INFORMATION SYSTEMS
5341. INFORMATION SYSTEMS ANALYSIS
5342. INFORMATION SYSTEMS DESIGN
5343. DISTRIBUTED INFORMATION SYSTEMS AND DATA COMMUNICATIONS
5344. DATA BASE MANAGEMENT
5345. MANAGEMENT OF INFORMATION SYSTEMS
5182, 5282, 5382. INDEPENDENT STUDIES IN INFORMATION SYSTEMS
5192, 5292, 5392. SELECTED TOPICS IN INFORMATION SYSTEMS
6301. APPLIED GENERAL SYSTEMS THEORY
6302. CONCEPTUAL ISSUES IN INFORMATION SYSTEMS

MANAGEMENT (MANA) *See Department of Management for course descriptions.*

5320. ORGANIZATIONAL BEHAVIOR
5321. COMPLEX ORGANIZATIONS

5322. COMPENSATION ADMINISTRATION
5324. GROUP AND INTERGROUP RELATIONSHIPS
5325. INDUSTRIAL RELATIONS
5326. ORGANIZATIONAL DEVELOPMENT AND CHANGE
5328. OPERATIONS MANAGEMENT
5329. METHODS OF ORGANIZATIONAL RESEARCH
5330. ARBITRATION AND DISPUTE SETTLEMENT
5331. MANAGEMENT OF INTERNATIONAL OPERATIONS
5333. MANAGEMENT OF TECHNOLOGY
5340. PERSONNEL-HUMAN RESOURCE MANAGEMENT
5182, 5282, 5382. INDEPENDENT STUDIES IN MANAGEMENT
5192, 5292, 5392. SELECTED TOPICS IN MANAGEMENT
6318. SEMINAR IN ORGANIZATIONAL THEORY AND LABOR RELATIONS
5328. SEMINAR IN BUSINESS POLICY
6338. SEMINAR IN ORGANIZATIONAL BEHAVIOR
6348. SEMINAR IN PERSONNEL/HUMAN RESOURCES MANAGEMENT
6392. RESEARCH IN ADMINISTRATION

MANAGEMENT SCIENCE (MASI)

See Department of Systems Analysis for course descriptions.

5311. DECISION MODELS AND INFORMATION SYSTEMS
5321. INTRODUCTION TO MANAGEMENT SCIENCES
5323. APPLIED DECISION THEORY
5326. SIMULATION AND BUSINESS MODELS
5327. APPLIED MATHEMATICAL PROGRAMMING
5330. NONPARAMETRIC STATISTICS
5182, 5282, 5382. INDEPENDENT STUDIES IN MANAGEMENT SCIENCE
5192, 5292, 5392. SELECTED TOPICS IN MANAGEMENT SCIENCE
6301. APPLIED GENERAL SYSTEMS THEORY
6302. DATA ANALYSIS USING REGRESSION

MARKETING (MARK)

See Department of Marketing for course descriptions.

5320. BUYER BEHAVIOR
5324. SEMINAR: CONTEMPORARY MARKETING PROBLEMS
5325. PHYSICAL DISTRIBUTION MANAGEMENT
5326. ADVERTISING AND NONPERSONAL COMMUNICATIONS
5327. RESEARCH FOR MARKETING DECISIONS
5328. PRODUCT MANAGEMENT
5329. SALES, SALES MANAGEMENT
5331. INTERNATIONAL MARKETING
5332. INDUSTRIAL MARKETING
5335. RETAIL MARKETING MANAGEMENT
5336. ADVANCED RESEARCH ANALYSIS
5340. MARKETING STRATEGY
5182, 5282, 5382. INDEPENDENT STUDIES IN MARKETING
5192, 5292, 5392. SELECTED TOPICS IN MARKETING

POLICY PROCESSES (SOCW)

See Graduate School of Social Work for course descriptions.

ADMINISTRATION

5320. HEALTH POLICY
6304. ISSUES IN CHILD WELFARE
6319. ISSUES IN COMMUNITY MENTAL HEALTH
6328. SOCIAL POLICY RESEARCH AND ANALYSIS
6331. PROFESSIONAL AND INSTITUTIONAL HISTORY AND PHILOSOPHY OF SOCIAL WELFARE
6337. POVERTY POLICY
6351. SOCIAL WELFARE POLICY AND THE AGED
6356. ADVANCED SEMINAR IN CONTEMPORARY POLICY ISSUES

REAL ESTATE (REAE) *See Department of Finance and Real Estate for course descriptions.*

5321. REAL ESTATE INVESTMENT
5334. ADVANCED REAL ESTATE EVALUATION
5335. ADVANCED REAL ESTATE FINANCE

RESEARCH IN ADMINISTRATION

An interdisciplinary field, see individual departments for course descriptions.

BUSA 5301. STATISTICS
MASI 5311. DECISION MODELS & INFORMATION SYSTEMS
URBA 5360. METHODS OF SOCIAL RESEARCH AND ANALYSIS
URBA 5362. STRATEGIES FOR URBAN RESEARCH
SOCW 6322. RESEARCH & EVALUATION METHODS IN SOCIAL WORK I
SOCW 6324. RESEARCH & EVALUATION METHODS IN SOCIAL WORK II
BUSA 5325. ADVANCED STATISTICAL METHODS IN BUSINESS ADMINISTRATION
URBA 5341. ADVANCED DATA ANALYSIS
SOCW 6361. ADVANCED STATISTICAL METHODS IN HUMAN SERVICES
ECON 5336. ECONOMETRICS I
ECON 5316. MATHEMATICAL ECONOMICS
MASI 5326. SIMULATION & BUSINESS MODELS
SOCW 6336. SEMINAR IN LARGE SCALE ORGANIZATIONAL AND EVALUATION RESEARCH
PSYC 5344. PSYCHOMETRIC THEORY
PSYC 5307. EXPERIMENTAL DESIGN
PSYC 5308. QUANTITATIVE METHODS
PSYC 5405. ADVANCED STATISTICS
PSYC 5406. ADVANCED STATISTICS II
ECON 5337. BUSINESS & ECONOMIC FORECASTING
URBA 5340. EVALUATIONS RESEARCH
SOCW 6360. ADVANCED RESEARCH METHODS IN HUMAN SERVICES
URBA 6340. RESEARCH DESIGN
MANA 6329. ADVANCED RESEARCH METHODS

URBAN AFFAIRS (URBA) *See Department of Urban and Regional Affairs for course descriptions.*

5301. THE URBAN POLITICAL SYSTEM
5302. THEORIES OF URBAN SOCIETY
5303. THE URBAN ECONOMY
5304. URBAN GEOGRAPHY
5305. URBAN HISTORY

5306. COMPARATIVE URBAN SYSTEMS
5310. URBAN POLICY AND INTERGOVERNMENTAL RELATIONS
5311. SOCIAL POLICY FORMATION
5312. ECONOMIC POLICY
5313. COMMUNITY DEVELOPMENT
5314. URBAN TRANSPORTATION
5315. URBAN EDUCATION
5316. HUMAN SERVICES
5317. URBAN ENVIRONMENTAL MANAGEMENT AND POLICY
5390. SPECIAL TOPICS IN URBAN THEORY
5391. SPECIAL TOPICS IN URBAN POLICY
6310. MONETARY AND FISCAL POLICY: THE FEDERAL ROLE

URBAN SYSTEMS AND ADMINISTRATION (URBA) *See Department of Urban and Regional Affairs for course descriptions.*

5320. ORGANIZATION THEORY AND DEVELOPMENT
5321. URBAN MANAGEMENT
5322. URBAN BUREAUCRACY AND THE POLICY PROCESS
5323. PUBLIC ORGANIZATIONAL CHANGE
5324. URBAN PUBLIC FINANCE
5325. URBAN AND ADMINISTRATIVE LAW
5392. SPECIAL TOPICS IN URBAN MANAGEMENT
6320. STRATEGIC DECISION MAKING

BIOMEDICAL ENGINEERING Program (BME)

Areas of Study	*Degrees*
Biomedical Engineering	M.S., Ph.D.
	Certificates
Clinical Engineering	Internship Residency

Master's Degree Plans: Thesis and Non-Thesis

Graduate Advisor: Wolf W. von Maltzahn 225 Engineering Laboratory 273-2249

Graduate Faculty:

Professor Lou
Assistant Professors Kondraske, von Maltzahn
Adjunct Associate Professors Allison, Eberhart, Finney, Kun, Reitman, Scacci, Stokely

OBJECTIVES

The Biomedical Engineering Program is jointly offered by The University of Texas at Arlington and The University of Texas Health Science Center at Dallas (UTHSCD). Research and teach-

ing efforts of various departments in the biological, engineering, mathematical, physical, and medical sciences of both institutions are coordinated through the Committee on Graduate Studies in Biomedical Engineering. The goal of the program is to prepare students as biomedical engineers for productive research, development, and teaching careers in academic, industrial, hospital, or governmental positions.

The program includes coursework and research in medical and hospital systems, cardiopulmonary assistance and oxygen transport, neurophysiological systems and cybernetics, radiological image processing, biomedical instrumentation, rehabilitation, biomaterials, biomechanics, simulation systems, and medical computer science.

The master's program is based upon graduate level work in one of the engineering disciplines supplemented with attainment of a fundamental knowledge of mathematics, and life and physical sciences. The program is designed to prepare the student for a professional career in biomedical engineering.

A six-month internship in clinical engineering after completion of the master's degree prepares a student for a professional career in clinical engineering. A student completing the internship program is awarded a certificate.

The doctoral program is based upon graduate level work in one of the engineering disciplines and extensive graduate training in the life and related physical sciences. The program is aimed at the development of professional biomedical engineers capable of independent research.

A one-year postdoctoral residency in clinical engineering is intended as preparation for clinical research. A student completing the residency program is awarded a certificate.

ADMISSION

Application for admission should be made at either UTA or UTHSCD. Normally, the institution through which the student applies and is admitted is the student's home institution. A student will be enrolled in both institutions while in the program.

In addition to admission requirements of the Graduate School, the bachelor's degree held by applicants to the program should be in engineering, biological, physical, or mathematical sciences. Students required to take the TOEFL must achieve a score of at least 550. Applicants to the doctoral program normally should have a graduate grade - point average exceeding 3.4 (if applicable), and a combined verbal and quantitative score of at least 1100 on the GRE. Students with unusual backgrounds and experience will be considered individually.

DEGREE REQUIREMENTS

In degree plan descriptions course numbers followed by a "D" are offered at UTHSCD. Courses indicated by an asterisk (*) are to be taken only with the written consent of the Graduate Advisor.

Non-Thesis Master of Science Degree Plan

Students selecting this plan take a minimum of 37 credit hours including the courses listed below.

Life Sciences: Physiology (BME 5385D); Anatomy (HSC 5607D).

One Engineering Area: Four courses*.

Biomedical Engineering: Fundamentals of Bioinstrumentation (BME 5381D); Laboratory Principles (BME 5382); Research Project or Directed Research (BME 5390 or 5396D); Seminar—1 year, first year (BME 5101 or 5193D).

Choose Two*: Neurophysiological Systems Analysis (BME 5311); Bioelectric Phenomena (BME 5312); Clinical Engineering (BME 5320); Biological Materials, Mechanics, and Processes (BME 5335); Cardio-Pulmonary-Renal Systems Analysis (BME 5325); Orthopedic Biomechanics 5340; Clinical Instrumentation and Measurements (BME 5345); Hospital Internship for Biomedical Engineers (BME 6390); Special Topics in Biomedical Engineering (BME 5300 or 5096D); Thermoregulation and Bio-heat Transfer (BME 5096AD); Design and Application of Artificial Organs (BME 5360D); Biomaterials and Blood Compatibility (BME 5096CD); Digital Processing of Medical Images (BME 5096ED); Biomedical NMR Imaging (BME 5096FD); Real Time Computation and Communication (BME 5374D); Optical and Magnetic Instrumentation and Measurements (BME 5386D).

Free Elective: One 3 hour course from Life Science, Engineering or BME.

Final Comprehensive Examination: The non-thesis student will be examined in all areas related to coursework taken.

Thesis Master of Science Degree Plan

Requirements of the thesis option are the same as those for the non-thesis option with the following exceptions: 1) free elective (3 hours) is deleted, 2) research project or directed research (BME 5390 or BME 5396D) is replaced by thesis (BME 5698 or 5098D), and 3) an oral defense of the thesis replaces the final comprehensive examination.

Clinical Engineering Internship Plan

Following the MS degree in BME, students entering this program are required to take Medical Rounds (BME 6193, 2 enrollments), Hospital Internship for Biomedical Engineers (BME 6990), and a comprehensive written/oral final examination.

Doctor of Philosophy Degree Plan

The PhD degree program consists of a minimum of 58 credit hours beyond the bachelor's degree level and includes the courses listed below.

Life Sciences: Neurobiology (PHYS 5582D); Physiology (PHYS 5680D); Biochemistry (BIOC 5680D) or TAGER Course or CHEM 4311 and 4312, or CHEM 5319 and 5320; Anatomy (BME 5383D); Medical Rounds (BME 6193 or MS 5176D).

One Engineering Area: Six Courses*.

Mathematics, Statistics, Computer and Physical Sciences: Choose two courses*.

Biomedical Engineering: Seminar—2 years, first 2 years (BME 5101 or 5193D); Fundamentals of Bioinstrumentation (BME 5381D); Dissertation—re-enroll, approximately 30 hours (BME 6399, 6699, 6999, or 5099D).

Choose Three*: Laboratory Principles (BME 5382); and the non-thesis MS degree listing of courses entitled "Choose Two."

Although qualified applicants may be accepted into the PhD program without earning the Master of Science in biomedical engineering, all students must satisfactorily pass the Diagnostic Evaluation. This examination will cover all relevant coursework taken by the student. The examination may be written, oral or both and consists of three approximately equal parts: (1) one engineering discipline. (2) biomedical engineering and physical and related sciences (mathematics, computer science, statistics, chemistry, and physics), and (3) biological and medical sciences.

Proficiency in the computer sciences and experimental statistics is substituted for the foreign language requirement.

The Comprehensive Examination consists of satisfactory completion of a detailed prospectus of proposed dissertation research and an oral examination.

Sufficient copies of the approved thesis or dissertation must be provided to satisfy the requirements of both UTA and UTHSCD.

Clinical Engineering Residency Plan

Following the PhD degree in BME, students entering this program are required to take Medical Rounds (BME 6193 or MS 5176D), Hospital Internship for Biomedical Engineers (BME 6990) each semester for one year, and a comprehensive written/oral final examination.

For additional information, applicants and students should contact the Graduate Advisor for a copy of the "Information Brochure" for related and amplified information about the graduate program.

5100, 5200, 5300. SELECTED TOPICS IN BIOMEDICAL ENGINEERING. Material may vary from semester to semester. May be repeated for credit if different topics are covered for each registration. Prerequisite: permission of the instructor.

5101, 5201, 5301. SEMINAR IN BIOMEDICAL ENGINEERING. University and guest lecturers speak on topics of current interest in the field of biomedical engineering. Graded P/F only.

5191, 5291, 5391. DIRECTED RESEARCH IN BIOMEDICAL ENGINEERING. Student participates in a research project under the individual instruction of a faculty supervisor. Prerequisite: permission of the instructor.

5193. MASTER'S COMPREHENSIVE EXAMINATION (1-0). Individual instruction, directed study, consultation, and comprehensive examination over course work leading to the non-thesis Master of Science degree in biomedical engineering. Graded P/F only. Required of all non-thesis MS students in the semester when they plan to graduate.

5311. NEUROPHYSIOLOGICAL SYSTEMS ANALYSIS (3-0). Applies systems theory to neurophysiology. Topics covered include: neuromuscular system, pupillary control, eye tracking, vestibular systems, cerebrospinal fluid dynamics, temperature regulation, and central nervous system function. Prerequisite: courses in college biology and EE 4314.

5312. BIOELECTRIC PHENOMENA (3-0). Introduces electrical behavior of nerve and muscle. Mathematical techniques utilized to provide a quanitative basis for observed phenomena. Topics include physiology of nerve and muscle, electro-chemistry and electrodes, subthreshold membrane phenomena, membrane action potentials, and volume-conductor fields. Prerequisite: BME 5385D.

5320. CLINICAL ENGINEERING (3-0). Electrical, mechanical, nuclear, radiological, and environmental hazards and safety programs in hospitals; hospital codes, standards, and regulations; setup and operation of clinical engineering programs in large, medium, and small sized hospitals; study of shared service programs.

5325. CARDIO-PULMONARY-RENAL SYSTEMS ANALYSIS (3-0). Mechanisms at work in the cardio vascular, respiratory and renal systems. Current methods of evaluating systems performance and the effect of pathologies are discussed. Prerequisite: BME 5385D, or permission of instructor.

5335. BIOLOGICAL MATERIALS, MECHANICS AND PROCESSES (3-0). Typical functional behavior of various biological materials, and the transport of mass, momentum and energy in biological systems. Prerequisites: BME 5385D, ME 3313, or permission of the instructor.

5340. ORTHOPEDIC BIOMECHANICS (3-0). Mechanical and structural properties of bone, cartilage, and ligaments; kinematics of joints; properties of implant materials; design of fracture fixation systems, joint protheses, and artificial ligaments.

5345. CLINICAL INSTRUMENTATION AND MEASUREMENTS (3-0). Measurement of physiological variables and historical developments of instrumentation. Lectures augmented by lab demonstrations. Topics include: electrode applications, cardiac and pulmonary instrumentation, surgical and intensive care monitoring, computer applications in medicine, evaluation of neurological function, X-rays and nuclear medicine, and electric safety. Prerequisites: BME 5385D, BME 5381D, or permission of the instructor.

5382. LABORATORY PRINCIPLES (0-9). Introduction to fundamental biomedical engineering laboratory procedures including human studies and animal surgery; data collection, analysis, and interpretation emphasized. Prerequisite: permission of the instructor.

5384, 5684, 5984. INSTRUMENTATION LABORATORY FOR BIOMEDICAL ENGINEERING. Laboratory course designed to provide experience in designing, developing, and evaluating biomedical instrumentation. May be repeated for credit if different topics are covered for each registration. Prerequisite: BME 5381D.

5390. RESEARCH PROJECT (0-9). Taken by students enrolled in the non-thesis option for the MS degree. Individual instruction in research and/or instrumentation development and evaluation conducted under supervision of the instructor. A final report required. Prerequisite: permission of the instructor.

5398, 5698, 5998. THESIS. Prerequisite: graduate standing in biomedical engineering.

6193. MEDICAL ROUNDS FOR BIOMEDICAL ENGINEERS (0-3). Individual instruction on biomedical engineering applications in medicine including both health care delivery and research. Patients seen provide educational foci for discussion of topics in biomedical engineering. Graded P/F only. Prerequisites: BME 5680D and permission of instructor.

6194. DOCTORAL DIAGNOSTIC EXAMINATION (1-0). Individual instruction, directed study, consultation, and diagnostic examination. Graded P/F only. Required of all doctoral students in the semester when they take the diagnostic examination.

6195. DOCTORAL COMPREHENSIVE EXAMINATION (1-0). Individual instruction, directed study, consultation, and comprehensive examination. Graded P/F only. Required of all doctoral students in the semester when they take the comprehensive examination.

6197, 6297, 6397, 6697, 6997. RESEARCH IN BIOMEDICAL ENGINEERING. Individually approved research projects leading to a doctoral dissertation in the area of biomedical engineering.

6390, 6690, 6990. HOSPITAL INTERNSHIP FOR BIOMEDICAL ENGINEERS. Each student interns at local hospitals under the individual supervision of the course instructor and staff physicians. During the semester, the student rotates through areas such as cardiac, pulmonary, prosthetic, and neuro surgery, anesthesiology, radiology, catheterization, and emergency care. Prerequisites: BME 5385D and permission of the instructor.

6399, 6699, 6999. DISSERTATION. Preparation and submission of a doctoral dissertation in an area of biomedical engineering. Prerequisite: admission to candidacy for the PhD in Biomedical Engineering.

Additional Courses offered at The University of Texas Health Science Center at Dallas (UTHSCD)

BME 5381D. Biomedical Instrumentation
HSC 5607. Anatomy for Biomedical Engineers
BME 5385D. Physiology for Biomedical Engineers
BME 5193D. Biomedical Engineering Seminar
BME 5094D. Research in Biomedical Engineering
BME 5096D. Special Topics in Biomedical Engineering:
BME 5096A. Thermoregulation and Bio-heat Transfer
BME 5096C. Biomaterials and Blood Compatibility
BME 5096E. Digital Processing of Medical Images
BME 5096F. Biomedical NMR Imaging
BME 5096G. Individual Laboratory Projects
BME 5360D. Design and Application of Artificial Organs
BME 5374D. Real Time Computation and Communication
BME 5386D. Optical and Magnetic Instrumentation and Measurements
BME 5176D. Medical Rounds

BUSINESS ADMINISTRATION Program

Areas of Study	*Degrees*
Business Administration	M.B.A.
Administration (See Interdepartmental and Intercampus Programs.)	Ph.D.

Master's Degree Plan: Thesis and Non-Thesis

Graduate Advisor: Paul Solomon 434 Business 273-3004

Graduate Faculty:

Professors Apilado, Carney, Courtney, Dickinson, Garland, Gates, Hayashi, Holland, McCrea, McDaniel, Mullendore, Nelson, Ross, Schkade, Snavely, P. Solomon, Stanley, Trapani, Wofford, Ziegler
Associate Professors Baker, Brobst, Calabro, Dierks, Dunn, Edgar, French, Gerloff, Gray, Hall, Herbst, Isakson, McInish, Ordway, Pinney, Quick, Price, Rajaraman, Sircar, L. Solomon, Tsay, Walther
Assistant Professors Caballero, Eakin, Hanna, D. Harris, F. Harris Rosenstein, Rudolf, Schmitt, Schwendiman, Slinkman, Swanson, Wheeler

OBJECTIVE

The Master of Business Administration program is aimed at general competence in management. Often managers must change their roles as they reach higher positions of responsibility. The ability to reason and learn in new situations aids in the creation of general management capabilities. The professional manager's ability to contribute constructively to change in business and to make and successfully execute wise decisions is, to a great extent, derived from a sensitivity to immediate problems. Management competence requires a willingness to face the challenge of living in an environment of uncertainty where innovation occurs at an ever-increasing rate and personal and group relationships are complex.

BUSINESS ADMINISTRATION

The MBA program offers the graduate student an opportunity to complete his or her education in business administration at a fully accredited college of business administration. The MBA program is fully accredited by the American Assembly of Collegiate Schools of Business.

ACCREDITATION

The Master of Business Administration program is accredited by the American Assembly of Collegiate Schools of Business.

DEGREE REQUIREMENTS

Admission to the Master of Business Administration program is based upon the completion of the general admission requirements of the Graduate School. For admission to the Business Administration program a satisfactory score on the Graduate Management Admission Test is required. There is no foreign language requirement for the MBA program.

Many people in business seek to enhance their career opportunities by broadening their knowledge and understanding of the overall management field. Since it is impossible for them to leave their responsibilities and return to academic work on a full-time basis, the College of Business Administration offers a complete program in the evening as a service to the community. Evening classes are taught by full-time faculty members and the same academic standards required of full-time students are maintained. It is expected that the student will progress through the program at a pace that is commensurate with the time available.

The program has been designed to accommodate students of widely divergent backgrounds. It is not necessary to have completed prior academic work in business administration. Foundation courses have been designed to prepare the student for advanced course work. These graduate courses are an integral part of the MBA program.

Grade and Graduation Requirements

The MBA program follows the grade requirements for probation as specified on pages 36-37. In addition, to graduate, students must have at least a 3.0 grade point average in all course work and area of concentration. Students will be dismissed from the MBA program if they accumulate grade deficiency points greater than 3. Any grade of C is worth one deficiency point, any grade of D is worth 2 deficiency points and any grade of F is worth 3 deficiency points. Deficiency points may not be removed from a student's record by additional course work.

THESIS DEGREE PLAN

Requirements for the thesis degree plan are the same as the requirements listed below for the non-thesis degree plan with the following change. A six hour thesis can be added to the MBA program. The six hours would be beyond the 36 advanced hours required for the MBA degree. All candidates for the degree shall defend the thesis at a final oral examination.

NON-THESIS DEGREE PLAN: Background Category I

Students who have had no prior academic work in business will enter the program of work listed for Semester I and continue sequentially through both the Foundation Program and the Advanced MBA Program. Students with a mathematics deficiency will be required to complete BUSA 5302.

NON-THESIS DEGREE PLAN: Background Category II

Students with varying amounts of academic work in business may have the requirement waived for those equivalent Foundation Program courses completed within the last eight years at institutions accredited by the American Assembly of Collegiate Schools of Business.

Foundation Program

Credit for these courses will not be given in the Advanced MBA Program.

Semester I

Accounting Analysis I (ACCT 5301)
Economic Analysis I (ECON 5309)
Statistics (BUSA 5301)
Decision Models and Information Systems (MASI 5311)
Behavioral Science in Management (MANA 5311)

Semester II

Accounting Analysis II (ACCT 5302)
Economic Analysis II (ECON 5311)
Marketing (MARK 5311)
Finance (FINA 5311)
Management (MANA 5312)

With approval of the Graduate Advisor, a student may enroll in advanced courses when schedule conflicts prevent completion of all the foundation courses. A student may not apply to the MBA degree more than nine semester hours of advanced work completed prior to the completion of all foundation courses.

Advanced MBA Program

The Advanced MBA Program normally consists of 36 hours of course work to be selected by the student and approved by the Graduate Advisor. However, the choice of accounting as the area of concentration will require the student to complete 39 or more hours of advanced course work. In those cases where it is necessary for the student to take the entire Foundation Program, the student will be allowed to waive up to six hours of electives in the advanced program.

Required MBA Courses

The following advanced MBA courses are required of all studentsOBUSA 5325; 5333; 5391; and either 5330 or 5337. BUSA 5325 is required of all students except those students with six hours of statistics who must take an approved advanced quantitative course.

Concentration Areas

A concentration of not more than 12 semester hours may be taken in one of the following curriculum areas: economics, finance, information systems (see Department of Systems Analysis courses), management, management science (see Department of Systems Analysis courses), and marketing. For those students who are required to take the entire Foundation Program and choose to waive the maximum of six hours of electives in the advanced program, the concentration will consist of nine hours. A student who wishes to take a program of courses in a wider range may choose not to take a concentration.

A concentration in accounting requires a minimum of 15 semester hours of advanced graduate accounting courses and a minimum of 39 semester hours of advanced work. The student selecting a concentration in accounting must have previously studied or include in his or her program courses covering the following areas of accounting: financial accounting and accounting theory, management information and computer systems, financial and operational auditing, and taxation.

Students who elect a concentration in Information Systems are advised to take six semester hours from ACCT 5322, 5323, 5324, or 5329 and may select up to six hours of graduate electives in computer science or management science, subject to the approval of the MBA graduate advisor.

Elective Areas

An MBA student may take elective courses in any of the curriculum areas of the MBA Program. He or she may take no more than six semester hours in advanced courses in an area other than the concentration field. Any course beyond the foundation courses may be completed for advanced elective credit.

Options

In addition to the traditional MBA program three options are available to emphasize specific career objectives. Selection of an option does not change the required MBA courses listed above.

International Option: For the graduate student wishing to emphasize international business administration, a summary of the elective international business courses follows the list of marketing courses.

Public-Institutional Management Option: The MBA Public-Institutional option is designed around the basic disciplines and analytical techniques applicable to the management of organizations, whether business, governmental, or nonprofit. The choice of electives will emphasize public administration rather than business administration, for the student interested in management of local, state, or federal governmental organizations or nonprofit organizations. The flexible curriculum permits the MBA student to select a limited number of electives from outside the College of Business Administration. Students wishing to pursue this option should consult the Graduate Advisor for complete details.

Real Estate Option: The MBA Real Estate Option is an interdisciplinary sequence of courses designed to provide a comprehensive background in real estate investment analysis and asset management. The option allows the student to develop a program of study, with the assistance of the Graduate Advisor, that will build on the MBA core courses and the experiential and academic strengths of the student. Emphasis is given to advanced application of theory and techniques for analysis of both the equity and debt positions of real estate within a framework of changing economic, legal, institutional, and cultural forces. The choice of electives will allow the student to focus on either entrepreneurial or corporate concentrations in the private sector. Expected courses include those in real estate, finance, taxation, law, marketing research, economics, and two courses outside of the College of Business Administration. Students wishing to pursue this option should consult the Graduate Advisor for complete details.

ACCOUNTING (ACCT) *See Department of Accounting for course descriptions.*

5301. ACCOUNTING ANALYSIS I—Foundation Course
5302. ACCOUNTING ANALYSIS II—Foundation Course

Advanced Elective Credit may be received from the following courses:

5310. INTRODUCTION TO BUSINESS TAXATION
5311. FINANCIAL ACCOUNTING I
5312. FINANCIAL ACCOUNTING II
5313. ACCOUNTING THEORY
5314. STUDY OF FEDERAL INCOME TAX LAW
5316. AUDITING CONCEPTS AND PRACTICES
5317. COST ACCOUNTING
5318. STUDIES IN AUDITING
5319. FINANCIAL ACCOUNTING III
5320. GOVERNMENTAL AND NONPROFIT ACCOUNTING
5321. CASES IN FINANCIAL ACCOUNTING
5322. ACCOUNTING FOR MANAGEMENT PLANNING AND CONTROL
5323. CORPORATE MODELING
5324. ADVANCED STUDIES IN PLANNING AND CONTROL
5327. CONTEMPORARY ISSUES IN ACCOUNTING THEORY
5329. INFORMATION SYSTEM ANALYSIS
5330. INTERNATIONAL ACCOUNTING AND FINANCIAL REPORTING
5340. STUDY OF FEDERAL INCOME TAX FOR ENTITIES OTHER THAN INDIVIDUALS
5341. TAX PROBLEMS OF PARTNERSHIPS AND PARTNERS
5342. TAX PROBLEMS OF CORPORATE REORGANIZATIONS AND LIQUIDATIONS
5343. TAX PROBLEMS OF TRANSACTIONS IN REAL ESTATE
5344. TAX PROBLEMS OF THE EXTRACTIVE INDUSTRIES
5345. CONTEMPORARY ISSUES IN FEDERAL TAXATION
5346. SEMINAR IN FEDERAL TAXATION
5347. FEDERAL TAXATION OF GIFTS AND ESTATES

5348. TAX PLANNING AND RESEARCH
5349. ADVANCED TAX PLANNING
5392. SELECTED TOPICS IN ACCOUNTING

BUSINESS ADMINISTRATION (BUSA)

5301. STATISTICS (3-0). Introduction to statistics designed to prepare the student for quantitative analysis of business problems. Includes probability, random variables, sampling distributions, confidence intervals, tests of hypotheses, regression theory and application, and Bayesian inference. Prerequisite: BUSA 5302 or equivalent.

5302. MATHEMATICS FOR MANAGEMENT SCIENCES (3-0). Study of the quantitative techniques of use in the functional courses and operations research including matrix algebra, linear systems, differential and integral calculus, and differential equations. May not be counted as an MBA Foundation Program course or elective.

5325. ADVANCED STATISTICAL METHODS IN BUSINESS ADMINISTRATION (3-0). Advanced topics in regression, correlation, experimental design, sampling methods, and other statistical methods with emphasis on their application to problems in the administration of operations. Prerequisite: BUSA 5301 or equivalent.

5330. LEGAL ENVIRONMENT OF BUSINESS (3-0). Study, in a conceptual framework, of the ideas and social and political forces that have led to changes in the business legal environment and legal institutions including current and historical developments affecting the business corporation. Legal framework and ethical problems of managers in serving diverse interests studied in connection with modern social legislation affecting business.

5331. LAW OF INTERNATIONAL BUSINESS (3-0). General principles of law applicable to international business including case law, statutory law, treaties, administrative law, and international agreements.

5332. ENTREPRENEURSHIP AND ENTERPRISE DEVELOPMENT (3-0). Venture formation and development process. Student-chosen entrepreneurial activities are planned including the preparation of a business plan for a proposed enterprise and, to the extent possible, execution of the business plan. Additional course activities will include guest speakers, "live" cases, entrepreneurial simulation and testing and selected case presentations by student teams. Prerequisite: permission of the instructor and Graduate Advisor.

5333. BUSINESS POLICY (3-0). Integration of the MBA curriculum into a cohesive whole. Treats the several elements of business administration by use of business policy cases and decision simulation methods. Satisfactory completion of this course fulfills the Comprehensive Examination requirement for MBA students. Prerequisite: permission of the Graduate Advisor.

5334. REAL PROPERTY LAW (3-0). Legal property theory underlying real estate transactions and relationships including estates and interests in land, conveyances, and mortgages.

5337. BUSINESS AND SOCIETY (3-0). Examination of the organizations of industry and commerce, government, labor, and other institutions within our society. Emphasis is on the total environment, and the social/political/legal/ ethical implications of the interface.

5150, 5250, 5350. BUSINESS INTERNSHIP. Faculty supervised part-time work performed in a participating business or government organization is combined with an academic paper. May be repeated for credit up to a maximum of 3 hours. Prerequisite: consent of instructor and Graduate Advisor.

5391. RESEARCH COLLOQUIUM. (3-0). An introduction to research methodology. Topics include: nature of scientific inquiry, sampling, experimental and quasi-experimental design, and data analysis. A research proposal is required. Prerequisite: BUSA 5325 or equivalent.

5398, 5698. THESIS Prerequisites: BUSA 5325, 5391 and approval of Graduate Advisor.

ECONOMICS (ECON) *See Department of Economics for course descriptions.*

5309. ECONOMIC ANALYSIS I—Foundation course
5311. ECONOMIC ANALYSIS II—Foundation course
Advanced elective credit may be received for the following courses:

5301. ECONOMIC DEVELOPMENT
5304. ADVANCED PUBLIC FINANCE
5310. MICROECONOMIC THEORY
5312. MACROECONOMIC THEORY
5313. MANAGERIAL ECONOMICS
5314. INDUSTRIAL ORGANIZATION
5316. MATHEMATICAL ECONOMICS I
5317. MATHEMATICAL ECONOMICS II

5321. INTERNATIONAL ECONOMICS
5324. MONETARY AND FISCAL ECONOMICS
5326. HISTORY OF ECONOMIC THOUGHT
5327. INTERNATIONAL FINANCE
5328. INSTITUTIONAL ORGANIZATION AND ECONOMIC BEHAVIOR
5329. RESEARCH METHODS IN APPLIED ECONOMICS.
5330. ADVANCED LABOR ECONOMICS
5331. URBAN ECONOMICS
5332. TRANSPORTATION ADMINISTRATION
5333. ECONOMICS OF HEALTH
5336. ECONOMETRICS I
5337. BUSINESS AND ECONOMIC FORECASTING
5338. SEMINAR
5340. ADVANCED MANPOWER ECONOMICS
5391. RESEARCH AND SELECTED TOPICS IN ECONOMICS
6310. APPLIED MICROECONOMIC THEORY
6312. APPLIED MACROECONOMIC THEORY
6336. ECONOMETRICS II
6392. RESEARCH IN ECONOMICS

FINANCE (FINA) *See Department of Finance and Real Estate for course descriptions.*

5311. BUSINESS FINANCIAL MANAGEMENT—Foundation Course
5320. SEMINAR IN CENTRAL BANKING
5322. ADVANCED BUSINESS FINANCIAL PROBLEMS
5323. INVESTMENT MANAGEMENT PROBLEMS
5324. SEMINAR IN FINANCIAL THEORIES
5325. MANAGEMENT OF FINANCIAL INSTITUTIONS
5326. COMMERCIAL BANKING
5327. RISK MANAGEMENT
5331. MULTINATIONAL FINANCIAL MANAGEMENT
5182, 5282, 5382. INDEPENDENT STUDIES IN FINANCE
5192, 5292, 5392. SELECTED TOPICS IN FINANCE

INFORMATION SYSTEMS (INSY) *See Department of Systems Analysis for course descriptions.*

5340. INTRODUCTION TO INFORMATION SYSTEMS
5341. INFORMATION SYSTEMS ANALYSIS
5342. INFORMATION SYSTEMS DESIGN
5343. DISTRIBUTED INFORMATION SYSTEMS AND DATA COMMUNICATIONS
5344. DATA BASE MANAGEMENT
5345. MANAGEMENT OF INFORMATION SYSTEMS
5182, 5282, 5382. INDEPENDENT STUDIES IN INFORMATION SYSTEMS
5192, 5292, 5392. SELECTED TOPICS IN INFORMATION SYSTEMS
6301. APPLIED GENERAL SYSTEMS THEORY
6302. CONCEPTUAL ISSUES IN INFORMATION SYSTEMS

MANAGEMENT (MANA) *See Department of Management for course descriptions.*

5311. BEHAVIORAL SCIENCES IN MANAGEMENT
5312. MANAGEMENT
5320. ORGANIZATIONAL BEHAVIOR
5321. COMPLEX ORGANIZATIONS
5324. GROUP AND INTERGROUP RELATIONSHIPS
5325. INDUSTRIAL RELATIONS
5326. ORGANIZATIONAL DEVELOPMENT AND CHANGE
5328. OPERATIONS MANAGEMENT
5329. METHODS OF ORGANIZATIONAL RESEARCH
5330. ARBITRATION AND DISPUTE SETTLEMENT
5331. MANAGEMENT OF INTERNATIONAL OPERATIONS
5333. MANAGEMENT OF TECHNOLOGY

5340. PERSONNEL—HUMAN RESOURCE MANAGEMENT
5182, 5282, 5382. INDEPENDENT STUDIES IN MANAGEMENT
5192, 5292, 5392. SELECTED TOPICS IN MANAGEMENT

MANAGEMENT SCIENCE (MASI) *See Department of Systems Analysis for course descriptions.*

5311. DECISION MODELS AND INFORMATION SYSTEMS
5321. INTRODUCTION TO MANAGEMENT SCIENCES
5323. APPLIED DECISION THEORY
5326. SIMULATION AND BUSINESS MODELS
5327. APPLIED MATHEMATICAL PROGRAMMING
5330. NONPARAMETRIC STATISTICS
5182, 5282, 5382. INDEPENDENT STUDIES IN MANAGEMENT SCIENCE
5192, 5292, 5392. SELECTED TOPICS IN MANAGEMENT SCIENCE
6301. APPLIED GENERAL SYSTEMS THEORY
6302. DATA ANALYSIS USING REGRESSION

MARKETING (MARK) *See Department of Marketing for course descriptions.*

5311. MARKETING
5320. BUYER BEHAVIOR
5324. SEMINAR: CONTEMPORARY MARKETING PROBLEMS
5325. PHYSICAL DISTRIBUTION MANAGEMENT
5326. ADVERTISING AND NONPERSONAL COMMUNICATIONS
5327. RESEARCH FOR MARKETING DECISIONS
5328. PRODUCT MANAGEMENT
5329. SALES, SALES MANAGEMENT
5331. INTERNATIONAL MARKETING
5332. INDUSTRIAL MARKETING
5335. RETAIL MARKETING MANAGEMENT
5336. ADVANCED RESEARCH ANALYSIS
5340. MARKETING STRATEGY
5182, 5282, 5382. INDEPENDENT STUDIES IN MARKETING
5192, 5292, 5392. SELECTED TOPICS IN MARKETING

REAL ESTATE (REAE) *See Department of Finance and Real Estate for course descriptions.*

5311. REAL ESTATE DECISION MAKING
5321. REAL ESTATE INVESTMENT
5334. ADVANCED REAL ESTATE EVALUATION
5335. ADVANCED REAL ESTATE FINANCE

International Option

The following advanced courses permit students to pursue a comprehensive program of study in international business administration within the MBA program. The complete course description and prerequisites may be found under the appropriate functional listing.

Students planning a career in the international field and taking extensive course work in international business administration may consider an international-related research topic for BUSA 5391, preferably conducting an area study (Latin American, Asian, European, etc.) of some type. Students should also recognize the importance of those graduate courses in political science, history, and foreign languages, which would embellish graduate study in international business administration.

ACCT 5330. INTERNATIONAL ACCOUNTING AND FINANCIAL REPORTING.
BUSA 5331. LAW OF INTERNATIONAL BUSINESS
ECON 5321. INTERNATIONAL ECONOMICS
ECON 5327. INTERNATIONAL FINANCE
FINA 5331. MULTINATIONAL FINANCIAL MANAGEMENT
MANA 5331. MANAGEMENT OF INTERNATIONAL OPERATIONS
MARK 5331. INTERNATIONAL MARKETING

CITY AND REGIONAL PLANNING Program (CIRP)

Area of Study — *Degree*

City and Regional Planning — M.C.R.P.

Master's Degree Plans: Thesis and Thesis Substitute

Director and Graduate Advisor: Joel Goldsteen — 219 University Hall — 273-2067

Planning Graduate Faculty:

Professors Cornehls, Geisel
Associate Professors Anderson, Goldsteen
Assistant Professors Anjomani, Erickson, Wegner

Interdisciplinary Graduate Faculty:

Professors (Architecture) Myrick; (Sociology) Taylor; (Urban and Regional Affairs) Cole, Taebel
Associate Professors (Architecture) Antoniades, Brooks, Pinno; (Civil Engineering) Yuan; (Urban and Regional Affairs) Rosentraub
Assistant Professors (Architecture) Scherr; (Civil Engineering) Clark; (Finance and Real Estate) Ordway

OBJECTIVE

The objective of the Master of City and Regional Planning (MCRP) program is to educate and train competent professionals qualified in guiding the development and growth of the city and region through public agencies or private consulting.

In a structured degree program, graduate students study the scope, issues and interdisciplinary relationships in city and regional planning with focus upon guidance of development of future cities and regions. Academically, the program equips the student with (1) knowledge of problem-solving skills and techniques; (2) an understanding of the dynamics of change, implementation methods, design control and; (3) the capability to evaluate implications of alternative solutions. Courses are structured to provide students with a general planning education comprised of theory, method, skills, concepts, experience, practice and field orientation to the profession of planning.

Since each student's interest and academic background will vary, guiding each student in developing a program respecting personal needs and goals is a foremost consideration. To achieve this purpose, a core curriculum permits variation in the general structure of each individualized degree program. Specialization in specific subject areas of planning is realized through faculty-guided course selection and directed course work.

Practical application of theory and research are important aspects of the educational process, and are facilitated through formal and informal research activities. The City and Regional Planning Center, The Institute of Urban Studies, The Housing, Research and Design Center, and the Construction Research Center are equipped to investigate planning problems and planning opportunities with staff recruited from the faculty and student body.

Substantive knowledge in planning combined with a new kind of technical focus is the basis for providing a new professional, capable of innovation in guiding a dynamic city and regional environment. Analytical methods and empirical research skills are the emphases of the professional education in planning at The University of Texas at Arlington.

Education and training in planning, in the social sciences, and in urban affairs, along with emphasis on research methods should provide those new skills necessary to guide the growth and development of future cities and regions.

DEGREE REQUIREMENTS

The 54 semester hours program for thesis plan students is composed of:
36 semester hours of planning core courses,
12 semester hours of general program electives, and
6 semester hours of thesis.

The thesis-substitute students will take a total of 57 semester hours, the additional hours of work approved by the student's supervising committee.

The practicum, as a working experience in an agency, center, research group or office, must be arranged and approved by the Graduate Advisor.

The MCRP Program allows students with interest in specific areas for academic concentration to submit their intentions to the planning faculty committee. While the required program of courses is established, certain graduate students entering the program may wish to specialize. Formal application to the planning faculty committee may be made for course and subject interest specialization by obtaining a declaration of specialization form from the Director of the MCRP Program. An individualized course program may be initiated only after planning faculty committee review and approval. Students may elect a thesis substitute which will be comprised of a comprehensive written examination. With the thesis substitute, students are required to specialize, using the available thesis substitute credit hours toward their specialization.

A bachelor's degree from an accredited college or university is required for admission. The applicant must meet the general requirements for the Graduate School.

The CIRP core seminars curriculum include: CIRP 5301, 5302 or 5315, 5305, 5309 or 5310, 5316, 5317, 5318, 5319, 5330, 5331, 5332, 5333.

JOINT M.C.R.P. AND M.ARCH. DEGREE PROGRAM

Students in the joint program can earn both the Master of City and Regional Planning and the Master of Architecture degrees in a curriculum of 84 semester credit hours. Applicants must meet the admission requirements of both the MCRP and the MArch programs. City and Regional Planning students wishing to earn the MArch degree will be required to take Program II in the architecture program unless they have earned an undergraduate degree in architecture. Programs of study will follow both master's programs, with all of the 15 credit hours of electives in the MArch program to be taken in the MCRP program. In addition to the 33 credit hours of architectural core courses, the remainder of coursework will be in the City and Regional Planning program with a required thesis to be supervised by a member of the City and Regional Planning faculty.

Course selection and programs of study should be designed with the assistance of the Graduate Advisors in both ares. Only in special instances may students select the thesis substitute plan of the MCRP program. The successful candidate will be awarded both degrees rather than one joint degree.

5193. MASTER'S COMPREHENSIVE EXAMINATION (1-0). Directed study, consultation and comprehensive examination over course work leading to thesis substitute for M.C.R.P. degree. Required of all thesis substitute students *not* enrolled in other courses during semester in which they plan to graduate. Graded P/F only.

5301. PLANNING THEORY (3-0). Various theories of planning. Planning as: an individual phenomenon (individual rationality, decision theory), an organizational phenomenon (the planning process, organization theory, communications theory), a social phenomenon (utopias, ideologies and systems, social planning and social reform, general systems theory), local planning in the United States (politics and policies, professional planning).

5302. HOUSING POLICIES, PROGRAMS AND HISTORY (3-0). Current housing programs and related policies in relation to housing history. Includes governmental and private sector emphases and programs.

5303. ACTIVITY LOCATION AND ANALYSIS (3-0). Study of principles, theories and methods in location of employment and retail centers.

5304. DOCUMENT PREPARATION: DEVELOPMENT CONTROL LAW (Zoning, Subdivision Ordinances, Capital Budgets) (3-0). Development of skills in document preparation including proper methods in preparing the usual development controls of zoning ordinances, subdivision regulations, and capital budgets and other municipal codes and regulations.

5305. LAND USE, MANAGEMENT AND DEVELOPMENT (3-0). Assesses land use, man-

agement and development and considers new directions. Relates comprehensive planning, environmental management, and land use.

5306. URBAN REDEVELOPMENT (3-0). Study of the problems and achievements of the public and private sectors in urban redevelopment.

5307. CENTRAL BUSINESS DISTRICTS (3-0). Study and evaluation of the historical role of the CBD and the scope of problems to be addressed in future plans of the central city.

5308. OPEN SPACE (3-0). Study of open space planning, needs, theories, and ecological bases. Parks, greenbelts, and recreational functions are assessed along with agricultural planning.

5309. TRANSPORTATION METHODS, MODELS, AND SIMULATION (3-0). Overview of transportation with specific transportation models and simulation methods. Current state of transportation.

5310. ECONOMIC METHODS, MODELS, AND SIMULATION (3-0). Overview of urban economics along with pertinent economic models and simulation techniques. Regional science and economic research findings in relation to planning.

5311. LAND ECONOMICS (3-0). Overview of the costs and profit structures of land use and development related to planning.

5312. NEW TOWNS AND COMMUNITIES (3-0). Study of the new towns, their historical formation, current status, and future potential.

5313. URBAN GROWTH POLICIES (3-0). Study of the political, societal and physical policies involved in urban growth.

5314. ADVANCED STUDIES IN PLANNING COMMUNICATION SKILLS (3-0). Techniques of presentation, use of graphic tools, and recent developments of media advances.

5315. TRANSPORTATION POLICIES, PROGRAMS AND HISTORY (3-0). Transportation and related programs and policies in relation to city development and housing patterns. Interdependencies of land use, building development, and social change are explained as transportation-related.

5316. PLANNING LAW AND THE POLITICAL SYSTEM (3-0). Presentation of planning law in relation to the American political system. Examination of case briefs for their content, applicability, and background. Overview of legal and political aspects of planning.

5317. RESEARCH AND FORECASTING METHODS IN CITY AND REGIONAL PLANNING (3-0). Various methods form the bases for non-quantitative and quantitative exercises in City Planning. Includes: statistics, computers, simulation, modeling, social data collection, mapping, demography, and other methods and techniques.

5318. ADVANCED TECHNIQUES OF PLANNING ANALYSIS (3-0). Various methods form the bases for non-quantitative and quantitative exercises in Regional Planning. Includes simulation, modeling, social data collection, mapping, computer graphics, demography, and other public agency methods and techniques. Prerequisite: CIRP 5317 or consent of instructor.

5319. AGENCIES OF PLANNING AND ADMINISTRATION (3-0). Investigation and analysis of public planning agencies; functions, objectives, organization, operations, and administrative practice.

5320. COMPUTER METHODS IN CITY AND REGIONAL PLANNING (3-0). Computer techniques studied as basis for advanced analysis and data manipulation. Topics include FORTRAN, computer mapping, use of data files, and applications of large land use data sets.

5321. INTERACTIVE COMPUTER TECHNIQUES AND SIMULATION MODELING (3-0). Advanced interactive computer programming and computer simulation modeling as applied to planning problems. An extremely versatile interactive programming language, APL, introduced and utilized in a variety of planning applications.

5322. URBAN AND REGIONAL ECONOMIC DEVELOPMENT (3-0). Seminar in subnational economic development programs in the U.S. These programs and their criticisms examined in depth with emphasis on a search for viable solutions via focus on national concerns and individual case studies. Prerequisite: Regional or Urban Economics.

5330. PROJECT PLANNING (0-9). Skills, practical experience, problem-solving methods and techniques in mapping, design, planning, and research projects. Studio and seminar for field studies in the practical application of city and regional planning.

5331. PROJECT PLANNING (0-9). Skills, practical experience, problem-solving methods and techniques in mapping, design, planning, and research projects. Studio and seminar for field studies in the practical application of city and regional planning.

5332. PROJECT PLANNING (0-9). Skills, practical experience, problem-solving methods and techniques in mapping, design, planning, and research projects. Studio and seminar for field studies in the practical application of city and regional planning.

5333. PROJECT PLANNING (0-9). Skills, practical experience, problem-solving methods and techniques in mapping, design, planning, and research projects. Studio and seminar for field studies in the practical application of city and regional planning.

5643. PROJECT PLANNING: SPECIAL TOPICS IN CITY AND REGIONAL PLANNING (1-15). Special projects as announced prior to the start of the semester.

5381, 5681. PRACTICUM. Students will serve as staff assistants, aides, or apprentices in area agency or private planning offices. Placement in such offices will be as approved and arranged; and performance will be monitored by the Graduate Advisor or instructor in charge.

5191, 5291, 5391. CONFERENCE COURSE. Special subjects and issues as arranged with individual students and faculty members. May be repeated for credit.

5195-5695. SPECIAL TOPICS IN PLANNING. Selected topics in City and Regional Planning. May be repeated for credit.

5398, 5698, 5998. PLANNING THESIS.

ENGINEERING: INTERDISCIPLINARY (ENID)

Area of Study — *Degree*

Engineering: Interdisciplinary — Ph.D.

Graduate Advisor: Floyd Cash — 204 Engineering — 273-2571

Graduate Faculty: the graduate faculty of the College of Engineering

OBJECTIVE

The Doctor of Philosophy degree in Engineering: Interdisciplinary provides opportunities for students to study and participate in research in more than one engineering area. The student's program may include courses and research in areas outside of engineering when the objective is to apply engineering concepts, analysis, synthesis or methodology to research problems.

DEGREE REQUIREMENTS

In addition to the general admission requirements of the graduate school, a student wishing to participate in the doctoral program in engineering must have completed work equivalent to that required for the master's degree in engineering at this university. An adequate background in mathematics, science and the engineering sciences is considered basic to any engineering program at the doctoral level.

The PhD requirements are the same as those listed in the Advanced Degrees and Requirements section of this catalog. A student's program will consist of course work, independent study, and a dissertation in fields pertinent to his areas of interest in engineering. The program for each student will be planned by the student and a committee of faculty members. Students with undergraduate degrees in fields other than engineering will be required to take the necessary courses to establish a background in science, mathematics and the engineering sciences equivalent to that required in the undergraduate programs. The Doctor of Philosophy in Engineering degree program has no language requirement but may require a research tool as determined by the student's committee.

Students may complete formal course work requirements of the PhD program on a part-time basis; however, dissertation research is expected to require full-time effort.

6197-6997. ENGINEERING RESEARCH. Individually approved research projects in support of PhD in Engineering (Interdisciplinary) program in the College of Engineering. This course may be repeated for credit.

6399, 6699, 6999. DISSERTATION. Preparation of a doctoral dissertation in interdisciplinary engineering area. Prerequisite: admission to candidacy for the Doctor of Philosophy degree. See individual engineering programs for co-requisites and additional prerequisites.

ENGINEERING MECHANICS Program (EM)

Areas of Study	*Degrees*
Engineering Mechanics	M.S., Ph.D.

Master's Degree Plans: Thesis and Non-Thesis

Graduate Advisor: J. H. Gaines 301D Engineering 273-2603

Graduate Faculty:

Professors Everard, Gaines, Huang, Lawrence, Yuan
Associate Professor Stanovsky

OBJECTIVE

The graduate program in engineering mechanics is designed to provide students with an understanding of the fundamentals of mechanics and prepare them for research in engineering problems involving mechanics and for careers in industry. Students desiring to study mechanics should have a high level of interest and aptitude in mathematics and analysis.

Candidates for a Master of Science degree in engineering mechanics and candidates for a Doctor of Philosophy degree in engineering mechanics may elect programs emphasizing solid mechanics, fluid mechanics, or dynamics and vibrations. The program is interdisciplinary. In addition to the engineering mechanics courses, applicable courses may be found in the areas of aerospace engineering, biomedical engineering, civil engineering, electrical engineering, mechanical engineering, materials science, and computer science.

ADMISSION REQUIREMENTS

Applicants for the master's degree who hold a baccalaureate in engineering must meet the general requirements of the Graduate School as stated in the catalog section entitled "Admission Requirements and Procedures."

Applicants not meeting all criteria will be admitted on provisional or probationary basis only under exceptional circumstances.

For applicants with no prior training in engineering, the same minimum criteria will apply and, in addition, their records will be reviewed in relation to the intended program of study. Probationary status with specific remedial work required may be a basis for acceptance of such applicants.

The acceptance of applicants who have already received a master's degree in engineering will be based on the above-mentioned minimum criteria and results of graduate work, including the master's thesis.

DEGREE REQUIREMENTS

The general degree requirements for the Master of Science and Doctor of Philosophy degrees have been presented in other sections.

Prior to admission as a degree candidate, the student must have, as a minimum, credit for statics, dynamics, mechanics of materials, advanced calculus, differential equations, basic fluid mechanics, and thermodynamics. In addition, each student must consult the Graduate Advisor to plan his program of course work and research.

The following coursework is required of all M.S. candidates:

1. EM 5311 Theory of Elasticity or EM 5324 Energy Methods in Applied Mechanics
2. EM 5321 Advanced Dynamics or EM 5323 Advanced Mechanical Vibrations
3. EM 5341 Experimental Mechanics or EM 5317 Structural Statics
4. Two additional courses (six credit hours) in engineering mechanics
5. Two approved courses (six credit hours) in mathematics

Master of Science in Engineering Mechanics

The Master of Science Degree is ordinarily a research oriented program consisting of a minimum of six credit hours of thesis and a minimum of 24 credit hours in engineering mechanics and related areas. In some cases, with prior approval of the Engineering Mechanics Committee on Graduate Studies, it is possible to complete a master's program without thesis. For details on a non-thesis degree plan, consult the engineering mechanics graduate advisor.

Doctor of Philosophy

The Ph.D. degree should normally require four years of full-time study after completion of the B.S. degree. Each Ph.D. candidate is expected to take sufficient course work to obtain an in-depth knowledge of theoretical and applied mechanics and mathematics. Normally this will require a minimum of 24 credit hours beyond the MS degree. In addition, a dissertation is required. The program of study will be subject to the approval of the candidate's supervisory committee.

5302. ENGINEERING MECHANICS SEMINAR (3-0). Semiformal discussion between faculty and students on progress and results of current research and on significant developments in the mechanics field. Prerequisite: permission of instructor.

5311. THEORY OF ELASTICITY I (3-0). Analysis of stress and strain in elastic bodies; equilibrium and compatibility conditions; analysis of two dimensional problems. Prerequisite: permission of instructor.

5312. THEORY OF ELASTICITY II (3-0). Continuation of Theory of Elasticity I; curvilinear coordinates, variational methods, axially symmetric stress distribution problems, and stress waves in solids. Prerequisite: EM 5311.

5313. THEORY OF PLASTICITY (3-0). Stress-strain relations in three dimensions; three-dimensional yield conditions and flow law; thick-walled tube and sphere; limit analysis and approximate theories. Prerequisite: permission of instructor. Offered also as ME 5329.

5314. THEORY OF PLATES AND SHELLS (3-0). Stress and deformation analysis of elastic plates and shells of revolution. Composite structures considered in addition to the homogeneous and isotropic case. Prerequisite: permission of instructor.

5315. AEROELASTICITY (3-0). Interaction of aerodynamic (or hydrodynamic), inertia and elastic forces acting on vehicles moving through fluids; flutter and divergence. Prerequisite: AE 4305 or equivalent; AE 3302 or equivalent, or permission of instructor.

5317. STRUCTURAL STATICS (3-0). Finite element method in the study of the static response of complex structures and of continuua. Applications to field problems. Analytical methods emphasized, and digital computer applications undertaken. Prerequisite: EM 5311 or consent of instructor.

5318. STRUCTURAL DYNAMICS (3-0). Natural frequencies; forced and random response of complex structural systems studied through the use of the finite element method. Computational aspects of these problems discussed, and digital computer applications undertaken. Prerequisite: EM 5323 or consent of instructor.

5320. THEORY OF THIN ELASTIC SHELLS (3-0). Elements of differential geometry, basic assumptions and fundamental elastic shell equations for shells of arbitrary shape. Specific equations and stress resultants derived from the general formulation for cylindrical shells and shells of revolution. Prerequisite: EM 5311 or consent of instructor.

5321. ADVANCED DYNAMICS (3-0). Hamilton's Principle, Lagrange's Equation and Hamilton-Jacobi Equation introduced. Dynamics of rigid body and theory of gyroscope studied. Prerequisite: permission of instructor.

5322. THEORY OF ELASTIC STABILITY (3-0). Elastic stability of bars, buckling of plates and shells. Both classical and numerical solutions included. Prerequisite: permission of instructor.

5323. ADVANCED MECHANICAL VIBRATIONS (3-0). Application of generalized coordinates and Lagrange equations. Free and forced vibrations of elastic systems including damping effects. Prerequisite: AE 4305 or equivalent.

5324. ENERGY METHODS IN APPLIED MECHANICS (3-0). Virtual displacements, minimum potential energy, principle of complementary energy, Castigliano's Theorem, action integral, variational principles, Hamilton's principles and Lagrange's equations. Applications to solve problems in stress analysis, elastic stability, vibration and related topics. Prerequisite: permission of instructor.

5325. DYNAMIC STABILITY OF ELASTIC SYSTEMS (3-0). The regions of dynamic instability of elastic systems due to parametric excitation presented; influence of damping included. Prerequisite: permission of instructor.

5326. INTRODUCTION TO NONLINEAR MECHANICS (3-0). Nonlinear differential equations governing various phenomena of mechanics; physical and mathematical implications of linearizations; analytical, graphical and numerical methods of solutions to the free oscillations of systems having nonlinear characteristics; response curves and stability considerations for forced oscillations. Prerequisite: permission of instructor.

5327. DYNAMICS OF SPACE VEHICLES (3-0). Two-body problem, geometry of spatial orbits, orbit determination, trajectory modification, introduction to perturbation theory, equation of motion for thrusting rocket, boost trajectories and related topics. Prerequisite: AE 4336 or equivalent.

5328. FLUID DYNAMICS (3-0). Kinematics and dynamics of Newtonian fluid motion, stresses in fluids, and surface flow. Prerequisite: ME 3313 or equivalent.

5330. NUMERICAL VIBRATION ANALYSIS (3-0). Theories developed in EM 5323 applied to practical situations; methods for solving linear, nonlinear, and transient vibration problems numerically utilized in connection with computer programming. Prerequisites: EM 5323 and a reasonable proficiency in computer programming and the consent of the instructor.

5331. SIMILITUDE AND THEORY OF MODELS (3-0). Similitude models, dimensional analysis, nomographs and graphical aids to analysis. Prerequisite: permission of instructor.

5332. CONTINUUM MECHANICS (3-0). Study of the underlying physical and mathematical principles relating to the behavior of continuous media; relationship between fluid and solid mechanics. Also offered as ME 5312.

5333. FUNDAMENTALS OF COMPOSITES (3-0). Methods of analyzing the mechanical behavior of composite materials. Failure criteria discussed. Also offered as ME 5348.

5341. EXPERIMENTAL MECHANICS (2-3). Experimental and analytical methods in structural mechanics. Various analogies studied. Experimental methods of determining stress, strain, force, and displacement. Prerequisite: permission of instructor. **$4 lab fee.**

5343. PHOTOELASTICITY (2-3). Methods of experimentally determining stress (or strain) fields using birefringent plastic models and coatings; techniques of model manufacture, data acquisition and reduction, use of the polariscope, interferometry and holography. Prerequisite: graduate standing or consent of the instructor.

5390. SELECTED TOPICS IN ENGINEERING MECHANICS (3-0). Topics of current interest in the field of engineering mechanics; subject title listed in class schedule. May be repeated for credit when topic changes.

5191-5991. ADVANCED STUDIES IN ENGINEERING MECHANICS. Topics selected from various branches of engineering mechanics, particularly those in which active research is being conducted. Prerequisite: permission of instructor or Graduate Advisor.

5398, 5698, 5998. THESIS. Prerequisite: 12 hours of advanced engineering mechanics and approval of Graduate Advisor.

6197-6997. RESEARCH IN ENGINEERING MECHANICS. May be repeated for credit.

6390. SUPERVISED TEACHING IN ENGINEERING MECHANICS (3-0). Teaching under close supervision, attending group meetings, and individual conferences, and submitted reports as required; may be repeated for credit. Required for all teaching assistants and associates in engineering mechanics; however, may not be used for degree credit. Graded P/F only.

6399, 6699, 6999. DISSERTATION. Preparation of a doctoral dissertation in engineering mechanics. Prerequisite: admission to candidacy for the Doctor of Philosophy degree.

HUMANITIES Program (HUMA)

Area of Study — *Degrees*

Humanities — M.A., M.A.T., Ph.D.

Master's Degree Plans: Thesis and Non-Thesis

Graduate Advisor:

Lenore Langsdorf — 333 University Hall 273-2389

Graduate Faculty: The graduate faculties of the departments of the College of Liberal Arts

OBJECTIVE

Programs leading to the degrees of Master of Arts in the Humanities, Master of Arts in Teaching in the Humanities, and Doctor of Philosophy in the Humanities are offered jointly by The University of Texas at Arlington and The University of Texas at Dallas. They are designed to integrate the disciplines of language, linguistics, rhetoric, literature, history, philosophy, anthropology, political and social theory, the visual arts, music, and other fields as they relate to the development of ideas that are expressed in the monuments of human creation. The program leading to the doctoral degree in the humanities is aimed at developing scholars and interpreters of the humanities who can function effectively in a variety of academic and professional situations.

The graduate student enrolled at The University of Texas at Arlington may also enroll at The University of Texas at Dallas for courses or independent study appropriate to the individual program as planned by the student, the Graduate Advisor, and the supervising committee. The degrees will be granted jointly by The University of Texas at Arlington and The University of Texas at Dallas.

DEGREE REQUIREMENTS

Master of Arts in the Humanities

The graduate program in Humanities, leading to the Master of Arts, offers a foundation in humanistic perspectives and a concentration in disciplinary or interdisciplinary content and method.

In addition to the general requirements for the master's degree, all students entering the program leading to the M.A. in Humanities must complete the following requirements:

1. Enrollment in and successful completion of the core course (Conceptual Bases of the Humanities) within two equivalent semesters of admission to the program.
2. Enrollment in and successful completion of the Foundations of Rhetoric course within two equivalent semesters of admission to the program.
3. Completion of two of the other foundation courses.
4. Within two equivalent semesters of admission to the program, selection in consultation with the Graduate Advisor of a disciplinary (where courses allow), divisional or interdisciplinary area of concentration.
5. Demonstrate reading proficiency in one foreign language.
6. To qualify for the final comprehensive examination, the student shall have submitted two article-length papers, approved by the Graduate Advisor, demonstrating research competence and illustrating a humanities perspective.

Summary of Requirements

3 hours	Conceptual Bases of the Humanities
3 hours	Foundations of Rhetoric
6 hours	Foundation Courses (Select from: 5302, 5303, 5304, 5305)
24 hours	Area(s) of Concentration
36 hours	

Master of Arts in Teaching in the Humanities (MAT)

The Master of Arts in Teaching sequence is designed for teachers who wish to strengthen a specialty, or develop another one, and broaden their humanistic perspective.

Concentration in Art History, English (Literature or Rhetoric), History, Linguistics, or Philosophy: In addition to the general requirement for the master's degree (see the catalog section entitled "Degree Requirements and Procedures"), students entering the MAT program will follow the requirements as described for the Master of Arts in the Humanities (above) except that (1) students in the MAT program will not be required to demonstrate reading proficiency in a foreign language, and (2) the 36 hours of course work required for the degree will be distributed as follows:

3 hours	HUMA 5300 Conceptual Bases of the Humanities
3 hours	HUMA 5301 Foundations of Rhetoric
6 hours	HUMA Foundation Courses (Select from 5302, 5303, 5304, 5305)
12-15 hours	Area of Concentration
9-12 hours	Second Area of Concentration (Six to nine hours of this concentration may be in education courses.)

The candidate for the MAT degree may or may not write a thesis. Should the thesis be undertaken, it will be in humanistic research with pedagogical application and will substitute for six hours of the above distribution, such distribution to be determined by the student's advisory committee. The student who elects to write a thesis will make an oral defense of the thesis in lieu of the comprehensive examination.

Concentration in French, German, or Spanish: Students intending to pursue this degree must present a baccalaureate degree with a major in a foreign language or have a minimum of 18 advanced hours or the equivalent in language proficiency and advanced hours. Reading proficiency in a second language is also required. Students must follow the general requirements for the master's degree (see catalog section entitled "Advanced Degrees and Requirements) and the requirements as described above for the Master of Arts in the Humanities, except that the place of the area of concentration is taken by exercising one of three essentially interdisciplinary options, each comprising a minimum of 24 hours. A thesis is not required. The options are:

1. Humanities and Language Teaching—
   Must include six hours of Education courses, of which one must be EDUC 5301; six hours of Applied Linguistics, e.g. LING 5307 and 5353; and twelve hours in the specific language area, of which six hours must be in literature.
2. Foreign Study Option—
   Nine hours of language or literature/civilization courses in an approved program of study abroad, and a written report and interview in the foreign language and relevant to the study abroad, 15 hours in the Department of Foreign Languages and Linguistics, including an approved combination of language and literature/civilization courses.
3. Spanish-Bilingual/Bicultural Option—
   Must include EDUC 5301; three hours of Applied Linguistics, e.g. LING 5307 or 5353; nine hours of Spanish-American culture and literature, e.g. SPAN 5319, 5328, 5329, 5331; and nine hours of courses dealing with the use of English and Spanish in bilingual/bicultural education, e.g. SPAN 5360, 5361, 5362.

Summary of Requirements (all options):

3 hours	Conceptual Bases of the Humanities
3 hours	Foundations of Rhetoric
6 hours	Foundation Courses (Select from: 5302, 5303, 5304, 5305)
24 hours	Option

Doctor of Philosophy in the Humanities

Admission from a Baccalaureate Program—Applicants with bachelor's degrees may declare an interest in pursuing the doctoral degree in Humanities. Such a candidate will, upon admission, follow the master's program in Humanities. If the candidate passes the comprehensive examination with honors, he or she will be credited with successful completion of the diagnostic examination and admitted to the Ph.D. program.

Requirements—In addition to the general requirements for the doctoral degree stated in the introductory sections of this catalog, the following requirements apply specifically to the program leading to the Ph.D. in the Humanities:

1. The student holding the M.A. or its equivalent may be required to submit satisfactory scores on the advanced GRE, as appropriate to the academic background of the projected area of concentration.
2. All students entering the program are required to enroll in and successfully complete the core course (Conceptual Bases of the Humanities) within two equivalent semesters of admission to the program.
3. All students entering the program are required to enroll in and successfully complete the foundation course in Foundations of Rhetoric within two equivalent semesters of admission to the program.
4. All students entering the program are required to select two of the other four foundation courses: Theory of Discourse, Culture and Society, Methods of Logical Analysis, Semiotics.
5. Each student shall have an advisory committee composed of faculty members representing disciplines in at least two of the program divisions. This committee shall have responsibility for certifying the content of the student's area of concentration and secondary area.
6. Two equivalent semesters after admission to the program, in consultation with the advisory committee, each student should have selected an area of concentration from division offerings in the Disciplinary or the Divisional or the Interdisciplinary Options.
7. All students will demonstrate reading proficiency in two foreign languages or one foreign language and one computer language, or other comparable research tool.
8. Within two equivalent semesters of admission to the program, the student shall have successfully completed the diagnostic examination. This examination will be composed of two parts, the first dealing with the core/foundation courses and the second with a disciplinary area. The student's advisory committee will be responsible for the composition, administration and evaluation of the examination.
9. The doctoral applicant will usually spend a minimum of two consecutive, regular semesters of full time study (9 credit hours per semester) beyond the M.A., or its equivalent, and will earn at least 24 credit hours in residence.
10. Comprehensive examinations will be offered semiannually, during the fall and spring terms.
11. All students will register for at least nine hours of dissertation.

Summary of Requirements (beyond the M.A. or equivalent):

3 hours	Conceptual Bases of the Humanities
3 hours	Foundations of Rhetoric
6 hours	Foundation Courses (Select from: 5302, 5303, 5304, 5305)
24 hours	Area of Concentration (Disciplinary or Divisional or Interdisciplinary Options)
9 hours	Second Area of Concentration
45 hours plus	
9 hours	Dissertation

The divisions of the program are as follows:

Division I *Language*	*Division II* *Literature*	*Division III* *Cultural Perspectives*
Linguistics	American	Anthropology
Rhetoric/Composition	English	Art History
Semiotics	French	History
Teaching Methodology	German	Music
	Spanish	Philosophy
	Comparative Literature	Political Theory
	Literary Criticism	Sociology

HUMANITIES

The Disciplinary Option is comprised of an area of concentration selected from one of the three divisions of the program enumerated above and a secondary area from another division. Minimum requirements for the Disciplinary Option are 24 hours in the Area of Concentration and nine hours in the Secondary Area.

The Divisional Option is comprised of a combination of disciplines from one division and a secondary area of courses from one or two of the other divisions. Minimum requirements for the divisional option are 24 hours in the Area of Concentration and 9 hours in the Secondary Area.

The Interdisciplinary Option is comprised of an interdisciplinary Area of Concentration which may include selections from any one or from each division organized by theme, genre, chronology or geography. The Secondary Area of Concentration is selected across the divisions and should relate to the Area of Concentration. Minimum requirements for the Interdisciplinary Option are 18 hours in the Area of Concentration and 15 hours in the Secondary Area.

5300. CONCEPTUAL BASES OF THE HUMANITIES (3-0). Presentation and illustration of basic concepts relevant to humanities: meaning, form, expression, structure and interpretation; content areas selected from history, literature, music, and art used as models to illustrate application of concepts. Required of all MA and PhD candidates in the Humanities.

5301. FOUNDATIONS OF RHETORIC (3-0). Survey of classical and contemporary views of rhetoric. Discussion of such topics as the conflict between rhetoric and philosophy; the relationship between rhetoric and epistomology, ethics, and pluralism; and rhetoric as a propaedeutic, providing methodologies for the human sciences. Required of all MA and PhD candidates in the Humanities.

5302. THEORY OF DISCOURSE (3-0). Study of relationship of linguistic analysis to oral and written discourse; description and analysis of types of discourse; interdisciplinary perspectives—linguistic, sociological, psychological, philosophical, literary critical—on types of discourse. Fulfills foundations requirement.

5303. CULTURE AND SOCIETY (3-0). Influence of culture, that historical embodiment in symbolic form of meaning or significance for a group of people, relationships and artifacts; anthropological or historical analysis of specific cultural elements in selected societies. Fulfills foundations requirement.

5304. METHODS OF LOGICAL ANALYSIS (3-0). Foundations of modern logic and logical terminology in language-centered disciplines; applications of logical method to selected problems in the humanities illustrating a diversity of philosophical approaches, e.g., analytic philosophy, hermeneutics, phenomenology. Fulfills foundations requirement.

5305. SEMIOTICS (3-0). Study of systems of symbols or "signs"; examination of structures underlying cultural activity from fundamental level of individual sign-creation to more complex systems. Fulfills foundations requirement.

5391. CONFERENCE COURSE IN THE HUMANITIES.

5392. TOPICS IN THE HUMANITIES (3-0). Selected topics of interdisciplinary interest. May be repeated for credit when subject matter changes.

5398, 5698, 5998. THESIS. The graduate student must be registered for this course (a) when in consultation over the thesis with the supervisory committee, and (b) in the semester or term in which the Master of Arts in Teaching in the Humanities degree will be conferred. Prerequisite: permission of the Graduate Advisor.

6330. SEMINAR IN THE HUMANITIES (3-0). Interdisciplinary study of genres and themes. May be repeated for credit when subject matter changes.

6391. READINGS IN THE HUMANITIES (3-0). Supervised individual study at the PhD level. May be repeated when the content changes.

6399, 6699, 6999. DISSERTATION.

INTERDISCIPLINARY STUDIES (INDS)

Area of Study — *Degrees*

Interdisciplinary Studies — M.A.,M.S.

Master's Degree Plans: Thesis, Thesis Substitute, Non-Thesis

Program Coordinator: Vi Babes Hudlow — 333 Davis — 273-2681

Graduate Faculty: All members of the graduate faculty of The University of Texas at Arlington.

OBJECTIVE

The purpose of the degree program is to allow individuals with extensive professional experience to pursue studies in multiple disciplines, to upgrade their formal education in their fields of specialization and to develop professional skills. The program is intended for persons who have several years experience beyond conferral of the baccalaureate degree.

ADMISSION

An applicant to this program must satisfy the requirement for admission to the Graduate School and would ordinarily have several years of professional experience in areas related to the graduate course work needed.

DEGREE REQUIREMENTS

Most programs of work in interdisciplinary studies involve courses in several departments and must be designed by consultation with the appropriate graduate faculty members of those departments. Students entering the interdisciplinary studies program must consult with the program coordinator prior to registration for the first semester or session of work in the program. To be eligible to continue in the program after the first semester of enrollment, each student must submit a program of work to the Committee on Graduate Studies in Interdisciplinary Studies no later than the end of the first semester or session of study. The Committee on Graduate Studies is not responsible for selection of courses taken prior to program of work approval and cannot guarantee that such courses will apply to degree credit.

The program is designed for a maximum of flexibility related to the specific professional objectives of the student. A supervising committee composed of members of the graduate faculty will be appointed to supervise the formulation and completion of an individual program of work. Except for general oversight by the Interdisciplinary Graduate Studies Committee and the Dean of the Graduate School, the supervising committee will have control of the individual's program. The student will typically work in at least two departments and may take courses in more than one of the schools or colleges of the University. The primary emphasis is on the individual needs and aspirations of the student.

No more than 50% of the credit hours in a student's program may be taken in an area in which the University does not offer an advanced degree, or in the College of Business Administration. A maximum of nine hours of advanced (junior/senior) undergraduate courses may be applied to a program in interdisciplinary studies; for the purpose of this policy, graduate foundation courses in the college of Business Administration are considered equivalent to advanced undergraduate courses and apply toward the nine hour maximum. Students will normally take a minimum of 12 credit hours during the 12-month period. Students must complete at least 30 hours.

5193. MASTER'S COMPREHENSIVE EXAMINATION (1-0). Directed study, consultation, and comprehensive examination over coursework, leading to the Master's degree in Interdisciplinary Studies. Graded P/F.

5398, 5698, 5998. THESIS. Research and preparation pertaining to the master's thesis.

MATERIALS SCIENCE Program (MATS)

Areas of Study — *Degrees*

Materials Science — M.S., Ph.D.

Master's Degree Plans: Thesis, Thesis Substitute, and Non-Thesis

Graduate Advisor: Carl D. Wiseman — 335D Engineering — 273-2028

Graduate Faculty:

Professors Johnson, Wiseman
Associate Professor Goolsby
Assistant Professor Nomura

OBJECTIVE

The graduate program in materials science is designed to provide students with a fundamental understanding of phenomena occurring in engineering materials and their associated mechanical, physical and chemical properties. It should prepare students for professional careers in materials science or for additional studies at the doctoral level.

The program is interdisciplinary and relates closely to the fields of engineering, chemistry and physics.

DEGREE REQUIREMENTS

Students with Bachelor of Science degrees in non-engineering disciplines, such as chemistry or physics, may qualify for graduate study in materials science upon the completion of a faculty-approved program of undergraduate courses.

Normally, all materials science master's programs will be expected to include a thesis. With prior approval of the Materials Science Committee on Graduate Studies, it is possible to complete a master's program with a thesis substitute or non-thesis.

5301. PHYSICS OF ENGINEERING MATERIALS (3-0). Free electron and zone theories of metals and their applications to electrical conductivity, ferromagnetism, cohesion and crystal structure. Prerequisite: permission of instructor.

5310. DISLOCATION THEORY (3-0). Theory of dislocations and their reactions and interactions in crystalline materials developed and extended into a basic understanding of mechanical properties of crystalline materials. Prerequisite: permission of instructor.

5311. ADVANCED DISLOCATION THEORY (3-0). Development of the theories of work hardening, fatigue, and creep of crystalline materials based on the generation, movement and interactions of dislocations with themselves and other crystalline defects. Prerequisite: MATS 5310 and permission of instructor.

5312. MECHANICAL METALLURGY (3-0). Relationships of microstructure to the plastic deformation of single crystal and polycrystalline materials with emphasis on mechanical properties, embrittlement and fracture. Prerequisite: ME 3345 or permission of instructor.

5313. ADVANCED PHYSICAL METALLURGY (3-0). Theory of phase stability in crystalline solids with special topics including Long Period Superlattice formation and superplasticity. Prerequisites: MATS 5301 and MATS 5342 or permission of instructor.

5314. FRACTURE MECHANICS (3-0). Theory and applications of linear elastic fracture mechanics. Topics include stress analysis of cracks, crack-tip plasticity, fatigue and stress corrosion. Applicability to materials selection, failure analysis and structural reliability reviewed. Prerequisite: permission of instructor.

5320. METALLURGICAL THERMODYNAMICS (3-0). Applications of thermodynamics to the study of metals, thermodynamic properties of liquid and solid solutions and their relationship to surfaces and crystalline defects. Prerequisite: permission of instructor.

5321. THEORY OF PHASE TRANSFORMATIONS (3-0). Theory of homogeneous and hetero-

geneous transformations, nucleation and growth, martensitic transformations, heat treatment and control of microstructure. Prerequisite: MATS 5320 and permission of instructor.

5322. KINETICS OF PHASE CHANGES (3-0). Kinetics of nucleation and growth of phases in metallurgical and ceramic systems including the effects of surfaces, stacking faults, dislocations and strain energy. Prerequisite: MATS 5320 and permission of instructor.

5123. PHASE DIAGRAMS (1-0). Construction and interpretation of multicomponent equilibrium diagrams, prediction of solidified structures and application to current processes. Prerequisite: permission of instructor.

5224. THEORY OF ALLOYS (2-0). Structural approach as applied to metallic alloys. Equilibrium, free energy, electron compounds, intermediate phases and order-disorder. Prerequisite: permission of instructor.

5227. HIGH TEMPERATURE PROPERTIES OF MATERIALS (2-0). Oxidation, oxidation resistance and other high temperature properties of materials and their relationships with structure. Prerequisite: permission of instructor.

5229. ADVANCED X-RAY STUDIES (2-0). Kinematical and dynamical theories of x-ray and electron scattering. Application of x-rays to crystal structure determination and other research problems emphasized. Prerequisite: MATS 5342 and permission of instructor.

5315. SOLIDIFICATION (3-0). Application of phase diagrams to solidification. Principles and practices of casting and solidification. Nucleation, heat flow, chemical homogenization and structure of cast metals. Prerequisite: ME 3345.

5330. CORROSION (3-0). Quantitative application of electrochemical principles to corrosion reactions. Effects of metallurgical factors and environmental conditions on oxidation, erosion, and cracking discussed along with materials selection. Prerequisite: permission of instructor.

5342. X-RAY METALLURGY (2-3). Theory and techniques of x-rays as applied to the study of crystalline solids. Production of x-rays, their scattering, absorption and diffraction. Special topics, such as stress analysis, crystal perfection, precision lattice constant determination, and phase diagrams. Prerequisite: permission of instructor.

5345. CONTINUUM MECHANICS (3-0). Study of the underlying physical and mathematical principles relating to the behavior of continuous media; relationship between fluid and solid mechanics. Also offered as ME 5312 and EM 5332. Prerequisite: permission of instructor.

5347. POLYMER MATERIALS SCIENCE (3-0). Intermolecular forces of attraction in high polymers, polymer synthesis, morphology and order in crystalline polymers, mechanics of amorphous polymers, time-dependent mechanical behavior, transitional phenomena, mechanical behavior of semicrystalline polymers. Prerequisite: permission of instructor.

5348. FUNDAMENTALS OF COMPOSITES (3-0). Fundamental relationships between the mechanical behavior and the composition of multiphase media; failure criteria discussed. Also offered as ME 5348 and EM 5333. Prerequisite: permission of instructor.

5349. APPLIED COMPOSITES (3-0). Applications of composite materials in the design of load carrying parts and structures. Also offered as ME 5349. Prerequisite: MATS 5348 or permission of instructor.

5181. ELECTRON MICROSCOPY (0-3). Laboratory techniques for using the electron microscope demonstrated. Specimen preparation for replica and transmission studies performed. Prerequisite: permission of instructor.

5190, 5290, 5390. SPECIAL TOPICS IN MATERIALS SCIENCE. May be repeated for credit when topic changes. Prerequisite: Consent of instructor.

5191, 5291, 5391. ADVANCED STUDIES IN MATERIALS SCIENCE. Topics selected from various areas of materials science. Work performed as a thesis substitute normally will be accomplished under the course number 5391, with prior approval of the Committee on Graduate Studies.

5398, 5698, 5998. THESIS. Prerequisite: approval of Graduate Advisor.

6197-6397. ADVANCED STUDIES IN MATERIALS SCIENCE. May be repeated for credit. Prerequisite: approval of Graduate Advisor.

6399, 6699, 6999. DISSERTATION.

MATHEMATICAL SCIENCES PROGRAM (MSCI)

Areas of Study		*Degree*
Mathematical Sciences		Ph.D.

Graduate Advisors:

Biology		
D. H. Whitmore	237 Life Science	273-2871
Chemistry		
Z. A. Schelly	238 Science Hall	273-3803
Computer Science		
R. G. Ward	706 Carlisle Hall	273-3785
Geology		
Brooks B. Ellwood	235 Geosciences Bldg.	273-2339
Mathematics		
G. S. Ladde	423 Nursing Bldg.	273-3261
Physics		
J. L. Fry	104B Science Hall	273-2266
Psychology		
J. Bowen	511 Life Science	273-2281
Systems Analysis		
Lawrence L. Schkade	132 Business	273-3502

Graduate Faculty: The appropriate Graduate Faculty of the various branches of mathematical sciences including Biology, Chemistry, Computer Science, Geology, Mathematics, Physics, Psychology, and Systems Analysis, with the support of the appropriate Graduate Faculty of The University of Texas at Dallas.

OBJECTIVES

A program leading to the Doctor of Philosophy degree in the mathematical sciences is offered jointly with The University of Texas at Dallas. This joint program utilizes the faculty and courses from both institutions and the accent will be on "applicable" mathematics. The program will aim at both real and demonstrated competency on the part of the student over material ranging from various branches of mathematical sciences. The nature of the dissertation will range from research in abstract mathematics to the discovery and testing of mathematical models for analyzing given problems in sciences and in locating and developing mathematical and computational techniques for deducing the properties of these models so as to solve these problems both effectively and efficiently. Such dissertations will be concerned with research problems from such areas as abstract mathematics, applied mathematics, probability, statistics, computer science, biology, biometry, chemistry, engineering, geology, information systems, physics, management sciences, and operational sciences.

DEGREE REQUIREMENTS

Upon entering Graduate School, the student has the responsibility to consult with the Graduate Advisor in the appropriate department on a continuing basis.

The student must satisfactorily complete all deficiency courses.

In addition to the Graduate School requirements for the Doctor of Philosophy degree, students must satisfactorily demonstrate competence in 30 graduate hours of core areas as specified by the Graduate Studies Committee for Mathematical Sciences (GSCMS). Furthermore, the student must complete additional graduate course work beyond these core areas as approved by the Graduate Studies Committee for Mathematical Sciences.

Of the 30 hours of core courses, each student is expected to complete a minimum of 15 graduate hours in the Mathematics Department. However, the 30 hours of core courses will vary depending on the student's area of interest and background and will be determined on an individual basis by the student's supervisory committee subject to approval by the Committee on Graduate Studies for Mathematical Sciences. The foreign language requirement is satisfied by the computer science requirements.

Normally each candidate is required to be in residence as a full-time student for one year or three consecutive semesters including summer term. Exceptions to this requirement may be approved if the student has demonstrated continuous degree progress while working as a part-time student.

In addition to meeting the specific requirements listed above, each student's program of work must be approved by the Dean of the Graduate School.

Ordinarily, after 40 semester hours of graduate work and with the approval of the Committee on Graduate Studies for Mathematical Sciences, a comprehensive examination (usually oral) will be administered. To pass, the student must exhibit outstanding intellectual capacity and sufficient knowledge to continue doctoral studies and a program of research. A student who has failed the comprehensive examination may be allowed a single re-examination by the Committee on Graduate Studies for Mathematical Sciences on the recommendation of the examining committee. The student must be enrolled in the Graduate School at the time of the comprehensive examination.

If more than five years have elapsed since the date of the comprehensive examination taken by the candidate, the student may be required to take another comprehensive examination before admission to the final examination.

The PhD program in the mathematical sciences, although demanding a strong mathematical orientation, does not fall within the traditional boundaries of a single department, and furthermore, the scope of this program is quite broad. Consequently, every course in a student's program of work will be evaluated as to not only course content but also the way in which each course complements other courses in the program of work as well as the ways in which each course broadens and furnishes depth to the program. Courses from a variety of departments (e.g., biology, business administration, chemistry, computer science, engineering sciences, geology, management sciences, statistics) will be counted toward the PhD degree if taken with the prior approval of the appropriate Graduate Advisor. One should refer to the list of departmental courses elsewhere in this catalog for specific descriptions.

6399, 6699, 6999. DISSERTATION. Prerequisite: admission to candidacy for the Doctor of Philosophy degree in mathematical sciences.

RADIOLOGICAL PHYSICS Program (RADP)

Area of Study
Radiological Physics

Degree
M.S.

Master's Degree Plan: Thesis only

Graduate Advisor: B. C. Thompson 108 Science Hall 273-2469

Graduate Faculty: The graduate faculty of the Department of Physics and the graduate faculty of the Department of Radiology of The University of Texas Health Science Center at Dallas.

OBJECTIVE

The master's program in Radiological Physics is a joint program of the Department of Physics of The University of Texas at Arlington and the Department of Radiology of The University of Texas Health Science Center at Dallas. The program is designed to prepare students for careers as radiological physicists in medical centers and for independent research in physics related to the life sciences and clinical procedures.

Radiological Physics is the study of radiation, both ionizing and nonionizing, and the medical application of the interaction of radiation with matter. The subject matter may be divided on the basis of the type of radiation and medical application into the physics of (1) radiation therapy, (2) diagnostic radiology, (3) nuclear medicine, and (4) radiation safety.

Physical principles and their application in medicine are emphasized. Research activities are conducted to improve current medical applications and to use new physical concepts and instrumentation in expanding the role of physics in medical procedures.

ADMISSION

Applicants must meet the entrance requirements of the Graduate Schools at both UTA and UTHSCD. Applicants will be expected to have or to establish a background in electronic circuits, statistical analysis, biology, and computer techniques. The background undergraduate courses are available at UTA.

DEGREE REQUIREMENTS

Consult the Advanced Degrees and Requirements section of this catalog for general master's degree requirements. The course requirements for radiological physics students varies depending upon the student's previous college level preparation or experience. Individual programs will be designed in consultation with the Graduate Advisor.

In addition to the courses listed under the Department of Physics in this catalog the following courses offered at UTHSCD are applicable to this program:

5181. RADIOLOGICAL PHYSICS
5382. APPLIED RADIOLOGICAL PHYSICS
5094. RESEARCH IN RADIOLOGICAL PHYSICS
5286. ADVANCED RADIOLOGICAL PHYSICS
5193. SEMINAR
5383. DIAGNOSTIC RADIOLOGICAL PHYSICS
5384. PHYSICS OF RADIOTHERAPY
5385. NUCLEAR PHYSICS AND PHYSICS OF NUCLEAR MEDICINE
5096. TOPICS IN RADIOLOGICAL PHYSICS
5391. READINGS IN RADIOLOGICAL PHYSICS
5098. THESIS

ADMINISTRATION and FACULTY

ADMINISTRATION

THE UNIVERSITY OF TEXAS SYSTEM

E. D. Walker, M.B.A., *C.P.A., LL.D., Chancellor*
James P. Duncan, Ed.D., *Executive Vice Chancellor for Academic Affairs*
Charles B. Mullins, M.D., *Executive Vice Chancellor for Health Affairs*

THE UNIVERSITY OF TEXAS AT ARLINGTON

GENERAL ADMINISTRATION

W. H. Nedderman, Ph.D., *President*
W. A. Baker, Ph.D., *Vice President for Academic Affairs*
J. Dudley Wetsel, M.B.A., *Vice President for Business Affairs*
B. Wayne Duke, Ed.D., *Vice President for Student Affairs*
Elwood J. Preiss, M.A., *Executive Assistant to the President*
R. Zack Prince, M.A., *Registrar and Director of Admissions*
John A. Hudson, M.A., M.S. in L.S., *Director of Libraries*

DEANS OF THE COLLEGES AND INSTITUTE

Walter E. Mullendore, Ph.D., *Dean of the College of Business Administration*
John W. Rouse, Jr., Ph.D., *Dean of the College of Engineering*
Thomas E. Porter, Ph.D., *Dean of the College of Liberal Arts*
Howard J. Arnott, Ph.D., *Dean of the College of Science*
Paul H. Glasser, Ph.D., *Dean of the Graduate School of Social Work*
George S. Wright, M. Arch., *Dean of the School of Architecture and Environmental Design*
Myrna Pickard, D.Ed., *Dean of the School of Nursing*
Richard L. Cole, Ph.D., *Dean of the Institute of Urban Studies*
Charles W. Funkhouser, Ed.D., *Director of the Center for Professional Teacher Education*

THE GRADUATE SCHOOL

Bob F. Perkins, Ph.D., *Dean*
Robert M. Johnson, Ph.D., *Associate Dean*
Vi Babes Hudlow, M.A., *Assistant Dean*

GRADUATE FACULTY

(Year in parentheses indicates year of initial employment.)

ACKER, BERTIE N., *Associate Professor of Foreign Languages (1965). B.A., Texas Woman's University, 1943; M.A., Southern Methodist University, 1957; Ph.D., University of Texas at Austin, 1971.*

ADAMS, DUANE A., *Professor of Foreign Languages (1960). B.A., University of Nebraska, 1947; M.A., 1949; Ph.D., Louisiana State University, 1963.*

ALLISON, E. JOE, *Adjunct Assistant Professor of Linguistics (1982). B.A., Oklahoma Baptist University, 1957; M.A., The University of Texas at Arlington, 1974.*

ALLISON, ROBERT D., *Adjunct Associate Professor in Biomedical Engineering Program (1976). B.A., Hardwick College, 1954; M.S., Wayne State University College of Medicine, 1960; Ph.D., 1962.*

AMSTER, HARRIETT, *Professor of Psychology (1973). A.B., Bryn Mawr College, 1950; M.A., Clark University, 1954; Ph.D., 1957.*

ANDERS, EVAN MARCUS, *Assistant Professor of History (1979). B.A., University of Texas at Austin, 1968; M.A., 1970; Ph.D., 1978.*

ANDERSON, FRANK W., *Associate Professor of City and Regional Planning and Assistant Director of Research and Service Programs Division (1973). B.A., Western Reserve University, 1949; M.A., University of Washington, 1953; Ph.D., 1958.*

ANDERSON, R. BRUCE W., *Associate Professor of Sociology (1973). A.B., Stanford University, 1961; M.A., Northwestern University, 1965; Ph.D., Duke University, 1970.*

ANGUIZOLA, GUSTAVE, *Assistant Professor of History (1966). B.A., Evansville University, 1947; M.A., Indiana University, 1948; M.S., Michigan State University, 1953; Ph.D., Indiana University, 1954.*

ANJOMANI, ARDESHIR, *Assistant Professor of Architecture and City and Regional Planning (1979). M. Arch., University of Tehran, 1968; M.Pl., University of Southern California, 1976; Ph.D., 1979.*

APILADO, VINCENT PAUL, *Professor and Chairman of the Department of Finance and Real Estate (1980). B.S., University of Portland, 1959; M.B.A., University of Oregon, 1966; Ph.D., University of Michigan, 1970.*

ARGENTO, VITTORIO K., *Senior Lecturer of Civil Engineering (1978). B.S., San Diego State College, 1964; M.S., University of Texas at Dallas, 1976.*

ARMSTRONG, J. CLYDE, *Associate Professor of Civil Engineering (1972). B.S., Texas A&M University, 1955; B.S., 1961; M.S., 1962; Ph.D., 1967. Professional Engineer.*

ARNOTT, HOWARD J., *Professor of Biology and Dean of the College of Science (1974). A.B., University of Southern California, 1952; M.S., 1953; Ph.D., University of California at Berkeley, 1958.*

BACON, JOHN D., *Assistant Professor of Biology (1975). B.S., Sul Ross State University, 1966; M.S., Texas A&M University, 1970; Ph.D., University of Texas at Austin, 1975.*

BAKER, R. C., *Associate Professor of Systems Analysis (1972). B.A. University of Texas at Austin, 1964; Ph.D., Texas A&M University, 1971.*

BAKER, W. A., *Professor of Chemistry and Vice President for Academic Affairs (1971). B.S., Texas A&I University, 1955; Ph.D., University of Texas at Austin, 1959.*

BARKER, CALVIN L. R., *Professor of Mechanical Engineering (1960). B.S., University of Texas at Austin, 1953; M.S., California Institute of Technology, 1954; Ph.D., 1958. Professional Engineer.*

BARNES, SUE M., *Assistant Professor of Nursing (1976). B.S., University of Missouri, 1960; M.Ed., Louisiana State University in New Orleans, 1972.*

BARRETT, MARJIE C., *Assistant Professor of Social Work (1978). B.A., Texas Christian University, 1959; M.S.S.W., University of Texas at Austin, 1962; Ph.D., Texas Woman's University, 1978.*

GRADUATE FACULTY

BASCOM, BURTON W., *Adjunct Assistant Professor of Linguistics (1977). Th.B., Bible Institute of Los Angeles, 1943; B.A., Pasadena College, 1953; Ph.D., University of Washington, 1962.*

BASTIEN, JOSEPH W., *Associate Professor of Sociology (1977). B.A., Maryknoll College, 1958; M.E., State University of New York, 1963; M.D., 1963; M.A., Cornell University, 1971; Ph.D., 1973.*

BEAUDRY, HARRY R., *Associate Professor of English (1966). A.B., Rice University, 1952; M.A., Boston University, 1956; Ph.D., Duke University, 1968.*

BELLION, EDWARD, *Associate Professor of Chemistry (1970). B.Sc., University of Leeds, 1965; Ph.D., 1968.*

BENDOR-SAMUEL, DAVID H., *Adjunct Assistant Professor of Linguistics (1977). B.D., University of London, 1958; Ph.D., 1966.*

BERGEN, ROBERT DALE, *Adjunct Assistant Professor of Linguistics (1982). B.A., Hardin-Simmons University, 1976; M.Div., Southwestern Baptist Theological Seminar, 1980.*

BERNFELD, STEPHEN R., *Professor of Mathematics (1975). B.S., Rensselaer Polytechnic Institute, 1965; Ph.D., University of Maryland, 1969.*

BERNSTEIN, BARTON E., *Adjunct Associate Professor of Social Work (1974). B.A., Drake University, 1951; J.D., Boston University, 1953; M.L.A., Southern Methodist University, 1971.*

BERNSTEIN, IRA H., *Professor of Psychology (1964). B.A., University of Michigan, 1959; M.A., Vanderbilt University, 1961; Ph.D., 1963.*

BIRMINGHAM, JUDITH ANN, *Specialist and Assistant to Dean in the Graduate School of Social Work (1979). B.S., Lamar State University, 1965; M.S.W., The University of Texas at Arlington, 1974.*

BLACK, TRUMAN D., *Professor of Physics (1965). B.S., University of Houston, 1959; M.A., Rice University, 1962; Ph.D., 1964.*

BLACKWELL, CHARLES C., JR., *Professor of Mechanical Engineering (1966). B.A., Rice University, 1955; B.S., 1956; M.S., Southern Methodist University, 1960; Ph.D., University of Arizona, 1966. Professional Engineer.*

BLANCHARD, ANDREW J., *Associate Professor of Electrical Engineering (1983). B.S., University of Southwestern Louisiana, 1972; M.S., Colorado State University, 1973; Ph.D., Texas A&M University, 1977.*

BOCK, E.C., *Associate Professor of History (1966). A.B., St. Gregory's College, 1945; M.A., Oklahoma University, 1964; Ph.D., 1966.*

BOLEN, JAMES C., *Associate Professor of Mathematics (1960). B.A., Texas A&M University, 1954; M.S., 1956; Ph.D., Texas Christian University, 1968.*

BOLEY, ROBERT B., *Associate Professor of Biology (1965). B.S., Sam Houston State University, 1949; M.S., Texas A&M University, 1960; Ph.D., Ohio State University, 1963.*

BOMBA, PAUL C., *Assistant Professor of Psychology (1982). A.B., Franklin and Marshall College, 1978; M.S., Brown University, 1981; Ph.D., 1982.*

BORLAND, BARRY L., *Adjunct Assistant Professor of Social Work (1976). B.A., Morningside College, 1962; M.S.S.W., Missouri University, 1964; M.S., 1966.*

BOSWELL, BILL W., *Associate Professor of Architecture (1975). B.Arch., University of Texas at Austin, 1969; M.Arch. & Urb. Des., University of Colorado, 1972. Registered Architect.*

BOWEN, JAMES N., *Professor of Psychology (1963). B.A., Hardin-Simmons University, 1960; Ph.D., University of Texas at Austin, 1963.*

BRAGG, LOUIS H., *Associate Professor of Biology (1960). B.S., North Texas State University, 1953; M.S., 1957; Ph.D., University of Texas at Austin, 1964.*

BRENER, NATHAN E., *Assistant Professor of Physics (1975). B.A., Brandeis University, 1965; Ph.D., Louisiana State University, 1971.*

BROBST, ROBERT W., *Associate Professor of Systems Analysis (1975). B.A., Kutztown State College, 1967; M.S., University of North Dakota, 1972; D.B.A., Louisiana Tech University, 1975.*

BROOKS, DOUGLAS M., *Associate Professor of Education (1975). B.A., Blackburn College, 1969; M.S., Roosevelt University, 1971; Ph.D., Northwestern University, 1974.*

BROOKS, R. GENE, *Associate Professor of Architecture and Planning and Associate Dean of the School of Architecture and Environmental Design (1975). B.S., University of Houston, 1959; M.S., University of Texas at Austin, 1969. Registered Architect, Registered Planner.*

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TURNER, WILLIAM E., *Professor of Art (1959). B.A., Southern Methodist University, 1952; M.A., Louisiana State University, 1954.*

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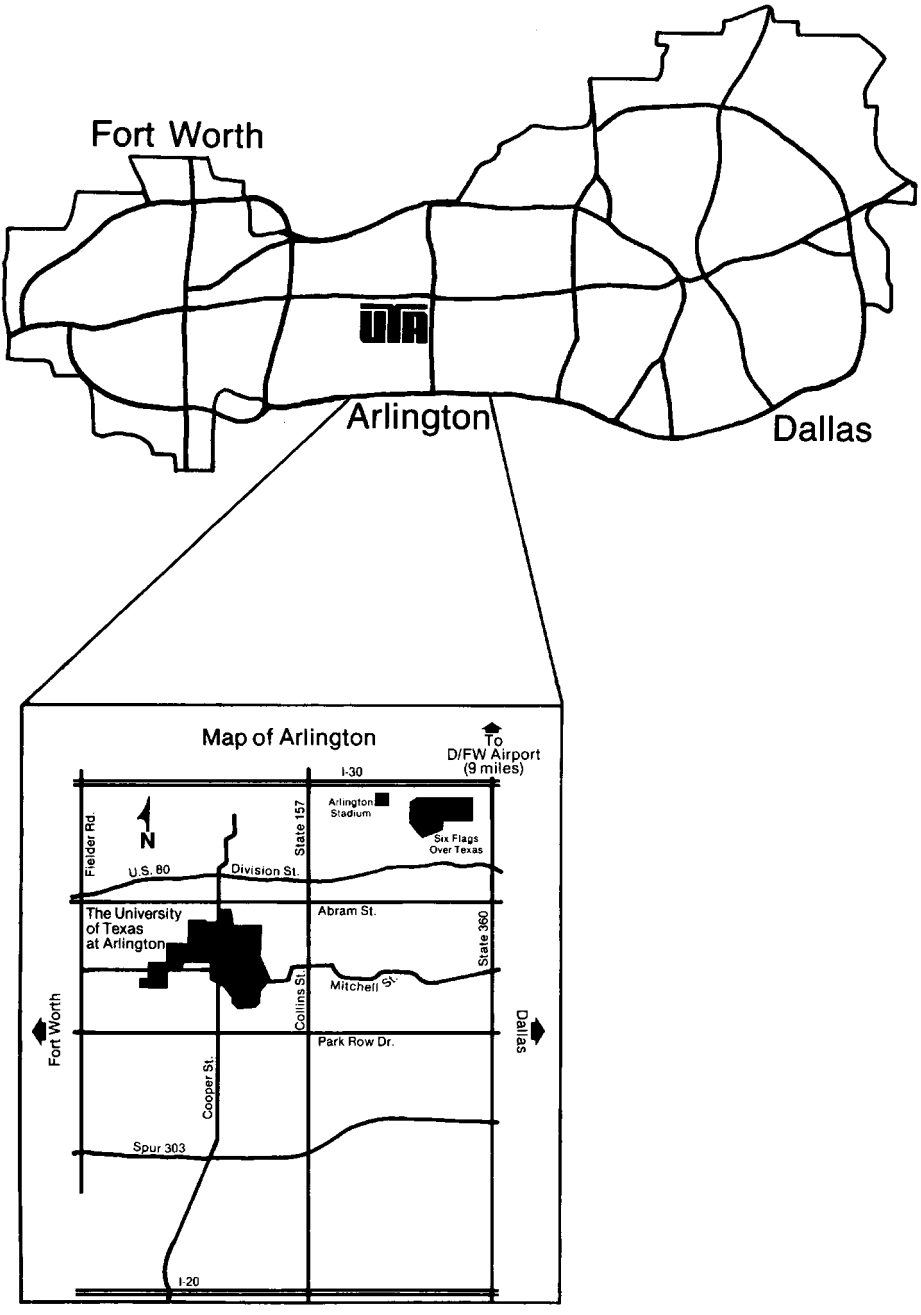
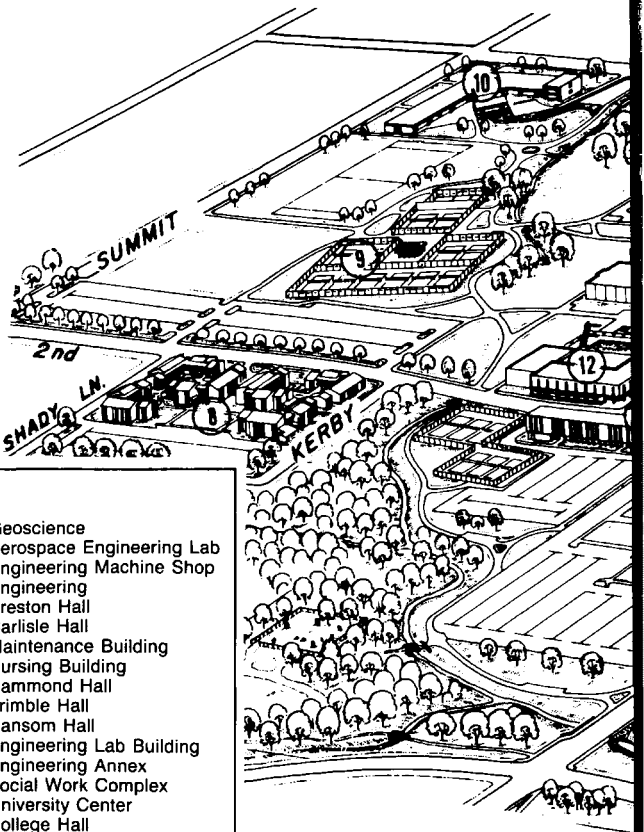
METROPLEX


Fort Worth
UTA
Arlington
Dallas
Map of Arlington
To
D/FW Airport
(9 miles)
I-30
Arlington
Stadium
Six Flags
Over Texas
Fielder Rd.
N
State 157
U.S. 80
Division St.
The University
of Texas
at Arlington
Abram St.
State 360
Mitchell St.
Collins St.
Fort Worth
Dallas
Park Row Dr.
Cooper St.
Spur 303
I-20

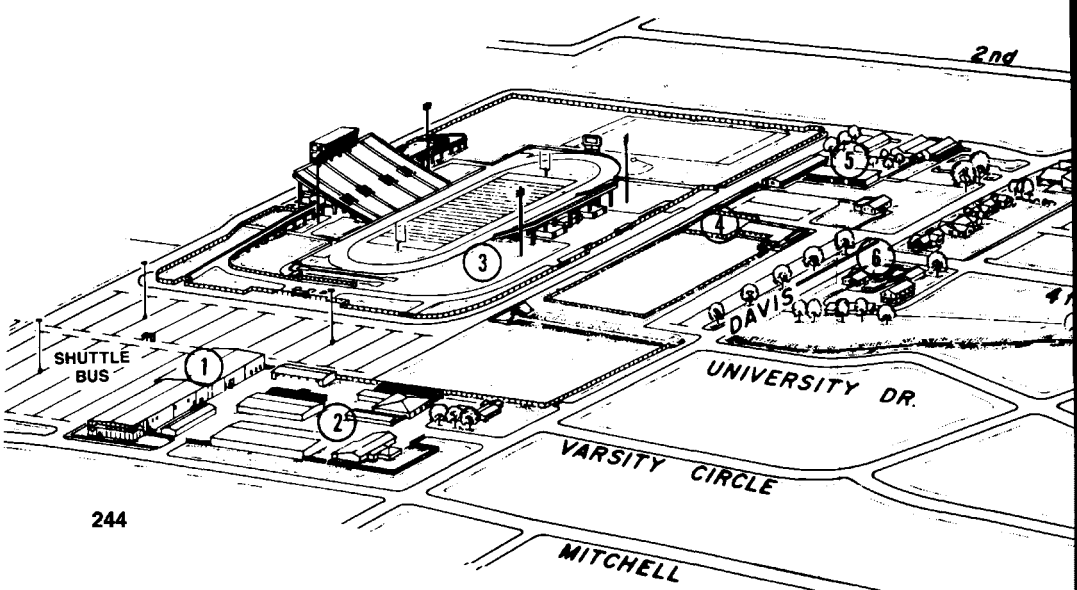
The UNIVERSITY of TEXAS at ARLINGTON

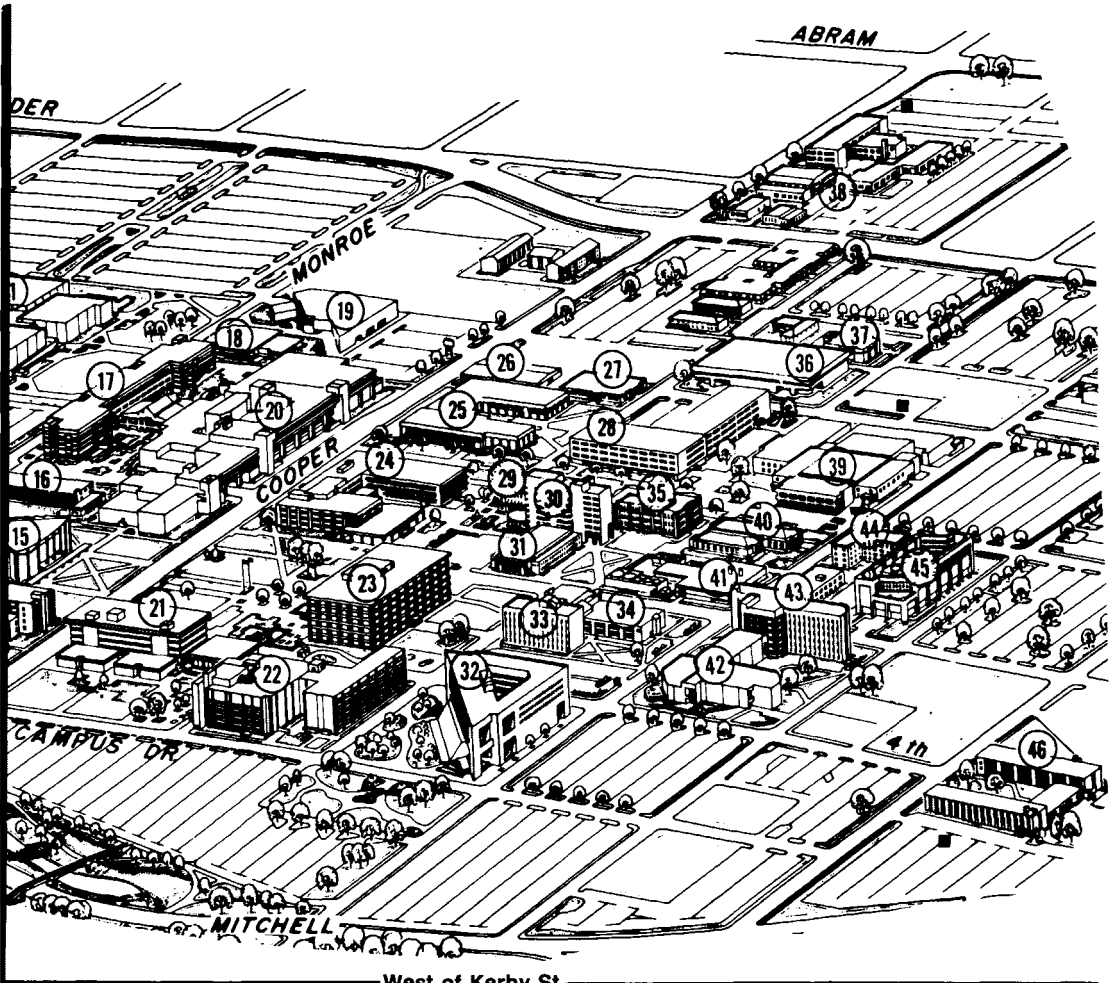


Legend

1. Central Service Building
2. Maintenance Shop
3. Maverick Stadium
4. Maverick Building
5. Maverick Village
6. Housing Office
7. International Office
8. University Village
9. Tennis Complex
10. Swift Center
11. Activities Building
12. PE Building
13. Trinity House (Men)
14. Davis Hall
15. Texas Hall
16. Pachl Hall (Men)
17. Architecture Building*
18. Campus Center
19. Bookstore
20. Fine Arts Building
21. University Hall
22. Life Science
23. Library
24. Science
25. Geoscience
26. Aerospace Engineering Lab
27. Engineering Machine Shop
28. Engineering
29. Preston Hall
30. Carlisle Hall
31. Maintenance Building
32. Nursing Building
33. Hammond Hall
34. Trimble Hall
35. Ransom Hall
36. Engineering Lab Building
37. Engineering Annex
38. Social Work Complex
39. University Center
40. College Hall
41. Central Utility Plant
42. Business Building
43. Health Center
44. Brazos Hall (Co-ed)
45. Thermal Energy Plant*
46. Lipscomb Hall (Women)

*Under Construction





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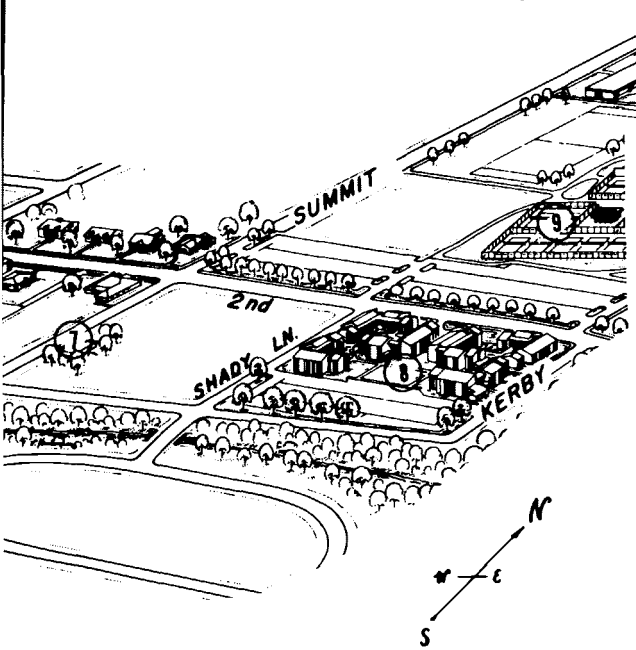

WHERE TO FIND

Activities Building	11	Housing	6
Admissions	14	International Office	7
Aerospace Engineering Lab	26	Library	23
*Architecture Building	17	Life Science	22
Athletic Office	4	Lipscomb Hall (Women)	46
Bookstore	19	News Service	14
Brazos Hall (Co-ed)	44	Nursing Building	32
Bursar	14	Pachl Hall (Men)	16
Business Building	42	PE Building	12
Business Office	14	Personnel Office	14
Campus Center	18	Placement	14
Carlisle Hall	30	Preston Hall	29
Central Utility Plant	41	Ransom Hall	35
College Hall	40	Registrar's Office	14
Continuing Education	18	Science Hall	24
Data Processing	14	Social Work Complex	38
Davis Hall	14	Student Administration	14
Engineering	28	Testing & Counseling	14
Engineering Annex	37	Texas Hall	15
Engineering Lab Building	36	Trimble Hall	34
Engineering Machine Shop	27	Trinity House (Men)	13
Financial Aid	14	University Center	39
Geoscience	25	University Hall	21
Graduate Dean	14	University Police	14
Hammond Hall	33	University Village	8
Health Center	43	Visitor's Parking	■

*Under Construction

INDEX

Academic Common Market 48
Academic Computing Services 9
Academic Dishonesty 35
Academic Programs and Courses 57
Accounting 59
Administration 220
Administration (program) 185
Admission
  Deferred 42
  Graduate Management Admission Test 39
  Graduate Record Examination 39
  Graduate Student Advisement 42
  International Students 38
  Procedures 19
  Readmission 39
  Registration Schedule 42
  Restriction on Admission 42
    Faculty 43
    General 42
  Televised Instruction 9
  Test of English as a Foreign Language 40
  Types of Admission 41
    Probationary 41
    Provisional 41
    Special Students 41
    Unconditional 41
  United States Students 38
Advance Registration 42
Advisors, Graduate 28
Aerospace Engineering 64
Allegorica 16
American Literary Realism 16
Architecture 68
Art 73
Art Collections 10
Assistantships: teaching; research 56
Attorney, Students' 53
Auditing 31
Biology 73
Biomedical Engineering 191
Board of Regents 4
Bursar's Office 54
Business Administration 195
Business and Economic Research Center 10
Calendar ..... (inside front cover)
Campus Map 244
Candidacy
  Doctoral Degree 26
  Master's Degree 22
Career Placement 52
Center for Comparative Urban Studies 10
Center for Criminal Justice Research and Planning 10
Center for Environmental Design Research 10
Center for Positron Studies 11
Center for Social Research 11
Certificates Offered 24
Change of Graduate Program or Major 35
Checks, returned 54
Chemistry 77
City and Regional Planning 202
City and Regional Planning Center 11
Civil Engineering 81
Committees on Graduate Studies 28
Computer Science and Engineering 88
Concurrent Enrollment 46
Conduct and Discipline 53
Construction Research Center 11
Counseling Services 52
Course Descriptions. See individual program descriptions
Courses, General
  Information about 28
  Auditing 31
  Changes 31
  Correspondence 33
  Designation System 32
  Drops and Adds 31
  Extension 33
  Grade Requirements 30
  Load 32
  Transfer Credit 32
  Withdrawal 31
Criminal Justice 93
Dan Gould, Sr. Center for Real Estate and Urban Development 11
Degree Requirements. See Master's Degree Requirements; individual program descriptions; Doctoral Degree Requirements
Degrees Offered 19
Departmental Programs 57
Directory of Offices 7
Dissertations 26, 33
Division of Special Collections 8
Doctoral Degrees Offered 19
Doctoral Requirements, General 24
  Candidacy 26
  Courses and Hours 25
  Comprehensive Examination 26
  Diagnostic Evaluation 25

Dissertation 26
Dissertation Defense 27
Doctoral Committees 25
Foreign Language 25
Grade-point average 30
Residence 24
Time Limit 26
Economic Education Center 12
Economics 95
Education 98
Electrical Engineering 99
Electronic Materials and Device Engineering Research Laboratory 12
Energy Systems Research Center 12
Engineering: Interdisciplinary 205
Engineering Mechanics 206
English 104
Examinations
Doctoral 26
Master's 22
See also individual program descriptions
Expenses. See Fees; Tuition
Extension Work 33
Facilities, Research 8
Faculty, Graduate 221
Fees 46
Finance and Real Estate 110
Financial Aid 54
College Work-Study 55
Financial Counseling 56
General Fee Waiver 56
Grants-in-Aid 54
Long-Term Loans 55
Short-term Loans 54
Student Employment Service 54
Foreign Languages 111
Fort Worth Federal Records Center 13
Frank E. Lozo Center for Cretaceous Stratigraphic Studies 13
Geology 119
Grade-Point Average. See Continuation in the Graduate School
Grades 29
Graduate Advisors 28
Graduate Assistantship/Associateship Policy 35
Graduate Faculty 221
Graduate School UTA 6
Graduate School Deadlines 34
Graduation Procedures 33
Grievances 30, 35
Handicapped Student Services 53
Harold Frederick Edition, The 16
Health Insurance 51
Health Services 51
History 122
Housing 51
Human Resource Center 13
Humanities 209
Illustrated Guide to the Preparation of Theses and Dissertations. See Theses; Dissertations
In Absentia Registration 34
Incomplete Grade Policy 29
Industrial Engineering 125
Intercampus Programs 183
Interdepartmental Programs 183
Interdisciplinary Studies 213
Inter-Library Loan Department 9
International Conference on Thermoelectric Energy Conversion 17
International Office 52
International Linguistic Center 13
Inter-University Consortium for Political and Social Research 14
Internship Reports 22
Investment Analysis Center 13
Jenkins Garrett Library 8
Joint Degree Programs 24
Landscape Architecture 129
Late Registration 48
Library 8
Library Courtesy Card 9
Linguistics 111
Living Accommodations, *See* Housing
Management 132
Marketing 134
Master's Degree Plans Available (thesis, thesis substitute, non-thesis) 21
See also individual program descriptions
Master's Degree Requirements, General: 21
Approval of Program of Work 22
Candidacy 22
Degree Plans (thesis, thesis substutute, non-thesis) 21
Final Examination 22
Foreign Language Requirements 23
Grade-point average 30
Hours Required 21
Internship Reports 22
Master of Arts 23
Master of Engineering 24

Master of Science 23
Residence 21
Specialized Professional Degrees 23
Supervising Committees 21
Theses 22
Time Limit 23
Master's Degrees Offered 23
Materials Science 214
Mathematical Sciences 216
Mathematics 136
Mechanical Engineering 141
Metroplex Map 243
Minority Cultures Collection 8
Minority Student Services 52
Museums 10
Music 147
Nonlinear Analysis—Theory, Methods, and Applications and Stochastic Analysis and Applications 16
"N" Designation 29
Nonresident tuition 44
Nursing 147
Official Transcripts, Records, and Test Scores 40
Papers Concerning Robertson's Colony in Texas 16
Petitions 35
Ph.D. Degrees Offered 19
Philosophy 151
Physics 152
Placement Service 52
Political Science 154
Power Systems Short Course 17
Pre/Text 17
Psychology 157
Publications 16
"R" Grade 30
Radiological Physics 218
Readmission 39
Real Estate (See; Finance and Real Estate)
Refunds 49
Regents, Board of 4
Registration 42
General 42
Late 48
Orientation for International Students 28
Regulations, General Graduate School 28
Rehabilitation Engineering Research Center 14
Research Center for Advanced Study 14
Research Centers 9
Research Facilities 9
Reservation of Courses for Graduate Credit 28
Residency Regulations
Doctoral Degree Candidates 24
General Tuition Policy 49
Master's Degree Candidates 21
See also individual program descriptions
Ryan-Reilly Center for Urban Land Utilization 14
Schatzkammer 17
Science Career Facilitation Program 18
Short Courses, Conferences, and Special Programs 17
Social Work 162
Sociology 173
Solar Energy Research Facility 15
Southwestern Graduate Research Conference in Applied Mechanics and Southwestern Graduate Research Conference in Thermal Science 18
Student Educational Records Policy 37
Student Employment Service 54
Student Responsibility 28
Student Services 51
Summer Institute of Linguistics Publications 17
Supervising Committees 21, 25
Systems Analysis 176
Taxation 59
Televised Instruction 9
Testing Services 52
Texas Labor Archives 8
Texas Urban Data Service 15
Thesis and Dissertation Registration Requirements and Credit 33
Theses 22
Time Limits 22, 23
Transfer Credit 32
Tuition and Fees 44
University of Texas at Arlington 5
University Art Gallery 15
Urban and Regional Affairs 178
Urban Studies Research and Service Division 15
Veterans' Assistance 56
Walter Prescott Webb Memorial Lectures 17
Withdrawal 31

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